FEEDBACK

The OFFICIAL Newsletter of the
Georgian Bay Amateur Radio Club Inc.

Sponsoring
VE3OSR FM REPEATER 146.940- OWEN SOUND
VE3IJD PACKET BBS 145.630 KEADY

March 1997

REGULAR EVENTS

GBARC MEETINGS: 4th Tuesday of each month at the Billy Bishop Airport 7:30 P.M.

BREAKFAST MEETINGS: 2nd and last Saturday of each month at the Rockford Esso , 9:30 A.M.

GBARC INFORMATION: Information regarding membership should be directed to VE3NEM Tom Merner RR#4 Owen Sound, N4K5N6 371-0655

FEEDBACK: Submissions or letters to the editor should be directed to VE3TSA Tom St.Amand, 1232 3rd Ave . East, Owen Sound N4K2L5

MINUTES OF THE GBARC MEETING FEBRUARY 25,1997

The general meeting was called to order by president Bob Vary with twenty one club members present and one visitor. The minutes of the November general meeting were read by Norm VE3NBJ and moved for acceptance by Bill VE3HMZ and seconded by John VE3TXB and passed. Tom VE3NEM gave a presentation of unaudited financial statements for the club year to date. Once audited, Tom will be posting the financial statement in a upcoming feedback. A motion was made to ask Dave Dixon VE3DXO if he would perform the duties of club auditor for the upcoming financial year. The motion was made by Bob VE3LKD and seconded by Jack VE3DTS and passed. A vote on the motion to change to club dues as recorded in the November feedback was made. The vote was as follows: Those in favour were twenty.....Those opposed were one.

John VA3JRF informed the members present that he is reviewing the club insurance that R.A.C. is setting up. John will report to the club when he has received more information. Bob VE3XOX informed the group that the basic course had eighteen attending and that thirteen passes have already been received. Bob also extended congratulations to Brad VE3RHJ for another successful course on behalf of the club. The group was informed that a video camera had been donated to the club and that the course has been video taped for future use. The meeting was attended by Sean O'Donoughue and Jim Van Overbeek who recently graduated from the course. Bob then gave a brief overview of the repeater situation at this time and future plans to be discussed at the next general meeting.

Norm VE3NBJ read a letter received from the Kiwanis club of Owen Sound as well as a $150 donation to our club. The letter was thanks to the club for past and future participation in the Santa Clause parades. This letter will be published in a upcoming feedback. A presentation of yearly incorporation requirements for the club was given by Norm VE3NBJ. The new airport room fee of $40 per meeting as well as other possible locations was discussed. Jim VA3CJM and Bob VE3XOX will be reviewing other locations and reporting back at the next meeting. There will be a A.P.R.S. meeting in Kincardine next month with details of the date and time to be announced. This event is sponsored by the Kincardine club and all members are invited to attend.

HAM OF THE YEAR was presented to JOHN VE3TXB...nominated by Tom VE3TSA and seconded by Bill VE3HMZ. Congradulations and thanks from all club members to John for his contributions to our club!

A brief discussion of the girl guides on the air operation that Tom VE3NEM and Norm VE3MTV participated in recently. Tom explained that the Brownies and Girl Guides had a great time and that the event was held on short notice at Kamp Aneesh. A motion to close the meeting was moved by Tom VE3TSA and seconded by Bil VE3HMZ. The 50/50 draw was won by Jim Van Overbeek a new member and recent participant of the basic course. Congratulations Jim and welcome to the club!....minutes by Norm ve3nbj

Readers of Part I of this series may have noted that we offered few black-and-white, yes-or-no answers to the questions commonly asked in the field of v.h.f. antenna design. This seemingly evasive line will be followed as we discuss methods of matching and feeding antenna systems, for just as there is no one "best" antenna for the v.h.f. man, so there is no one transmission line or matching device that is ideal for all purposes. The reader must make a choice based on his own circumstances, taking into account many mechanical, electrical and economic factors that may not be covered in most written material on antennas and feed systems.

V.H.F. Antenna Facts and Fallacies

Part II — Choosing the Right Transmission Line

BY EDWARD P. TILTON,* WIHDQ

THE best antenna in the world is of little value if it cannot be made to take power from the transmitter and transfer the signals it intercepts to the receiver with reasonable efficiency. Thus the selection of the right transmission line for the job at hand, and an effective means of matching it to the antenna system, are of utmost importance, especially at 50-Mc. and higher frequencies where transmission line losses are inevitably higher than in our lower bands.

If one type of transmission line was "best" we would not still be using three. Each has its uses, and line-loss figures in the *Antenna Book* and the prices quoted in your distributor's catalog don't tell the whole story, by any means. Let's consider line-loss data first. Experienced v.h.f. men almost know the figures by heart, but how many know whether their installations actually achieve the performance implied in these tables? Losses given in published information are for new lines, properly used, in dry weather. Nearly all amateur installations are less than perfect in one or more of these respects.

Coax, Twin-Lead or Open-Wire

Coax has relatively high loss in the tables. RG-8, perhaps the most commonly-used line, reputedly has a loss of about 2.5 db. per 100 feet at 144 Mc. This means that 100 watts output at the transmitter will be reduced to about 57 watts at the antenna, with a 100-foot line — *if* the line is working perfectly. In the 420-Mc. band that same line, in new condition and perfectly matched, will dissipate about 70 watts in a 100-foot run between a 100-watt transmitter and its antenna. Discouraging as these figures seem, they're only half the story, and the smaller half at that. Transmitting loss can be made up at least partially by increasing power, but in receiving, the signal lost can never be recovered.

Good coax, on the other hand, is tolerant of installation. It is almost impervious to weather changes, and it can be installed anywhere. Tape it to a steel tower, or bury it; let it wrap around the tower and unwrap again as the beam is rotated — the loss will stay the same, almost regardless of conditions that adversely affect other types of lines. Another prime advantage of coax is that you can measure the performance of the system readily, with fairly inexpensive equipment. You know your s.w.r. and line loss, and the effect of any adjustments is immediately apparent. This is not easy with other forms of transmission line.

Twin-Lead is inexpensive and convenient to use. Its advertised losses look good on paper compared to coax. The best grade of tubular Twin-Lead, transmitting type, is quoted at 1.25 db. per 100 feet at 144 Mc., and 2.3 db. at 420 Mc. But anyone who has used it knows that polyethylene-insulated balanced line is a terror in rain. Flat ribbon types give the most trouble, but even the best tubular line will give you a bad time with fluctuating loading in heavy rain conditions. Cheap lines with small conductors and thin insulation should be avoided like the plague, unless the line is to be only a few feet long, and used indoors.

Book figures make open-wire line look best of all. If a good open line has only a 0.2-db. loss per 100 feet at 144 Mc., why doesn't everyone use it? Even at 420 Mc. the loss per 100 feet should be under 1 db. — it says here. This picture has the biggest "ifs" of all, however. Such fine performance is achieved, if ever, only with large conductors, spaced so that radiation is nil, and held in precise alignment with a minimum of insulating spreaders. It should be installed without any sharp bends, and the conductors must be balanced to ground.

These conditions definitely are *not* met in most amateur installations. We use TV-type lines, with too-small conductors, and spacings generally too wide, at least at 420 Mc. These lines have spreaders every few inches, and we usually have to go around several corners in an average home installation. The author was sadly disillusioned with a 220-Mc. open-wire-line job some years ago.[1] With a 125-foot run, installed with a ... amount of care, and using half-inch-spaced line, we found that 70 watts output at the transmitter showed up as less than 25 watts at the antenna.

This was the best line available ready-made at moderate prices. Where did that 4-db. loss come from? First, there were two coaxial baluns. Our transmitters have coaxial output, and rightly so. To get from this to a balanced transmission line requires an antenna coupler or a balun. There is bound to be some loss in either, and the loss increases with frequency. Another balun was used at the antenna end, so that coax could be used for a trouble-free rotating section. But most of the trouble probably came from radiation at bends in the line, and from unbalance introduced at insulating supports attached to the tower. Our installation was better than average in these respects, but obviously it was not good enough. We suspect that nearly all v.h.f. antenna installations using open-wire line have far higher losses than their proud owners realize.

Making Open Line Pay Off

The poor results described above did not entirely disenchant the writer in regard to open lines. We felt that a good system could be made for frequencies up through at least the 420-Mc. band, so we set up an experimental line recently to measure losses under near-ideal conditions. A 100-foot line was made of No. 12 enameled wire, spaced ⅝ inch. Spreaders were nylon rings left over from another project, and they ... put in at 6-foot intervals. They determined ... spacing; even closer might have been better, at least at 432 Mc. Spreaders of nylon or teflon rod stock would be equally good. The line was strung up parallel to and a few feet above ground, and pulled up tightly with a turnbuckle. This line has an impedance of just over 300 ohms.

The test setup is shown in Fig. 1. Power from the transmitter was monitored at meter M_1, and the power delivered to the load by meter M_2. The position of the short at the transmitter end of the line, and the point of connection of the input balun, were adjusted for zero reflected power at M_1. A similar adjustment at M_2 was made for maximum power transferred to the load, and the adjustments at the sending end were rechecked. Measurements were made on this line at 144, 220 and 432 Mc., with results as

Table 1

Line loss per 100 feet measured at 144,220 and 432 Mc. with open-wire and G-Line systems, as shown in Fig. 1. Loss includes baluns, where used.

Freq., Mc.	Transmission Line	System Loss, Db.
144	No. 12, spaced ⅜ inch	1.1
220	Same	1.35
432	Same	1.56
432	No. 18 TV line	2.5
432	* G-Line, 4 bends	6.
432	* G-Line, straight	2.7

* G-Line modified for coaxial feed at transmitter end.

* V.H.F. Editor, *QST*.

[1] Tilton, "A 66-Element 220-Mc. Array," January, 1959, *QST*.

own in Table I. Checks were also made with the two baluns butted together without the 100-foot open line, so that we could tell, for sure, where our losses were coming from. A 100-foot length of the TV line used in the 220-Mc. installation previously mentioned was also measured on 432 Mc. in the same manner, as was a G-Line installation to be described later.

It will be seen that the combined balun-and-line loss with the No. 12 line was down to very respectable proportions on all three bands; vastly lower than anything but the most expensive coax could produce. This line has since been installed to feed the 48-element 432-Mc. collinear array at W1HDQ, where it is currently giving highly satisfactory results. It is fed with a balun and adjustable short at the transmitter end, as

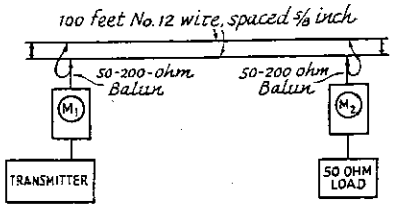

Fig. 1—Test setup used for determining the properties of open-wire line at 144, 220 and 432 Mc. The same system may be used in applying the balanced line to a transmitter and antenna combination designed for coaxial feed. The point of connection of the balun at the transmitter end is adjusted, along with the position of the short, for zero reflected power, indicated in meter M1. A similar adjustment is made for maximum power indication at the load end.

shown in Fig. 1. At the antenna end it is connected to a section of tubular Twin-Lead long enough to serve as the movable portion when the beam is rotated. Strain insulators are used at each end, and the line is pulled up tightly on a turnbuckle. There is only one slight bend in the entire 100-foot open-wire section of the line.

These experiments indicate that much of the trouble with our 220-Mc. open-line installation mentioned earlier must have been due to unbalance and bends in the line, as the loss in the 100-foot test section of this line turned out to be only 2.3 db. — and at 432 Mc., rather than 220. The small size of the conductors, No. 18 hard-drawn copper, and the large number of spreaders, one every four inches, are minor adverse factors.

Tricks with Baluns

Part of the loss in such a system is due to the baluns used to convert from coaxial output to balanced line. The easy way to make a balun is with a piece of coax electrically one-half wavelength long, doubled back into a loop and connected as shown at Fig. 2A. The problem is to know how long to make *L* in Fig. 2B. A balun at 50 Mc. is easy. If you know the velocity *factor* of the line, which is the percentage of a physical half wavelength that makes an *electrical* half wavelength, you're all set. The length of the leads required for the connections will not be particularly critical. These leads become a greater percentage of the total balun length with each band higher in frequency. At 432 Mc., a balun loop is something around 8 inches long. A little mechanical variation here can throw the balance the balun is supposed to produce quite a bit off.

Different kinds of coax, particularly with various kinds of insulation, can show large variations in velocity factor, so we should check the loop electrically in some manner. The easiest way is with a dip meter, as shown in Fig. 2B. With leads of the length to be used in making the connections, short one end and make a loop of the other. Couple the dip-meter to this, and find the resonant frequency. No dip-meter at 432 Mc., you say? Then use your transmitter, or a simple 432-Mc. oscillator, and couple the loop to the grid circuit. Trim the length until it absorbs power, as indicated by the greatest drop in grid current. You can afford to spoil a loop by going too far — it's only 8 inches of coax lost.

In making a balun loop in this way for 144 Mc., check it for resonance at 432 as well. You

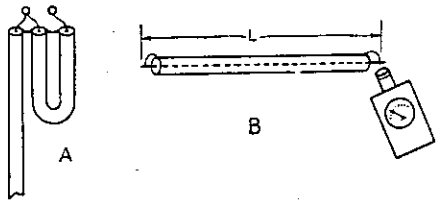

Fig. 2—A balun for working from coaxial to balanced line is shown at A. Impedance at the balanced end, top, is four times that of the coaxial line used. The loop is an electrical half wavelength. Its resonant frequency may be checked with a dip meter as shown at B.

may find that a single balun can be made to serve for both bands.

There is a temptation to use small coax for baluns, as it handles so nicely, particularly for the small loop required at 432 Mc. Don't do it. Losses in small coax may be very high when it is used for baluns. Soldering operations nearly always weaken and distort the insulation, and the small conductors break off very easily. Our first measurements on the 432-Mc. open line were made with baluns of RG-58, and losses from these alone were about 2 db. This was reduced to less than 1 db. per pair when good-quality RG-8 was substituted.

To make the initial adjustments of the shorts on the line and the point of connection of the baluns, some form of sliding contact is helpful. We found that narrow strips of Reynolds perforated aluminum stock were fine for this. The metal has its holes already drilled, and the rough edges left when the stock is cut help it to bite into the copper of the line. One of these clips is shown in Fig. 3.

Tips on Selecting Coax

Any coax costs money and good coax is quite expensive, but all things considered the best may turn out to be a good investment. Cheap coax is likely to be old, and its measured loss may be higher than figures given in the *Antenna Book*. More important, older types of coax and some inexpensive new ones deteriorate quite rapidly when used outside. Be sure to find out whether or not the coax of your choice will stand up in outdoor service. "Non-contaminating" is the word for it. Coax guaranteed for 15 years of use, underground or otherwise exposed, is now available at moderate cost.

Coax is available in infinite variety. Worth looking for is the "polyfoam" version of standard types. These cost slightly more than solid-dielectric types, but losses are typically one-third less. Watch the velocity factor, however. Reduced density of insulation generally means a higher velocity factor. An electrical half wavelength will be a greater portion of a physical half wavelength with foam or other low-density dielectric.

Various lines are made with semiflexible sheathing, usually aluminum, and with spiral wrap or foam insulation. These are fairly costly, but they deliver excellent results and are fine for permanent installation. Flexible sections for rotation are needed with these, and a good way to handle a multiband installation is to put in a remotely-operated coaxial switch to permit the use of one line for all antennas.

About Coaxial Fittings

If you go to the expense of a good coaxial line, it is approaching the ridiculous to pinch pennies on the fittings to be used with it, particularly on 220 Mc. and higher. The so-called "UHF" fitting isn't to be trusted in the u.h.f. range, especially if you want to be able to measure antenna and feed-line performance with any degree of accuracy.

Probably the best fitting, for most of us, is the series N, a constant-impedance type that can be bought at moderate prices on the surplus market. It gives a constant impedance through the connection, and can be had in all types required. Properly installed, it is weatherproof.

Series C fittings provide constant impedance, and are weatherproof. In addition, they are quick-disconnect, and very handy on that account. However, they are not on surplus, and are quite expensive.

The BNC Series is nice, but too small for the RG-8-size line. The Type HN is a constant-impedance series, for the larger sizes of coax. Whatever series you select, be sure that the installation job is done properly. Water leaking into fittings will ruin the best system in short order.

How Good Is G-Line?

Most u.h.f. amateurs are aware that there is a single-conductor transmission line, invented by Goubau, and called "G-Line" in his honor. Papers by the inventor appeared some years ago, in which seemingly fantastic claims for

low line loss were made: losses under 1 db. per 100 feet in the microwave region, for example.[2] Isn't this something we should be using on 420 Mc. and higher bands? Especially attractive was the claim that the matching arrangement used was a broadband device, making it appear that a single G-Line system might work well on both 432 and 1296 Mc.

When u.h.f. TV first appeared on the scene about 10 years ago, a G-Line kit was put on the market. Mainly because of its high cost (about $30.00, plus installation) it never got off the ground as a home receiving system for TV use, but it has since come into use in cable TV systems. Here very long lines must be used and losses must be held to a minimum, so the G-Line is getting some play. How about its worth for amateur purposes? To find out, we set up a G-Line experiment similar to the one used with the open-wire line.

The idea is that a single conductor can be an almost lossless transmission line at ultra-high frequencies, if a suitable launching device is used. Another launcher is placed at the far end. Basically the launcher is a cone-shaped extension of a coaxial line. You might say that the cone gets the energy used to traveling on the inner conductor of the coax, as the outer conductor is gradually removed. I'm not sure that Dr. Goubau would approve of this explanation of his invention, but you get the general idea. Incidentally, he says that the single conductor must be fairly heavily insulated. The wire in the kit is No. 14, with a vinyl covering about as thick as the diameter of the wire itself.

The kit is intended for use with u.h.f. TV antennas and receivers, so the small end of the horn launchers is fitted with a balun of sorts. Usually 300-ohm Twin-Lead is used for the short runs at the ends of the G-line. The G-line is very sensitive to bends, which must be made (if absolutely required) on a very large radius. The line must be kept several inches away from any metal, and preferably away from all insulators as well. This, obviously, is impossible, but our experience indicates that, with bends at least, the inventor was not fooling.

Our initial checks showed some promise, so for a practical test we put the G-Line on our 48-element 432-Mc. collinear array. In fact, it was the first line used on this antenna. It worked reasonably well, and the added height and gain of the 48 enabled us to hear and work stations that were out of range with a lower 16-element collinear. Some of the first results mentioned in Part I were with the G-Line in use on the 48. We then took it off and substituted the No. 12 open line of Fig. 1. The average signal level on reception increased by about 2 db., in line with original rough checks made on the ground.

But G-Line was supposed to be the best thing possible, next to air-insulated coax, or perhaps waveguide, so we looked for ways to improve it.

[2] Goubau, "Designing Surface-Wave Transmission Lines," *Electronics*, April, 1954, p. 180.

The first thought was that the baluns supplied with the kit, being made for 470 to 900 Mc., could hardly be expected to be the optimum size for use on 432 Mc. Further, why use baluns at all, since we come out of our transmitter and receiver with coax anyway?

So, we extended the horn of one launcher with a sheet-metal cone that tapered down to about a half-inch hole, and fastened the end of this cone to an N-type coaxial receptacle. The G-line was soldered directly to the center terminal on the receptacle. The launcher at the far end was left as supplied, for the time being, and an adjustable stub, balun, meter M_2 and 50-ohm load were connected, as shown in the open-line test. Meter M_1 was inserted close to the modified launcher.

The system turned out to have a 70-ohm input impedance when modified for all-coax feed. The s.w.r. on our 50-ohm line was 1.4:1, but this was not important for the purpose of the test, as we were interested only in the power going into the system, and the power coming out.

First, out of curiosity as to the effect of bends, we suspended the line roughly in the shape of a letter C, using a 100-foot line tied up at four points about equally distant from one another. The angle at each rope tie was very obtuse; not less than 150 degrees. This installation showed a loss of nearly 6 db.!

Then the line was suspended in a straight line, requiring no supports on the G-Line part of the system. With no other change, the loss dropped to 2.7 db., for the 100-foot line, the two launchers, and the Twin-Lead and balun at the load end. This began to look interesting, as experience

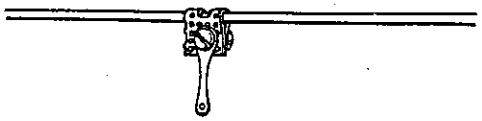

Fig. 3—Clip for use in adjusting the point of connection of a balun, or the adjustable short of Fig. 1, made from a piece of perforated aluminum. Balun leads are soldered to the lug. When the adjustment process is completed, the clip may be removed and the connection soldered permanently to the line.

with many kinds of line previously had shown that it takes a very good system to better 3 db. per 100 feet appreciably at 432 Mc.

We suspect that the way to make the Goubau invention pay off at 432 would be to convert it to all-coax launchers, feed it with 75-ohm coax, make the horns much longer (theory says 3 wavelengths, and the kit launchers are less than 1 wavelength at 432 Mc.), eliminate the baluns at both ends, and install the line in as near a straight line as possible and with the fewest possible supports. Since the loss in the line itself is extremely low when properly installed, the G-line system should be especially useful where very long runs are required in u.h.f. and microwave work. QST

Part III, "The How and Why of Matching," will follow in an early issue.

1997 Basic Course Results

From VE3RHJ

At long last...here's a summary of the results from the course we just completed in Kilsyth. Of our 19 enrolled students,

14 have passed the Basic,
1 has passed the Basic and Advanced,
3 did not pass their first attempt,
2 have not yet written the exam (out of town on exam day).

Please welcome our new hams when you hear them on 2m!

For the three who have not YET passed the Basic, we have ensured that they have individual tutors (two have hams in the family). They were all very close, and we expect that they'll pass the exam sometime in March.

We did not offer Morse code instruction with this course. A few of the students have expressed an interest; perhaps it's time to offer code practice on 2m again?

73, Brad VE3RHJ (exhausted)

Constitution and BY-LAWS

The following pages contain the GBARC Constitution and By-laws for your information and perusal. ....73 Editor

Constitution of the Georgian Bay Amateur Radio Club

BE IT KNOWN BY THESE PRESENTS

That the Charter Members of the Georgian Bay Amateur Radio Club having derived much pleasure from amateur radio through personal experience:

FIRSTLY : Desiring to share that pleasure with their fellow hams,

SECONDLY: Desiring to encourage and assist others to enter their world of amateur radio,

THIRDLY : Desiring to improve their knowledge and technical skills in electro-magnetic communication, and

FOURTHLY: Desiring to make available to their community that knowledge and those techniques (in which they, as no other civic group, excel) in times of local and national emergency,

have, to those ends, caused to be established The Georgian Bay Amateur Radio Club, and BY THESE PRESENTS do hereby constitute themselves as THE GEORGIAN BAY AMATEUR RADIO CLUB,
and by those enactments following do adopt their Constitution governing THE GEORGIAN BAY AMATEUR RADIO CLUB.

ARTICLE I Name

Section I The Name of the organization shall be "The Georgian Bay Amateur Radio Club" hereinafter referred to as "The Club".

ARTICLE II Eligibility for Membership

Section I Any and all persons, regardless of sex, age, race or creed, may be enroled as members on submitting their name, address and other pertinent information to a member in good standing, the type and class of membership to be in accordance with those types and classes as laid down in the BY-LAWS of the club, and by paying such dues required for such type and class of membership.

ARTICLE III Officers of the Club

Section I President, Vice-President, Immediate Past President, Secretary-Treasurer, Technical Director, Program Director, and the Editor of the Club Bulletin.

Section II Executive Committee

These above shall be constituted as a Committee known as the Executive Committee but nothing herein shall inure to prevent further additions to the Executive Committee; but such power to add shall be within the guidelines set by the BY-LAWS of the club.

Section III Appointment of Auditor

There shall be appointed by the Executive Committee in Committee of the whole, a CLUB AUDITOR, which appointment shall be presented to the entire membership for ratification. Failure to obtain the ratification by a majority vote of the members, the Executive Committee will confer again and submit an acceptable alternate choice.

Section IV Election of Officers

Election of Officers shall take place in May of each year. A Nominating Committee shall be struck by the Executive Committee and composed of two active club members who shall confer with the President, and which committee shall bring in a recommended slate of Officers, which slate shall be placed before the membership one month prior to elections. The Nominating Committee shall also accept nominations for office from the floor at that meeting. Nominations shall be presented by a sponsor, and with the Nominee's agreement the nomination shall stand. Voting shall be by secret ballot and the Non-Executive members of the Nominating Committee shall preside.

Section V Vacancies in Executive Committee

Vacancies in the Executive Committee occurring during the term of office of the person vacating, for whatever reason, shall be filled in the same manner as set out in ARTICLE III Section IV.

Section VI When office is assumed

Officers shall assume office immediately after election, at which time the President-elect shall assume the chair when vacated by the Chairman of the Nominating committee, and shall at that time introduce the Executive-elect to the members present.

ARTICLE IV Duties of Officers

Section I The President shall:

Preside at all meetings of the club, conducting same in accordance with the best rules of order;
Recognize each members rights under the Constitution and BY-LAWS and give due deference to those rights in questions of order;
Sign all official documents on behalf of the club;
Perform all the duties customarily associated with the office.

Section II

The Vice-President shall:
Assist the president in any capacity designated by the President; Assume the duties of the President whenever the President is unable to carry out those duties.

Section III

The Secretary-Treasurer shall:
Keep a record of the Minutes of every general meeting, Executive Committee meetings and such other meetings as are formally called by the President and the Executive Committee.
Keep an up to date roster of the members;
Keep an accurate record of all monies received and expended; Turn his books and records over to the Auditor at the end of the club year; On being superseded by the Secretary-Treasurer elect turn all books and records over to the person superseding him.

Section IV

The Technical Director shall:
Be responsible for the proper maintenance and operation of all communication equipment, and ancillary equipment, belonging to and/or operated by the club as a whole;
Provide items and topics of a technical nature of interest to the club members generally, both at club meetings and through the club periodical;
Be prepared to assist individual club members in technical matters;
Through any means at his/her disposal endeavour to raise the technical ability of the members of the club.

Section V

The Program Director shall:
Co-operate with the other members of the Executive Committee to provide interesting and informative programs for the regular monthly meetings;

Organize field trips of interest to the members generally;
Be included in any Committee set up to organize any activity in addition to the regular club meetings.

Section VI

The Editor of the Club Periodical shall:
Cause to be promulgated among the entire membership of the club a News Bulletin appearing at regular intervals containing news, notices of Club activities and associated information of interest to all members.
In keeping with his journalistic position he is expected to give leadership in new fields, and, to this end, he/she is to be considered an ex-officio member of all committees.

ARTICLE V Form of Business

Section I All business dealt with at general Meetings shall be in the usual form of mover and seconder, voted on by a show of hands, excepting in those cases where, in the opinion of the Presiding Officer, a secret Ballot is preferable, but such voting may not be carried out unless and until a quorum of the general membership is present.

Section II Quorum

Quorum for this purpose shall consist of ten voting members excluding members of the Executive Committee.

Section III Executive Quorum

No motions shall be considered or voted on at a general meeting unless a minimum of three Executive Committee members are present.

ARTICLE VI Disbanding of Club

Section I In the event of the club's ceasing operations under this, the Constitution, such may only be accomplished by a motion brought before the entire membership and approved by a two-thirds vote of the membership.

Section II

This Constitution may be amended by a two-thirds majority vote of the membership present at any meeting providing a Notice of Motion is given at least one month prior to the said meeting and all members of the Club advised of such Notice of Motion by mail in the intervening time between the Notice of Motion and the meeting at which the voting is to take place.

Section III Power to amend By-Laws given by Constitution

The Club may, at the discretion of the Executive Committee, entertain motions from the floor relevant to deletions from and alterations to any BY-LAWS in the manner set out in ARTICLE V, Sections I to III inclusive; but any such motion which has, or tends to have, a nullifying effect on this, or any part or portions of this constitution, shall be declared Ultra Vires of the powers of the Committee and membership, unless such motion is made under ARTICLE VI, Section II, and if such improper motion is voted on, passed and incorporated in the BY-LAWS, by inadvertence, such Motion or BY-LAW must be vacated by the Executive Committee.

Wordfind for Hams

L B W G J M P I C U R R E N T J A K B C
Z J E A X E W S A M I A N N E T N A R R
E K H N F L C U L H Z N U Q L U R A E Z
S D C W L A R L L Y O H C E F S H N Q A
R G E I Y E P S V A I D N I P I L U R
O E A F C E T H I M L J V N L M K D A W
W C R W E R A C G X A B G A A Q U B E N
S I Y A N K E E N I R L K X R R A D I O
C E R K S J P T U V E T E R O R O C B P
A V E C E B E U Q S N R T A M C E V R E
N E W I X S R C I T E C X Y E K S I H W
T R O J P T O D D E G W H S O R A C S O
V B T A A M E N T E X T R A B L E T O H
Q U M N P B Y N O F L O G S R O A O V T
X P G U A M U G B V M I K E A L M R Z S
S O T N I L R R A S E E J B V I I U S E
K E D F O X T R O T Y M W U O K L E T T
R A D V A N C E D E H D B T X U K W L N
V S E N O H P O R C I M T E K C A P O O
T T E I L U J B Q U N I F O R M D Y V C

Advanced, alpha, amps, antenna, ARRL, bravo, callsign, Charlie, computer, contest, current, delta, echo, E-layer, Extra, foxtrot, General, golf, hotel, India, Juliett, keyer, kilo, license, lima, microphone, Mike, morse-code, November, Novice, Oscar, packet, papa, Quebec, radio, receiver, repeater, Romeo, RTTY, Sierra, single-sideband, slow-scan-TV, tango, Tech-plus, tower, tubes, uniform, Victor, volts, volunteer-examiner, whiskey, x-ray, yankee, zulu.

BY-LAWS

GOVERNING THE OPERATION OF THE GEORGIAN BAY AMATEUR RADIO CLUB

AMMENDED JULY 1992
AMMENDED FEBRUARY 1997

BY-LAW 1 GENERAL

(A) The BY-LAWS of the Georgian Bay Amateur Radio Club, (Hereinafter designated as "The Club") shall be enacted by a vote of all voting members of the club and shall be duly recorded by the secretary, as provided for in the Constitution of the club, but only when and if the provisions of the constitution regarding notice to be given, and quorum requirements, are met.

(B) A voting member shall be a full member whose arrears of dues, if any, do not exceed one (1) month.

BY-LAW 2 MEMBERSHIP

(A) There shall be three (3) classes of membership,
FULL MEMBERSHIP, FAMILY MEMBERSHIP and ASSOCIATE MEMBERSHIP.

(B) Full membership shall be exclusive to, and mandatory for, all holders of a certificate of proficiency in amateur radio issued by the Department of Communications, CANADA.

(C) Family membership shall apply to immediate family members who would normally be classed as full membership but occupy the same household.

(D) Associate membership shall be restricted to any person who does not hold a certificate of proficiency in amateur radio issued by the Department of Communications, CANADA.

(E) Associate membership shall confer all privileges of the club and its activities save and except the right to hold office in the club, and the right to vote on any motion, by-law, or constitutional amendment.

BY-LAW 3 DUES

(A) Full membership , Family membership and Associate membership dues shall be fixed by a BY-LAW of the club, and such dues may be altered from time to time, by an ammendment to the said BY-LAW in the usual way.

(B) Dues are payable for the following year, from the 1st day of September to the 31st day of December in the current year. Special cases may arise from time

to time which will be reviewed by a quorum of the executive comittee.

(C) The schedule of dues for members in good standing shall be as follows:
i)Full membership - $35.00, discounted to $30.00 per year if paid before December 31st.
ii)Family membership - First full member - $35.00, discounted to $30.00 per year if paid before December 31st.
- Second full member -$25.00, discounted to $20.00 per year if paid at the same time as the first full member and before December 31st.
iii)Associate membership - $25.00, discounted to $20.00 per year if paid before December 31st.

(D) The schedule of dues for new members shall be as follows:
i)New Full Members - $35.00
ii)New Family Members - $25.00 for second full member and each additional full family member.
iii)New Associate Members- $25.00

BY-LAW 4 RESOLUTIONS

(A) Statements of policy of the club to the public, governing departments, and officials of such governing departments, and affiliated bodies, and officials of such affiliated bodies, or to the media, shall be by resolution, duly motioned and seconded, and voted on by a quorum of full members as set out in the constitution.

(B) No member, either FULL, FAMILY or ASSOCIATE shall make any statement of policy, as set out in BY-LAW 4 (a) without direction and permission of the club as set out in that BY-LAW.

BY-LAW 5 CLUB BULLETIN

(A) Members in good standing shall receive copies of the club bulletin, as they are issued.

(B) Any member may request a copy of the club bulletin be sent to any prospective member, but such request shall grant provision of one issue only of such bulletin.

(C) A member in arrears of dues may receive the first issue of the club bulletin subsequent to lapse; and no further club bulletins will be provided for such member unless, and until, he/she has been re-instated as a member in good standing as provided in BY-LAW 3.

THE KIWANIS CLUB OF OWEN SOUND

INCORPORATED

P.O. BOX 192

OWEN SOUND ONTARIO

N4K 5P3

February 24,1997

President
Georgian Bay Amateur Radio Club

Dear Sir:

The Kiwanis Club of Owen Sound would like to thank the members of the Georgian Bay Amateur Radio Club for their assistance with communications during our November 1996 Owen Sound Santa Claus Parade. We held a very successful parade, in no small part due to the important role your members played in tying the parade together from start to finish.

Please accept this gift as a way of showing our appreciation for your assistance with our parade, and in recognition of the valuable service your club offers our community.

Would you please convey our thanks to the members who participated on parade day. We hope that we will be able to work with your club on future parades for the good of our community.

Yours very truly

L K Droine

Linda Droine
Santa Claus Parade Committee
Kiwanis Club of Owen Sound