Ottawa Amateur Radio Club

Groundwave

P.O. Box 8873, Ottawa, Ontario, Canada, K1G 3J2

Check out our Web Page: ***www.oarc.net***

March 2009

Great Canadian Ski Marathon—see Mike's description. Another chance to volunteer is the Lanark Highlands Rally in May.

Speaking at the March meeting is the team of Ying Hum ,VA3HUM, and Bryan Rawlings, VE3QN. The topic is the NUE-PSK modem, its construction, and operation. This modem is used for communicating in digital PSK mode.

City Hall is apparently going to start charging us for the monthly meeting room so the executive is looking at alternatives. For the rest of this year we are still at City Hall although in a different room—the **Colonel By Room**.

See you at the meeting.

Ian Jeffrey, VE3IGJ
Editor

MARCH MEETING 7:30 pm, Wednesday, March 11th
in the Colonel By Room at Ottawa City Hall

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Ottawa Amateur Radio Club
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March 2009

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VE3TEN

Tuning in the beacon so that it makes sense requires you tune to **28.175** on **CW** and read the tone that is there . The spaces between the elements are the higher tone. If that doesn't work, tune to **28.175.28** on **lower sideband** for better results.

Articles may be submitted for use in this publication provided that they portray events or activities that promote Amateur Radio. Letters and comments are also welcome. Submissions may be made by mail addressed to the Editor care of the OARC, or by e-mail to "ve3igj@rac.ca". Deadline for submissions occurs three days after the regular monthly meeting of the OARC.

Please support your local radio organisations. They support you!

Club Information

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.

Regular Meetings of the OARC Inc. are held on the second Wednesday of each month (except July and August) in the Honeywell Room which is on the second floor of Ottawa City Hall, formerly Regional Municipality of Ottawa Carleton Headquarters, on Lisgar Street. Meetings commence at approximately 19:30 hours. Further details about each meeting is elsewhere in this publication.

Executive Meetings of the OARC Inc. are normally held on the first Wednesday of each month at 19:30 hours. Contact the President to confirm the date, time and place of the next meeting.

The CAPITAL CITY FM Net meets every Monday (except some holidays) at 20:00 hours on the club repeater **VE2CRA 146.940(-)** 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 Seib, VA3ES. This feature appears on the Capital City FM Net. To list items and make inquiries, got to http://www.ncswapnet.ca. You may reach Ed at 613-738 8924 or e-mail him at va3es@rac.ca.

The POT-HOLE Net is a SSB/HF net sponsored by the Ottawa Valley Mobile Radio Club and is conducted every Sunday at 10:00 hours on **3.760 MHz**. All amateurs are welcome to check in.

The POT-LID CW Net is an informal slow-speed **CW** net sponsored and conducted by Ed Morgan, VE3GX, and meets every Sunday, except during July and August, at 11:00 hours on **3.620** MHz, to promote interest in CW and CW procedures.

The QCWA CHAPTER 70 Net meets every Monday evening at 19:30 hours on repeater VE3TEL **147.030(-).** You do not have to be a QCWA member to participate.

The Ottawa Valley VHF/UHF SSB Net is sponsored by the West Carleton ARC. Look for it every Tuesday night (except the first Tuesday of the month) around 21:00 on **144.250,** (roll calls after net on 50.150, 432.150, 222.150, and 1296.100.) Horizontal polarization is preferred.

Voice (VHF) 146.94/146.34 100Hz CTCSS required
(UHF) 443.300/448.300

VE3TVA Amateur Fast Scan Television Repeater
Video/audio beacon & input 439.25 MHz (audio sub. 443.75)
Video/Audio output 914 MHz (FM)

IRLP Node 2040 146.94/146.34 (VE2CRA/VE3RC)
(Code 411 for info) (Code 204 for activity)
(Code 88 for time)
For further information please contact the Repeater Chair.

Note: The IRLP link is not connected to ECHOLINK. Please do not try to connect using the alpha keys on your keypad. It just confuses the operator.
Note: The IRLP link is disabled during the Capital City Net each Monday. It is disabled from 2000 to 2145 Mondays except for May to August when the link is disabled from 2000 to 2020.

Ottawa Amateur Radio Club
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March 2009

February Minutes

Meeting Commenced at 19:33

Visitors -- Charles Richer, Doug Yuill, VE3OCU, Margret Tidman

Membership: David, VE3TLY and Al, VE3TZU gave out the very attractive club ID badges. Dave spoke briefly about our temporary relocation to another room in City Hall. He also gave the membership a reminder that if there were to be another unexpected venue change, the only way to let people know quickly is through the membership list. So please do make sure that your contact information is current, and a wonderful way to do that is to be a member in good standing.

SKI Marathon: Harold, VE3UNK, gave a brief round-up of the ski marathon. He thanked the approximately 55 volunteer radio operators who gave their time over the weekend. With over 1800 skiers and so many kilometers to cover, there were no serious problems and it was a good year all around. Janice,VA3PAX, has qualified for her 5 year pin which will be presented to her soon.

Dayton Trip: Dave,VE3TLY, mentioned the many discussions about the trip, and related that the executive had concluded that it would not formally plan a trip but encouraged the individual members to make plans and the club's website and any other facilities were at the disposal of the interested parties. Greg, VE3YTZ pointed out that airfares to Dayton are relatively inexpensive this week, so flying was even more appealing.

Lanark Highlands Car Rally: Mike, VE3FFK told us that the rally would be held on May 9th, 2009 and interested radio operators or rally enthusiasts could find more information at http://www.lhfr.ca/spectators.php

Club Project: Dave, VE3TLY and Dave, VE3KL The club project will commence on Saturday the 14th of February at Algonquin College Room T219. Contact VE3FFK to pick up your parts.

Dates to Remember

2009

Feb. 7, 8	Canada Ski Marathon
Apr. 8	Homebrew Night
Jun. 10	OARC AGM and Elections
Jun. 27, 28	Field Day
Jul. 1	RAC Canada Day Contest
Sep. 12	Hamfest
Sep. 30	Membership Renewal Deadline
Nov. 4	Joe Norton Award Subm. Due
Dec. 19	RAC Winter Contest

Field Day Logs: Dave, VE3TLY asked if people could accumulate the logs on behalf of the Club for field day. There is the intention to register the club's call on the ARRL's Logbook of the World <http://www.arrl.org/lotw/>

Speaker: Dr. Dave Conn, VE3KL, spoke on "Transmission Line Reflections with Applications to Ladder Lines and Coaxial Cables" an interesting and informative talk on the rumours and realities of getting the signal out of the antenna efficiently. The presentation slide deck will be posted on the OARC website for review.

The 50/50 was $23 and was won by a tall fellow, the name of whom I didn't get... maybe Al wrote it down.....

-30-

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and describe the benefits of membership in RAC. This would be a great way to expand your interests in radio. Basically the mandate is to keep RAC on the minds of your friends in local radio clubs. If you are interested or would like to know more about it please send me an email at wunger@confederationc.on.ca

Thanks for considering this.

Bill Unger, VE3XT
North East Ontario Director
Radio Amateurs of Canada

mk's Words

Looks like everything I have done in amateur radio this month has been part of a team effort. Not the typical sit-in-the-basement-and-yak sort of hamming that seems to be the norm these days. Then again if hamming solo was the norm, there wouldn't be any team efforts out there for me to play in, would there?

By now you have probably seen pictures and heard stories about how the Canadian Ski Marathon has gone. These days it seems everybody has a camera. If you are reading this, you were probably there with us. You'd have to ask Harold, but it sure looked like a record number of hams volunteered. Other organizers of public service events must envy the CSM and its interaction with the hams. As someone who tries to recruit hams to the Emergency Management College, I know I'm jealous.

The OARC club project is off to a flying start. There are three groups of hams doing three related projects. They are all learning the ins and outs of microcontrollers at one level or another. As was the case last year they are all learning from each other, as well as the two Daves running the show. Sometimes it is a quick hint about how to solder a tricky part. Sometimes it is a clever way to get the software to move from doing what you tell it, to doing what you want it to do. It all seems to be adding to the local stock of fun in ham land.

One new(ish) thing for me was a quick check into the POT LID slow speed CW net on Sunday (3.620 MHz at 11:00 am local). Although it was almost a year since the last time they were in the log the net controller remembered my name. The net is a curious mix of newcomers, newcomers to CW and veterans with decades of experience. As a kid I joined the net when it started and seem to have been slowly creeping (beeping?) from the kid end to old phart end of the net member spectrum. Everyone seemed to have a familiar call sign and fist. There is the key "slapper", with dits that sound like water drops on a hot frying pan and the bug operator with dah's at 10 wpm and dits at 20. Then there are the ones with keyers that sound */almost/* like a machine, except that machines can g ett hespac ing better. It seems none of us use keyboards to send on there. Although usually I use my trusty old Johnson Speed-X straight key on the net, this time the paddles were handy and the pump handle was down in the kitchen. Some time I'll have to tell you the story of that key.

One last thought. Happy Birthday to the VE3JW station at the museum. It takes a lot of work to get something like that established, and a lot more to keep it going. Congratulations to the crew who puts in the endless hours to make it all work.

73.. mk VE3FFK

Lanark Highlands Rally

I am writing to you to ask for your assistance once more at a one day event, in the daytime, on Saturday May 9, at the Lanark Highlands Forest Rally (LHFR). The rally HQ will be at the community centre in MacDonald's Corners.

Previously, the Lanark Highlands Rally was an 'open road' rally, a Road Rally. Almost anybody in any car could enter that rally. The Motorsport Club of Ottawa has not run that rally for at least 2 years now, but we are returning to the Lanark Highlands once more for a 'closed road' rally, a Stage Rally, also known as a Performance Rally (some of you already know these distinctions).

In a stage rally only licensed rally drivers, driving specialized race/rally cars, race the clock at one minute intervals on a road closed to the public. We have a permit to do this and a big thick rulebook to abide by. The rally is sanctioned by Rallysport Ontario, and the national body of the Canadian Association of Rallysport. The rally is insured via the same body that sanctions the Formula 1 race in Canada (well, when we had a Formula 1 race!).

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Ottawa Amateur Radio Club
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Unified Electrodynamic Force

Fire two charged particles at the same moment, with the same initial velocity, into a perfect vacuum. The two particles, having the same electric charge, repel one another. This repelling electric force, F, makes the particle tracks diverge.

Given the magnitude of the electric force and the masses and internal velocities of the particles, you can, if you know a little college physics, predict the rate of divergence – but you'd be wrong. The actual particle tracks diverge at a slower rate than electric-field considerations alone predict.

If French physicist and mathematician André-Marie Ampére were alive today, he would explain the diminished divergence as the result of magnetic forces. Ampére's laws describe a mechanical force that pulls together parallel wires carrying current in the same direction. Simplified to the case of only two charged particles moving in space, the pull of Ampére's magnetic force partly counteracts the electric repulsion to produce a different trajectory.

Case closed? Hardly. Follow me to the next level.

Place yourself in a chair moving alongside the two particles. From your perspective, as the electron guns recede leftward, the two particles appear stationary. The only movement you perceive is their gradual vertical divergence. From your perspective, the particles have no horizontal motion, so there is no magnetic force. From your perspective in the chair, the particles diverge at a rate that solely their electric-field interactions determine.

Yet, from my perspective standing on the ground beside the electron guns, a magnetic force indeed seems to exist, and it shows the divergence of the two particles. Which of us is right?

The key to this paradox may shock you because it sounds like the theme of a science- fiction novel: My time and your time are different. Your velocity induces a tiny dilation of your scale of time relative to mine. From my perspective, that time dilation slows your predicted rate of divergence just enough so that your rate precisely matches mine.

In this experiment, the choice of reference frame modulates the existence of the magnetic force. You can turn it on or off depending upon where you stand or sit. It is therefore not a "real" force. It is nothing more and nothing less than a direct consequence of Einstein's theory of relativity.

Standing on the ground observing the experiment, I can review the result in three ways:

- Using the reference frame of your chair, computing a purely electric-field interaction, and adjusting the results to account for the relativistic time dilation between us;
- Accepting at face value Ampére's fictional magnetic force as apparent from my perspective; or
- In full realization that only one force, the electric force, is in play, with its magnitude modified according to the relative velocities of the particles and observers involved.

Reference 1 outlines the third method. It makes interesting reading for those ready to embrace the full brilliance of relativity and the true meaning of the unified electrodynamic force. The treatment is highly mathematical.

The characterization of magnetic force as a relativistic effect in no way diminishes the importance of magnetic-field calculations in ordinary circuits. The magnetic-field illusion is an extremely useful means of understanding and designing all sorts of things – from motor-generators to high-speed transmission lines. EDN

Howard Johnson, PhD

Signal Integrity, EDN Magazine

Reference 1. Fukai, Junichiro, A Promenade Along Electrodynamics, Vales Lake Publishing, 2003.

Ottawa Amateur Radio Club
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Directors Report

January 2009

The monthly meeting of the Regional Directors was held on January 27th starting at 2330Z.

I did miss sending out the December Report. At that time of year I am marking end of term reports and we went out west to visit kids and grandkids.

At our last teleconference again most of the time was spent with routine housekeeping matters. One minor concern is things are a little backlogged at RAC headquarters so I hope you can be patient with renewed memberships as the temporary staff has left for a full time job.

I obtained a list of amateurs who chose not to renew their subscription to RAC and out of curiosity I called them. Over the last few weekends I attempted to contact 51 Amateurs from the North East Region. Out of the 51 names 27 were not listed on Canada 411. I tried to contact some of them by phoning people with the same last name in their community and still could not contact them. The data on Canada 411 was the same as Industry Canada's addresses. Some of the hams never got around to it and others were not as involved in amateur radio as before. That's fair ball. What does concern me and other Directors is that over 50% of amateurs are not current in the Industry Canada data base.

As part of the above I sent out email to the Radio Clubs listed on RAC's Web Page for my region and many were bounced. Would you please verify the information for your club and correct it if necessary. I would be pleased to make the changes for your club.

Again I am asking you to go to the IC listing of amateurs and please verify that the data for each amateur in your area is current. If not please notify them and ask them to correct the data. If you're not sure just let me know and I will correct the data.

The link to the data base is http://www.callsign.ca/

Once there chose your language preference and do a "search by city" based on your location. I know I have asked this before but it is really important to maintain accurate data for both us and Industry Canada.

On a personal note I hope you keep an ear open for the Little Thunder QRP Club on February 7, on 40 or 20M in the CW bands. I will be taking part in the Freeze Your Buns Off. It's kind of like Field Day in Long Johns. We operate from a city park and the multiplier is based on the temperature at the operating position. We usually get the maximum multiplier! So give a listen for VE3XT/QRP.

If you have any questions or concerns please email me at ve3xt@rac.ca.

73, Bill, VE3XT

North East Ontario Regional Director

(Continued from page 4)

We require volunteers for the daytime, as noted above. HAM operators on the 2m band are extremely necessary, as we need to monitor and track the cars on the closed road as they pass by each checkpoint (they will not stop at these checkpoints, they will be whizzing by at great speed, you will NOT be parked on the road). If you are not a ham operator, we still need your help. For most positions, you get a front row seat at a 'real' rally. As a volunteer, you will get fed after the rally, and you will receive a token of our appreciation with a gift commemorative of the event. You can mingle with the drivers and their crews. It's usually a lot of fun, and we won't sleep deprive you this time!

We need some volunteers beginning early in the morning on the Saturday, and the bulk of the workers from about 11:00 AM. We also may need a few on Friday evening for a couple of hours. The

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REMRG—ARES

EMRG Article #4: OARC Groundwave – March 2009

I want to start by thanking the folks at the January OARC meeting who took away EMRG projects as bags of parts and brought back completed equipment. These are things that EMRG needed built and they each take a bit of time. There seems to be some interest in people doing these small one of projects, so I will keep bringing some in when they are available. Thanks OARC for the help!

This month I want to talk about equipment for emergency communications. The most common equipment used for emergency communications is VHF FM. The choice of hand held radio or mobile is personal and often based on your available resources. There is no right or wrong answer. It is a hobby, so you should go with what works best for your wallet and the way you will use the radio day to day.

The two important criteria for an emergency communications radio are portability and sustainability. In other words, you need to take the radio to where it is needed, such as inside a shelter (bolting it in your house or your car limits the usefulness significantly) and you need to be able to operate effectively for long periods of time (hand held batteries alone may not be enough).

If you have some extra money and don't want to remove your radio from the house or the car, one option is to pick up a used VHF mobile at the local hamfest. It doesn't need to be beautiful, with all the latest features. The hamfest is a good time to look for a length of coax, an external speaker and an antenna to enhance your emergency communications kit (or maybe next year).

If you own or are buying a hand held radio, get the battery pack that takes AA batteries. You can keep some extra batteries on the shelf for a long time and you probably have something else that uses AA batteries, so you can keep them fresh. Get a DC adapter for your hand held radio, so you can operate using an external power source such as a power supply or gel cell battery. This will allow the radio to use other power sources that can last a long time.

As mentioned in a previous article, people are the most important resource for emergency communications. There are always radios available, so building up your own equipment can be done over time, as you have funds available. The benefit of having your own equipment is that you are ready to go, with equipment know.

Once you have a radio, you can begin to add some accessories to improve the effectiveness of your system. Headphones are a must have item in most operating locations. The EMRG headphone control box is another great thing to add to your kit. This unit allows you to have 2 sets of headphones and a speaker, each with their own volume control. The plans are available on the EMRG web site. http://www.emrg.ca/EMRG-212_Headphone_Control.pdf

Peter Gamble – VE3BQP

(ve3bqp at rac.ca) www.emrg.ca

EMRG – Team Leader, Ottawa ARES – EC

Two Names – One Group – One Purpose

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rally will be over by about 5-6 pm, then the banquet is held.

A link to the event webpage, still under development, is here: http://www.lhfr.ca/workers.php Please sign up, and let any other interested people to sign up as well.

Thank you.

73, Craig Hamm,VA3KRT
Routemaster & Clerk of the Course

Ottawa Amateur Radio Club
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March 2009

RAC Bulletins

At the February 24th, 2009 Radio Amateurs of Canada Board teleconference meeting, President Dave Goodwin, VE3AAQ/VO1AU, announced that he was resigning his position effective immediately. Dave indicated that his decision was motivated by his inability to devote enough time to RAC affairs because of a recent increase in personal and professional responsibilities.

Dave became RAC President on Jan 1st, 2008 at the end of President Earle Smith's tenure. All attending the teleconference thanked Dave for the time he could devote to RAC's affairs both as a Director and then as President.

At the same teleconference meeting, the RAC Board elected Bob Cooke, VE3BDB, to be the RAC President until the end of the current term on Dec 31, 2009.

Bob has a long history of working with RAC. His involvement started in the early 1990s as an Assistant Director and he was elected and served as RAC Ontario South Director from November 2001 to January 2005. He was then elected by the RAC Board as Vice president for Field Services, serving from January 2006 to February 2009 when he resigned to accept the appointment as President.

Daniel A. Lamoureux, VE2KA,
Vice President for International Affairs
Radio Amateurs of Canada

The Radio Amateurs of Canada Board of Directors has appointed Sue Cooke, VE3SUH, as Vice President for Field Services. She will act as VPFS for the remainder of a two-year term which ends December 31, 2009, or until a permanent replacement is identified and appointed, whichever comes first. Former VPFS Bob Cooke, VE3BDB, resigned from that post to accept appointment as the RAC President. Both appointments were made at a Board meeting on February 24, 2009.

Sue brings to the VPFS position a wealth of experience in administration, having spent 30 years with the Ontario Government service. She has been a licensed Radio Amateur for nearly ten years and her operating qualifications include Morse Code. Sue's previous service with RAC embraces three years as an Assistant Director in Ontario South Region, two years as an Official Bulletin Station and a two-year term as RAC's Corporate Secretary. She is a RAC Certified Emergency Co-ordinator, having successfully completed the CEC exam.

Daniel A. Lamoureux, VE2KA
Vice President for External Affairs,
Radio Amateurs of Canada

Assistant Director Position

Assistant Director Required for Ottawa Area

Hello I am Bill Unger, VE3XT and I am the Director for Radio Amateurs of Canada for the North / East Ontario Region. I live in Thunder Bay and I am not able to visit Ottawa with any regularity due to the distance and a day job as well.

I was hoping that one of you in the Ottawa area would consider becoming an Assistant Director for that area. It is one of those jobs that allows you to set your own hours at your convenience. The duties would consist of being available to man a booth at local Hamfests, telling other hams and hopefully prospective ones about Amateur Radio and the benefits of joining RAC as well. You can sell memberships if you wish. We supply all the pamphlets and hand out material. On a monthly basis I send out a brief one page newsletter just to keep you informed as to the happenings at RAC. You are not required to send in any reports, but if there is something you want me to feature in the monthly report I will gladly do so.

If you desire you could visit other clubs in the area

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Distress Beacons at 121.5 and 243 MHz Phased Out

As of February 1, the Cospas-Sarsat (Search and Rescue Satellite Aided Tracking) satellites are no longer monitoring distress beacons at 121.5 and 243 MHz. All mariners, aviators and individuals who use emergency beacons on those frequencies will need to switch to the newer, digital 406 MHz frequency if they want to be detected by the monitoring satellites. The National Oceanic and Atmospheric Administration (NOAA) claims that in 2008, beacons monitored by the Cospas-Sarsat worldwide system were responsible for almost 300 lives saved, including 203 people rescued in 65 in at-sea incidents and 12 people rescued in 7 aviation incidents.

"Over the years, many amateurs have played vital roles by monitoring frequencies that the satellites have stopped tracking," said ARRL Emergency Preparedness and Response Manager Dennis Dura, K2DCD. "While the switchover to 406 MHz just occurred, there is still 'older' equipment out in the world, so amateurs may want to continue monitoring, as they may save a person's life who doesn't have the latest gear, but is in distress and needs to be found."

According to NOAA's National Environmental Satellite, Data and Information Service (NESDIS), NOAA, the US Coast Guard, the US Air Force and NASA monitored these emergency beacons. According to NESDIS, problems in the frequency band that inundated search and rescue authorities with poor accuracy, as well as numerous false alerts that adversely impacted the effectiveness of lifesaving services, were some of the deciding factors to stop the monitoring of 121.5 and 243 MHz. The agency also acknowledged that two United Nations agencies -- the International Maritime Organization (IMO) and the International Civil Aviation Organization (ICAO) -- recommended the switchover to the 406 MHz digital frequency, even though the beacons for this frequency will cost more.

Cospas-Sarsat provides a satellite based worldwide monitoring system that detects and locates distress signals transmitted by 406 MHz Emergency Locator Transmitters (ELTs, used in aviation), Emergency Position Indicating Radio Beacons (EPIRBs, used for maritime) and Personal Locator Beacons (PLBs, used by individuals). The system includes space and ground segments that process the signals received from the beacon source and forwards the distress alert data to the appropriate Rescue Coordination Center (RCC) for action.

NOAA said that the 406 MHz emergency beacons have "superior performance capabilities" as compared to the 121.5 and 243 MHz beacons, as they "transmit a stronger signal and are more accurate, verifiable and traceable," and that the 406 MHz distress signals can be "easily detected within a matter of minutes. Each 406 MHz beacon has a unique ID encoded within its signal. As long as the beacon has been registered (required by law), RCCs can quickly confirm that the distress is real, who they are looking for and where they should look. This means that a search can be launched even before a final distress location has been determined. Position accuracy means the search area is less than 2 nautical miles in radius, which decreases the amount of time SAR teams must search."

From the ARRL Web Site

Membership Application/Renewal

Ottawa Amateur Radio Club Inc., Box 8873, Ottawa, Ontario K1G 3J2

☐Single ($25, $20 after Feb 1)
☐Family ($30)
☐Junior ($15, under 18 years of age)
☐New Ham (Free if licensed in current Membership year)
☐Emailed *Groundwave* ☐Mailed *Groundwave* (add $5.00)

Please Note: Membership year is September 1 to August 31

Family Name: _____ First Name/Initials: _____

Address: _____

City: _____ Prov: _____ Post Code: _____

Home Phone: _____ Work Phone: _____

E-mail address: _____ (For *Groundwave* mailing)

Callsign(s): _____
Qualifications: ☐ Basic ☐ Advanced ☐ Morse Code
Year Licensed: _____ RAC Member? Yes ☐

Other Family Members

Name: _____ Callsign(s): _____
Qualifications: ☐ Basic ☐ Advanced ☐ Morse Code
Year Licensed: _____ RAC Member? Yes ☐

Interests: _____

Comments/Suggestions: _____

All members who are in good standing on or before the December General Meeting will be eligible for a free one-time name badge. Members who wish a second or replacement badge may purchase one at the Club Price (approx $7.50 plus tax). Ordered badges will be available in January.

OARC NAME TAG Yes ☐ Second or Replacement Yes ☐

ORDER DETAILS - As to appear on badge:

First Name _____ Call Sign _____