

JAN 85

# THE GROUNDWAVE



Club Call VE3RC

Repeater VE2CRA



**THE GROUNDWAVE**

Official Bulletin of the Ottawa Amateur Radio Club, Inc.

---

<b>Managing Editor</b>	Bill Deacon VE3UD	703-810 Edgeworth Ave. Ottawa, Ont. K2B 5L5	820-7394
<b>Contributing Editor</b>	J. Gord MacKay VE3JMT	P.O. Box 1204 Stittsville, Ont., K0A 3G0	831-1004
<b>Production Committee</b>	Ernie Brown VE3ICP	106 Hilliard Ave. Nepean, Ont., K2E 6C4	225-7798
	Archie McKenzie VE3NJY	2042 Haig Drive Ottawa, Ont., K1G 2K7	731-3698 996-6487
	Kingsley Beattie VE3OFK	1344 Kilborn Ave. Ottawa, Ont., K1H 6L4	523-2170 994-4356

---

**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 3 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 Dec 5th, 1984

The meeting was declared open by the President at 2005 hours. The minutes of the November meeting were adopted without change.

While at the podium, Samson, VE3JSP, took the opportunity to thank those who helped make the flea market a success. Special thanks went to Brett Delmage and Mrs Deacon.

Jerry introduced the guest speaker, Brian, VE3JKZ. During his presentation on the 160 m. band, Brian directed the attention of the audience toward the good supply of reference materials on what he called "The gentlemen's band". Some interesting antenna designs were explained. Brian was very sympathetic to those with not much real estate but with an avid desire to get on the 160 m band.

George, VE2MCK , from Montreal dropped by while visiting the National Capital Region.

VE3GK spoke with some emotion about the visit to the Childrens' Hospital. He thanked those who had already signed up to provide communications between Santa and the confined children; and invited other volunteers to join.

Bill, VE3UD, told us that, as of now, we are no longer in violation of postal regulations. In his effort to continue the streamlining of operations, and to make sure that The Groundwave gets to you, he has consulted with Post Office officials. The G.W. will be delivered at the Book Rate henceforth. With the help of Archie, Ernie and Kingsley, you will get it.

The President congratulated Ray Perrin, who was voted a Director of C.R.R.L. for another term.

Dan Holmes would like to see a lot of people attend the classes for Radio Amateurs at Algonquin College. Classes start January 29. Registration takes place at the Continuing Education Office January 22, 23.

Ralph, VE3BBM, mentioned a number of EMI cases that were being monitored. Glen Cairn has received the visit of the Yamaha service man. Four more cases are awaiting attention in Barrhaven. Dealers are co-operating by supplying more information. He also mentioned that orders will be taken for toroids and ferrite rods.

Alan, VE3LNH, would like some volunteers to operate the station at the Museum of Science and Technology during the Christmas holidays. The hours are 1000 to 1800 hours every day except Monday.

The door prize was won by VE3MVB; and the raffle prize by GOG. Meeting adjourned at 2215 hours.

\*\*\*\*\*

**SPECIAL NOTICE:**

We regret to advise those members whose 1985 dues have not yet been paid that their names will be removed from THE GROUNDWAVE mailing list before the next issue, and until 1985 dues are paid.

From the President's Desk:

The year that was - 1984 - saw much activity for OARC. New ideas have been implemented; other possibly valid ones not, as time has run out for this executive. Many hours were spent in meetings discussing and making decisions on the Club's business; many more at the Club meetings and other undertakings of OARC.

We have a large Club, an interesting Club, a diversified Club. So much expertise is in our midst. Be a part of it. Attend our meetings Providing the new slate of officers with our full support will result in an even greater year in '85.

I thank the Membership for its assistance; the Groundwave for a job well done; the other members of the Executive for their co-operation. I thank you.

May 1985 see happiness and contentment in abundance.

It's been a pleasure.

Joan Powell VE3FVO

#####

Nomination Committee Report

After two months of canvassing the membership for volunteers and nominations for the Executive, the Committee has come up with the following list of nominations:

<b>President</b>	Dan	VE3EBI
<b>V/President</b>	Brett	VE3JLG
<b>Secretary</b>	Henry Samson	VE3OMU VE3JSP
<b>Directors- at-large</b>	Keith Gerry Tom Russ	VE3GFI VE3CDS VE3OFM VE3LOW

As you can see, at this point we will have elections for only two positions. It is unfortunate that a club as large as ours is unable to generate enough member interest to at least have an election for each position. If each member were to stand for a position in rotation, he would only have to serve once every 40 to 50 years. This does not seem to be a great deal to ask, although it does seem difficult to receive. We can only hope that, when nominations are opened to the floor at the January meeting, there will be additional people responding.

I would like to take this opportunity to thank Sydney, VE3GVI, for his help in canvassing for nominations. I would also like to thank those who agreed to run for office for the interest they have shown in the welfare of the club.

Respectfully submitted on behalf of the Nominating Committee.

David, VE3GOG

Next meeting: Weds, Jan 2 at the NRC Auditorium, 100 Sussex Drive.

Several speakers will each give short talks on a potpourri of subjects; and, of course, our annual elections will take place. We know it's an awkward date; but please come out and give the incoming Executive some encouragement to work in their customarily diligent fashion for the continued successful operation of what we think is the finest amateur radio club in the country.

.....

Friends of Jerry, VE3CDS, will be sorry to hear that our good friend is, at press time, resting in the Brockville General Hospital. Jerry is recovering from a heart attack; and our last word before sending this to the printer is that his condition has stabilized; and he is expected to be moved to Ottawa about Dec. 19th. We all hope very much that Jerry will be able to have a comfortable and Happy Christmas.

+++++

Canadian Ski Marathon:

Don't forget that this annual event will be coming up in February. George, VE3BNO, will be looking for volunteers Feb. 9-10.

+++++

Basic and Advanced amateur courses at Algonquin College start Tuesday, Jan 29/85. Registration dates are Jan. 22 and 23.

=====

Letters to the Editor

Editor, The Groundwave:

It is sad to read of KC2ZM in October QST (p. 57). In spite of 24 years as a ham, he now feels "insulted, ignored and censored".

Surely, in his hamming he must have participated in a public service event, or on a club's executive. The dedication of the hams in these activities is impressive.

Nobody claims that radio amateurs are angels; but most try to be polite and helpful.

73, Fred, VE3BAJ

.....

Readers will note that these mailings no longer carry stamps. By arrangement with the Post Office, we are using a "Permit" procedure. Its advantage to us is that it eliminates a time consuming process in the Terminal: stamp cancellation. Together with other changes in routines which are too esoteric to bore you with will, we hope, provide a substantial improvement in "throughput" time at Alta Vista. We have our fingers crossed for this edition due to the heavy mail flow at this time of the year. if you don't get it on time, it will not be for lack of effort on our part.

MAY 1985 BE HAPPY AND PROSPEROUS  
FOR ALL OF US

---

**Electric Power**  
(Your signal won't leave home without it)  
by  
**Henry Greenway, VE3OMU**

To supply your "Hamshack" and other loads, Ontario Hydro, operating under the authority of the Power Corporation Act, RSO 1980, delivered 118 billion kilowatt-hours in 1983. A record primary peak load of 18.8 million kilowatts was set on 21st Dec., 1983. (from 1983 Annual Report- Ontario Hydro).

The partial one-line sketch in the lower area of Fig 1 indicates the power path from generator to your shack outlets; and it is as follows: One of the units in G.S. #2 generates 60 mva of 60 hz power at 13.8 kv. This is stepped up to 230 kv by a 266 mva transformer and delivered to a HV bus at TS #2 (located very close to the GS).

From this 230 kv bus, transmission lines (on steel towers and from 70 to 370 km in length) go to TS's (eg TS #3 & TS #4) located near major load centres. A ring-bus system supplies auto transformers which reduce the voltage to 115 kv to feed a 115 kv ring-bus.

From this bus, 115 kv sub-transmission lines (eg A1C, A1D) supply MV TS's where the voltage is once more stepped down to 13.2 kv (or that of the utility's main voltage). This last change is made by delta primary-double secondary (with under load tap changers for voltage regulation) transformers, with capacities in the order of 45, 60 (fans cooled) & 75 mva with fans plus pumps cooling. The municipal bus system is usually in the same station as the Ontario Hydro 115 kv equipment, or very close to it.

To ensure uninterrupted supply during maintenance or emergency outages, Hydro duplicates its facilities for all major components of the system. For instance, if a transient fault activates the relay protection of line A1D, breakers 3T2B & TB open at HV TS3, breakers 2T1.1 & 2T1.2 open at MV TS #2, as do similar bus breakers at MV TS #3. After a timed interval, 3T2B re-closes to energize line A1D. If the fault has cleared, synchrocheck relays compare voltages and phase angles on either side of the breaker; and, if normal, close the other breakers to restore the system.

For a 2T1 transformer fault, the same tripping sequence occurs; and both low and high side motor-operated disconnect switches open to isolate the bank. The 13.2 kv 2T1 breakers do not re-close; and 2T2 carries all the MV TS #2 load. Line A1D is restored as for a line re-closure.

The local utility's 13.2 kv bus system usually has six feeder positions per bus. The feeder breaker for each position has over-current protection and timed reclosing. These buses are in pairs supplied by parallel Ontario Hydro buses. Feeders from associated pairs only may be switched to the other bus via a transfer bus.

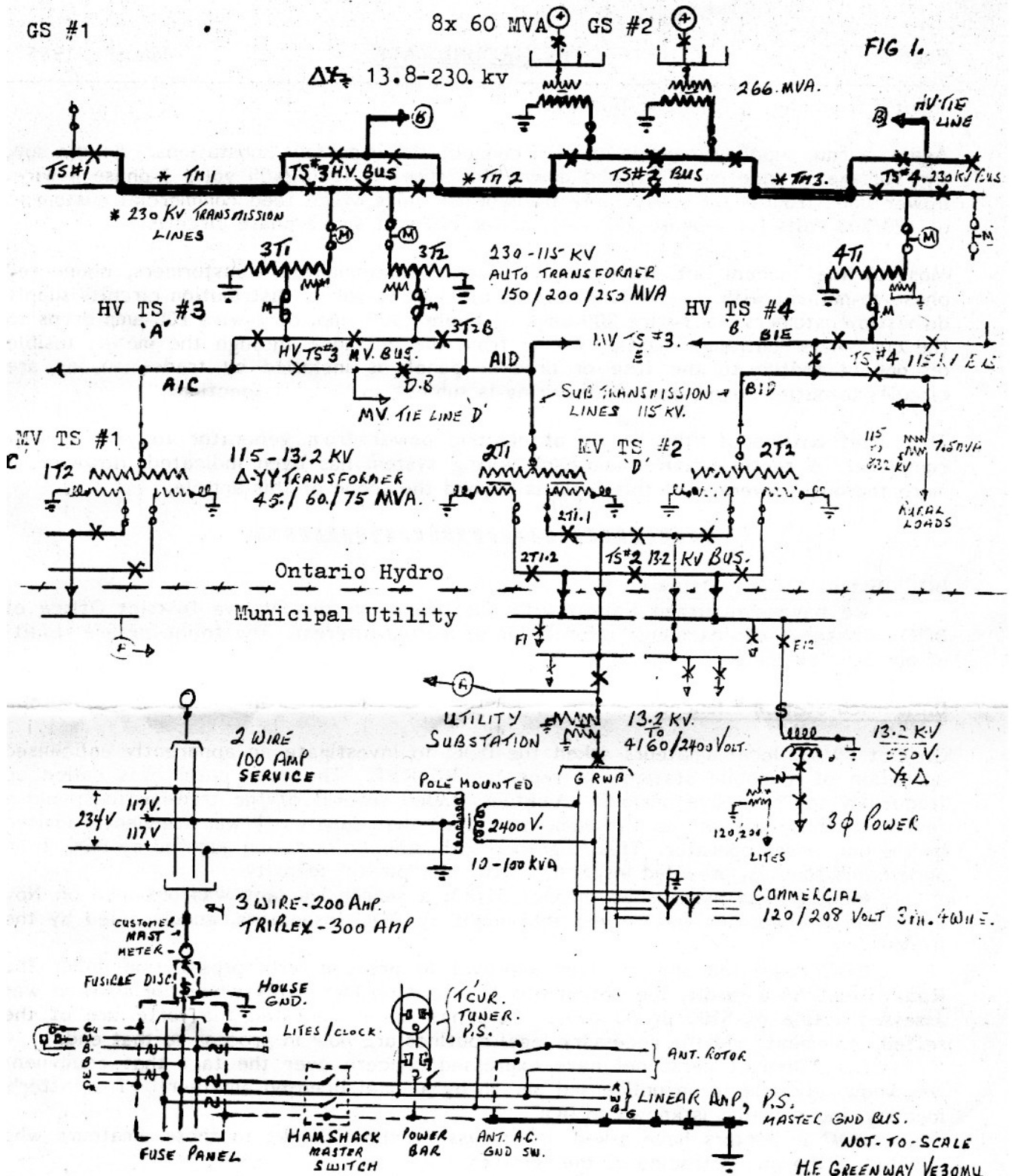
The feeders supply power directly to large industrial customers, where the step-down is to 550 volts delta for motor loads, or for 550 to 120/208 volts 3-phase 4-wire for small motor or single phase lighting loads. However, most of the feeders supply utility substations at commercial or domestic load centers.

cont'd page 8-

GS #1

8x 60 MVA GS #2

FIG 1.



-cont'd from page 6 (Electric Power)-

Again, a ring supply system is used to connect the important substations. At the sub, the voltage is once more stepped down, this time to 4160/2400 volts 3-phase 4-wire. Power lines from these subs supply transformer units which feed commercial customers at 120/208 volts for 3-phase 208 volt, or for 120 volt single phase circuits.

Most of the feeders out of these subs supply pole-mounted transformers, connected phase-to-neutral with a secondary voltage of 117/234 volts. Distribution circuits supply domestic customers via 3-wire 200-amp, or triplex 300-amp, or 2-wire 100-amp drops to the customers' entrance masts. Wiring from the entrance through the meter, fusible disconnect switch to the fuse or breaker panel, is installed by tradesmen, as are circuits to outlet boxes, etc. This wiring is subject to Hydro inspection.

This brief outline of "the supply of electric power from generator to you" is now complete. A representative hamshack wiring system has been indicated. However, a more thorough coverage of this topic is beyond the scope of this article.

#####

DOC District Office, Ottawa

We have established liaison with our friends in the Ottawa District Office of DOC so that we can exchange information of mutual interest. The following are results of our first exchange:

Unlicensed Station Silenced

On Oct 29/83, local amateurs asked the DOC to investigate an apparently unlicensed operation of a mobile station via repeater VE3RST. The auto patch was called up frequently for extensive periods. Amateurs taped several of the transmissions; and a review of these brought up the name of a Mall that apparently was frequently visited by the unlicensed operator. This, together with other information secured by DOC from unrevealed sources, provided Inspectors with the "pirate" identity.

Identity was established on Oct 31/83; a search warrant was obtained on Nov 2/83; and the warrant was served that night by DOC Inspectors, accompanied by the RCMP.

DOC requested and received approval to proceed with prosecution under the Radio Act. As a result, the action was finalized on Oct 16/84 when the accused was assessed a fine of \$500 or 30 days. DOC has since requested the forfeiture of the seized equipment; and the necessary legal routines are now in process to that end.

DOC District personnel have expressed concern over the fact that equipment was knowingly sold to an unlicensed person by a local licensed amateur. The latter's identity, incidentally, is known to DOC.

DOC Inspectors have asked us to pass on their thanks to those amateurs who assisted in the initial tracing of the "pirate".

3-Letter Calls

The District Office advises that the practice is to not re-issue 3-letter calls. Call signs now are issued in continuing sequence.

**BE AN AUTHOR FOR GROUNDWAVE**

by

**Gordon MacKay, VE3JMT**

Why, you might ask, does the Ottawa Amateur Radio Club spend time and money on GROUNDWAVE. It is a bother to a lot of people who might otherwise be on the air a few more hours each month or be happily engaged with their soldering irons on a favourite project. GROUNDWAVE is expensive to prepare, to print, and to mail.

On the positive side, however, GROUNDWAVE fills a communication gap. QST, TCA, and other national periodicals cover the larger aspects of our hobby at the expense of passing over the specifics of the local picture. GROUNDWAVE and similar club magazines and news sheets round out the local picture with published minutes, advance publicity of scheduled events and an intimate record of fellow club members with their successes and difficulties as events unfold.

GROUNDWAVE also provides a forum wherein the more experienced members of the club can explain how to circumvent the problems that beset every new amateur, how to get the best out of their equipment under difficult conditions, how to get along with the neighbours, and perhaps best of all, how to stretch available pennies.

So, here and now, is an appeal to you to provide a helping hand to the readers of GROUNDWAVE. Sharpen your communication skills and savour the pleasures of authorship by becoming a contributor with a by-line. Unsuspected rewards await your efforts.

Apart from immediate recognition from fellow Club members, there is a good chance of your article being picked up by other club papers and thereby extending your recognition far afield. You may expect to see copies of your article appearing on the bulletin board at work. You can also expect direct discussion with others who may or may not agree with your dissertation. In any case, in the doing, you will profit from the practice and the experience. The return in personal satisfaction and sense of achievement far exceeds the small expenditure in time of preparation.

So, how do I become an author?

Well, simply put, you become an author by being one. In the doing is found the learning. Rest assured that authorship is a learned skill. There are few born authors; but there are many who have become competent word handlers through trial and error. What follows here are some suggestions for the would-be scribe.

As sure as you hit print, you will be criticized. Welcome the criticism, then weigh it. If the criticism is valid, learn from it and grow with it. If the criticism is unfair or uninformed, ignore it.

Aim for simple, uncluttered writing. Use a vocabulary that is familiar to the reader without being cute or clever. Skip the humour until you acquire control over your material. Concentrate on producing a piece of "easy readin".

cont'd page 10-

-cont'd from page 9-

Easy reading doesn't come from easy writing very often. Writing is hard work. Most people who write for a living should be called re-writers since their first draft is usually just a be to be worked and re-worked until they get it right. There are methods, fortunately, which can help one reach a useful product quickly.

Start by making some notes. At the top of your note paper, try to express your theme in a single sentence. For example:

"This is a set of instructions for building a simple two element tri-bander", or:  
"Operating finesse makes more friends than does brute power".

By stating your theme in this manner, you are less likely to wander down irrelevant side streets.

Next, write a note to yourself describing the audience to whom you are addressing your message. You might write something like this: "I am reaching toward the new amateur who does not have formal electrical training", or "I am addressing the amateur who is jaded with the popular HF and VHF bands and who would like to explore the world of satellites".

At this point, you are ready to expand your main theme statement into a band of sub-themes. Each of these sub-themes will become the key statement for a paragraph or two; but first they must be assembled in a logical sequence for presentation. Let's just group the sub-themes into sections identified as beginning, middle and closing.

In the "beginning" section, we will introduce the subject and the vocabulary to be used. The intent of the article will be given so that the reader can see where it is going. Specialized meanings should be identified and unusual vocabulary introduced. It is not a bad idea to set boundaries early by noting aspects of the subject not being covered for one reason or another.

In the "middle" section, the writer gets down to the business at hand. Having set the goals, introduced the subject, established the audience, the instruction or information can proceed.

In the "closing" section, the writer sums up what has been covered and reinforces the new information with a brief review of the salient points. A suitable balance between parts for this type of article might be to devote two thirds of your space to the main or middle section and divide the remaining third between the beginning and the closing.

You will note that to this point we haven't started writing. But this type of planning will make the writing task flow much easier. This is a good time to call the editor for a reaction to the piece that you have been planning but which you have not yet begun to write. Tell the editor what you have been doing and ask him for points to be stressed. Ask how much space can be spared for the piece and find out when it might be scheduled. Find out definitely when the editor must have the piece for assessment. Then re-do your notes.

cont'd page 11-

-cont'd from page 10 (Be An Author)

When your notes are in the order in which you will present the piece, go ahead with the first draft. At this point, do not worry about the niceties of spelling or punctuation. Don't worry about the exactness of figures or formulae. Put down whatever seems reasonable to you at the time and draw a circle around your guess for later checking. The object at this point is simply to produce a first draft to be corrected and polished word by word and sentence by sentence.

Select a simple direct title based on your main theme. Sample titles related to the sample themes given earlier might read, "Building a Two Element Tri-Bander", or "Operate With Style". Under the title, write "By Your Name VE3ZZZ".

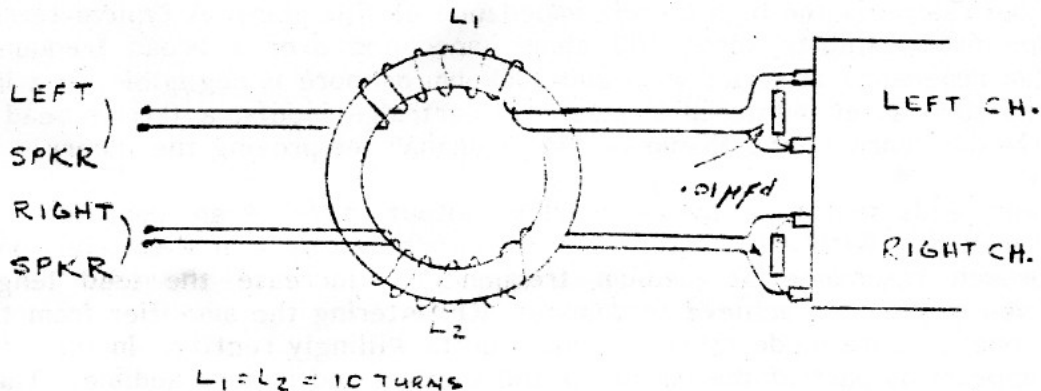
Finally, type or have your manuscript typed double spaced with good margins on standard letter sized white paper. Make a photo copy for your own file. Place the original typed version in an envelope large enough to take it without folding. Pass the envelope without delay to the editor.

Your manuscript may come back to you with a question or two. The editor may suggest some changes which he would like to make, but one thing certain will happen: you will receive the editor's thanks for you efforts. Oh yes, one thing more! You are now an author, so get to work on the next piece. Authors can't hang around basking in past glories.

\*\*\*\*\*

-cont'd from page 14- (Cross Waves)

There are other forms of cup cores, E cores, etc.; but most cost considerably more. Take your choice. More details next issue.



Ralph Cameron, VE3BBM  
Chairman, EMI Committee

CROSS WIRES #2

Second Report from the EMI Committee  
Ralph Cameron, VE3BBM, Chairman

I am happy to report that some progress has been made in reducing the organ interference at the Glencairn location of Case #1. The organ in this case was a Yamaha and showed very high susceptibility to R.F. When held close to the organ, a handheld CB transmitter could easily trigger a host of unknown dischords.

The service manager from Yamaha has succeeded in reducing the susceptibility by 75%. He followed a number of suggestions mentioned in the last Groundwave. He needed five trips to accomplish this. (Who said EMI elimination was 6 turns on a toroid?)

The next obvious step is to replace several long, unshielded leads which connect directly to the preamps. It is planned to use miniature coax, float the shields and ground at a single point. This type of shielding is recommended for low level, low frequency, medium impedance circuits. The outcome should be of interest.

On the other hand, digital signals require frequent grounds to keep circuit impedances low, between the live circuit and the ground plane. The high frequency energy in digital pulses (square wave shape) is more easily dissipated by keeping the area enclosed by the live circuit and ground plane as low as possible. Multiple value capacitors/common point bypassing achieves a similar effect.

In the case of the organ, extensive metal taping and foil wrap was necessary and has helped narrow the sensitive area. Facing the organ, there is a location to the lower right that contains several audio jacks mounted on a user accessible panel. The four preamps mentioned connect to these jacks via long unshielded floating leads. Ferrite beads inserted (8 total) one in each preamp input were not deemed to have much effect. A probable reason is the high circuit impedance at this point. A typical ferrite bead of the type used exhibits about 100 ohms impedance over a broad frequency range. A 100 ohm impedance in series with 200-300kohm or more is negligible. In a low impedance preamp such as encountered in magnetic cartridge inputs, a ferrite bead is satisfactory. Live and learn -- and thanks to "Mr Yamaha" for proving the theory.

Unshielded speaker leads tied to a transformerless output stage of an amplifier help make a fine RF monitor! With a little end loading contributed by a hi fi speaker, one can almost approach resonance at medium frequencies. Increase the lead length appreciably and you might even achieve resonance! RF entering the amplifier from the output side sees one or more diode junctions which quite willingly rectify. In turn, the rectified signal appears as part of the output at the speaker and is very audible. Thus, our amplifier now becomes a villainous detector, mixer and amplifier, all in one. Should our RF enter at some stage prior to the output amplifier, we have at our finger tips the ability to volubly signal the fact.

Signals picked up on the speaker leads were almost totally eliminated by using toroids on the leads. Amplifier output bypassing was done with .01 mfd; but any value from .01 to .05 mfd should be satisfactory. The beauty of toroids is that they are so easily installed. Don't forget the DOC's booklet "How to Identify and Resolve Radio and Television Interference". There is a lot of practical information in there.

-next page-

---

-cont'd from page 12-

Larger core toroids are useful for power cords. In fact, the larger the better, because some of the newer appliances have thick power cables; and it's not possible to get more than a few turns thru the center. One suitable circuit for speaker leads using one toroid for a stereo amplifier is suggested and shown because it really works. I use about 10 turns of prewound paired speaker wire of the Radio Shack variety. Don't skimp on the wire; keep to the same size or larger as used on existing leads.

There are lots of choices for toroids. What are the best types for each application? For speaker leads, try to use toroids with the highest permeability you can get; but ensure that (a) the power rating is sufficient; and (b) the cut off frequency response is at least 200 KHz. You may recall permeability multiplies the inductance in linear fashion; i.e. for a permeability ( $\mu$ ) of 1, which is using air as a reference, we would obtain 100 times the inductance for the same number of turns on a core with a  $\mu$  of 100.

Usually, the price goes up with the  $\mu$ , the diameter and the frequency rating. Powdered iron cores are most economical for speaker leads; and they needn't have the diameter of an inner tube. I've used T 200-3 cores which have a grey colour. Their  $\mu$  runs about 30. A one or two inch O.D. will permit sufficient turns for both channels to occupy the same core. While I don't think it much matters, you could wind left and right channels in opposite directions to give some degree of isolation. This method may also help achieve a little better cancellation should there be unequal currents in each channel. It can't get much simpler. The .01 to .05 capacitors go across the amplifier output. A 200 volt rating is satisfactory.

Power rating is mentioned because cores can saturate and powdered iron is better than ferrite in this respect. A two inch core can handle about 500 watts (well suited to ghetto blasters). A cutoff frequency above 200KHz is suggested because many good quality hi fi amplifiers extend their response to 100KHz in order to get the desired flatness to 20KHz. Should you insert an impedance on the load side of the amplifier which becomes very lossy within the range of amplifier compensation, you may cause a terminal problem. There are toroids available with  $\mu$  in the region of 3-5000. Avoid their use in speaker leads, or some of Handel's spectacular "Water Music" may recreate a similar display of fireworks in your own living room.

Toroid diameter usually decreases as the  $\mu$  increases. One or two inch diameter cores work well with speaker leads. The 2"-3" O.D. cores of ferrite material are best suited to power cables. Typical  $\mu$  is 125; and the idea is to get as many turns as possible of the power cord around the core. The core should butt as close as possible to the back of the appliance.

Another source of ferrite material is found in rod form. Usually 4, 5 or 7 inch length with O.D. of 0.3 to 0.5 inch. This is very easy to work with and should have similar, if not better, properties than toroids. That is, except the property of containing the field. With a little orienting and a  $\mu$  of 800, it should be possible to prevent any reradiation from such a device.

-cont'd page 5-

The Ottawa Amateur Radio Club, Inc.  
P.O. Box 8873  
Ottawa, Ont.  
K1G 3J2

Book Rate

**PERMIT**  
**L51**

ARCHIV  
G. MARTIN, CARC ARCHIVES  
1771 HUTTON AVE  
OTTAWA ONT  
K1G 1M1

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

President	Joan Powell VE3FVO	Box 390 RR#2 Nepean, Ont., K2C 3H1	825-4104
V/President	Jerry Wells VE3CDS	12 Sutton Place Nepean, Ont., K2E 5G2	225-7374 237-3022
Secretary	Samson Pierre VE3JSP	Box 909, RR #1 Cumberland, Ont., K0A 1S0	833-2801 745-9411
Treasurer	Bruce Lauer VE3MJV	10 Winlock Crescent Nepean, Ont., K2G 3X4	829-9471 990-8987
P/President	Bob Baillargeon VE3MPG	179 McGillvray St. Ottawa, Ont., K1S 1K7	235-0187 744-0963
Directors	Brett Delmage VE3JLG	304-1330 Richmond Road Ottawa, Ont., K2B 8J6	820-3940 592-4164
	Keith Bedal VE3GFI	125 Ridgefield Crescent Nepean, Ont., K2H 6T4	828-1870 998-2234
	Wally Clarke VE3CBE	35 Solva Drive Nepean, Ont., K2H 5R7	828-8627 596-2589
Repeater Chairman	George Roach VE3BNO	104 Strathcona Ave. Ottawa, Ont., K2G 3H1	234-0885 233-6242
Custodian & Archivist	Gerry Martin VE3CNJ	1771 Hutton Ave. Ottawa, Ont., K1G 1M1	731-3220
Net Manager & Emgcy Coord	Ken Kendall VE3IHX	777B Springland Drive Ottawa, Ont., K1V 6L9	731-0892
EMI Comittee Chairman	Ralph Cameron VE3BBM	30 St Remy Drive Nepean, Ont., K2J 1A3	825-1634 225-2850
Membership Chairman	Peter Hafichuk VE3LBW	118 Ivy Crescent Ottawa, Ont., K1M 1X6	745-0608 993-1740
Capital City Award Manager	Brian Summers VE3JKZ	2231 Hillary Ave. Ottawa, Ont., K1H 7H7	523-1535 996-7885