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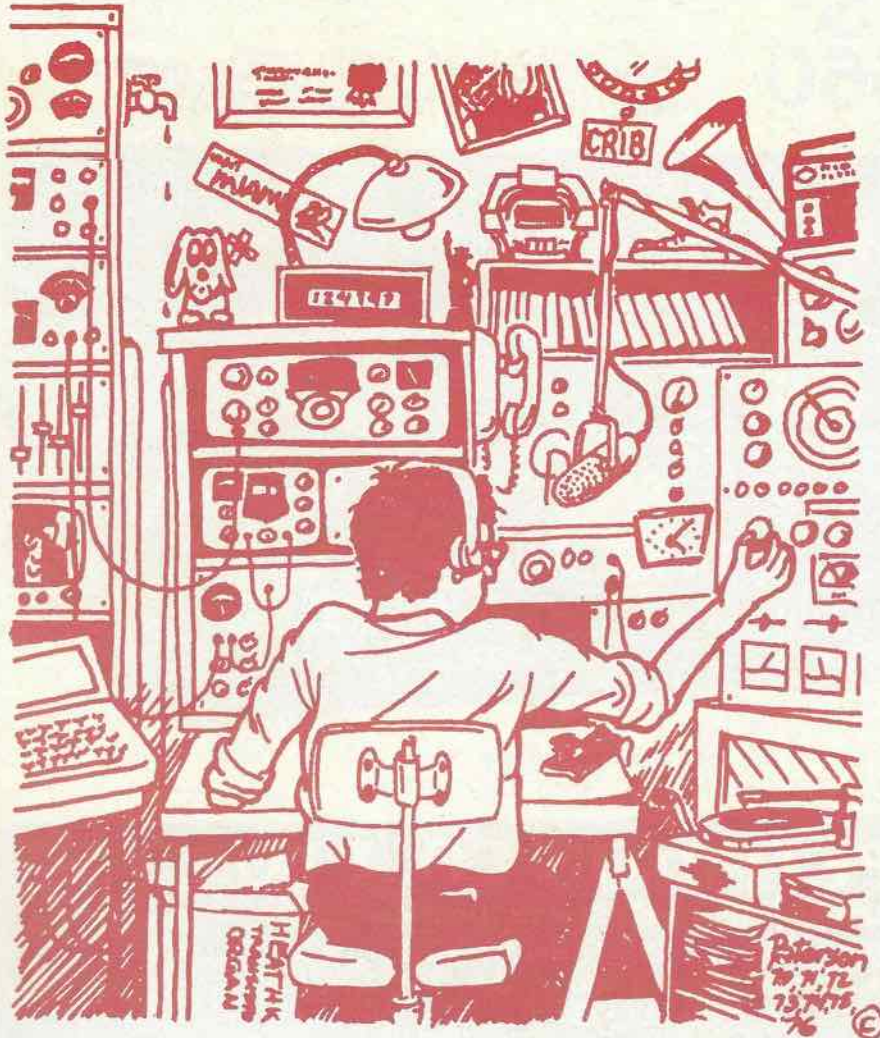
TCA



\$1⁰⁰

JULY
1982

The Canadian Amateur Radio Magazine

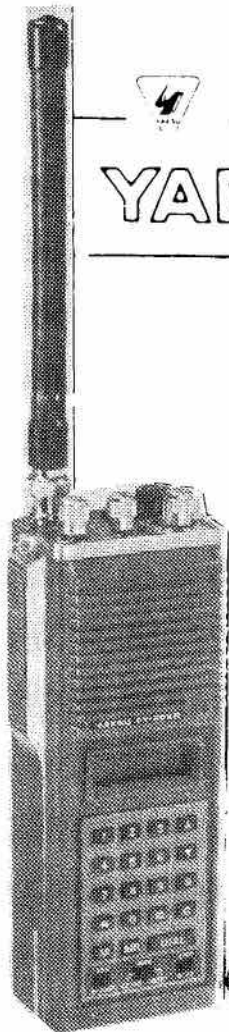


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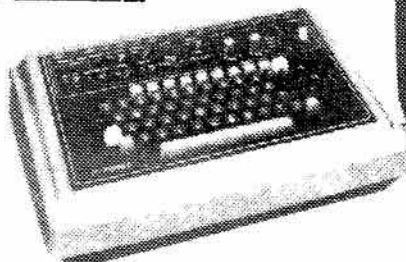


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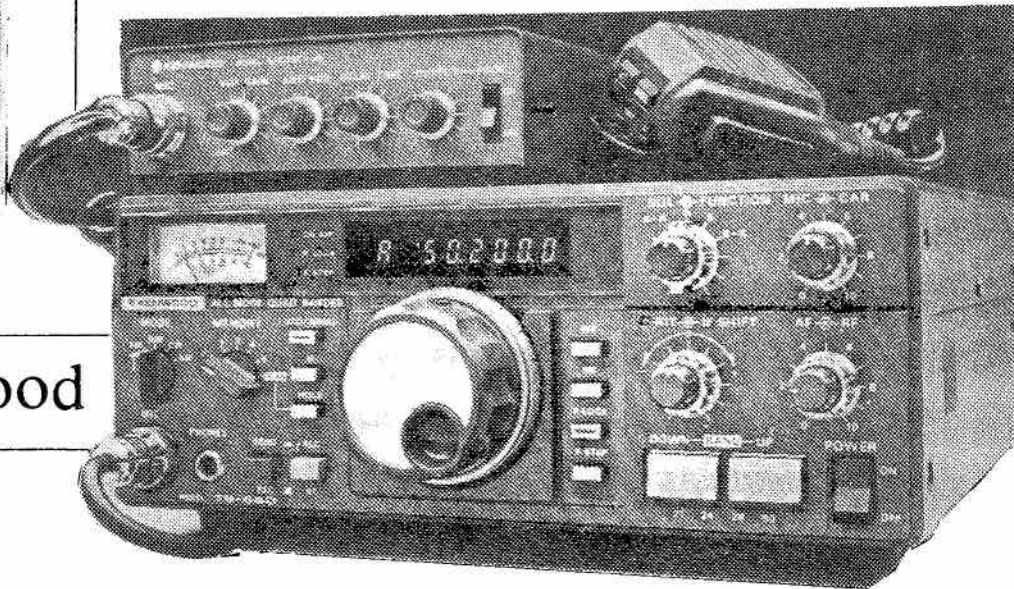


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Vol. 9 No. 11

Letters to the editor	Page 8
Symposium Report	Page 9
From the Editor	Page 16
Teaching Ham Radio Effectively	Page 22
VHF/UHF News	Page 31
Contest Score	Page 32
Canada Contest Results	Page 33
DX Column	Page 37
Con Com '82	Page 38
Em Com	Page 40
TCA Writing Guidelines	Page 41

TECHNICAL SECTION

A Helpful Handful	Page 44
Extend the Range of your Frequency Counter	Page 45
Signal Tracer	Page 47
Studying for Ditigal Amateur Ticket	Page 49

Thanks go to Joan Powell, Art Stark and Doug Burril for their help with this issue. Thanks also to the people at Runge Newspapers in Renfrew for starting us off on the right foot. **BIGGEST ISSUE YET.**

FRONT COVER

Artist's conception of station layout VE3ARS in 1971. Copyright 1971, J. Geoffrey Paterson, Printed with permission of the artist.

TCA — The Canadian Amateur is published in Canada 11 times per year to provide Radio Amateurs, those interested in radio communications and electronics and the general public with information on matters related to the science of telecommunications.

Unsolicited articles, reviews, features, criticisms and essays are welcomed. Manuscripts should be legible and include the contributor's name and address. A signed article expresses the view of the author and not necessarily that of C.A.R.F. Publications Limited.

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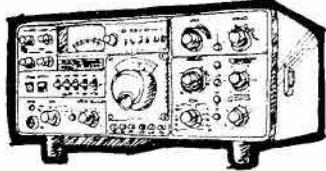
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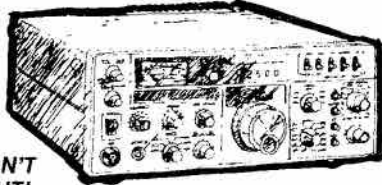
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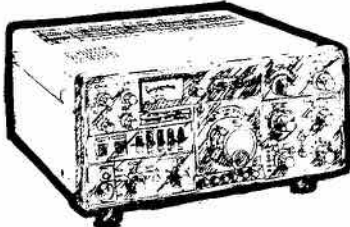
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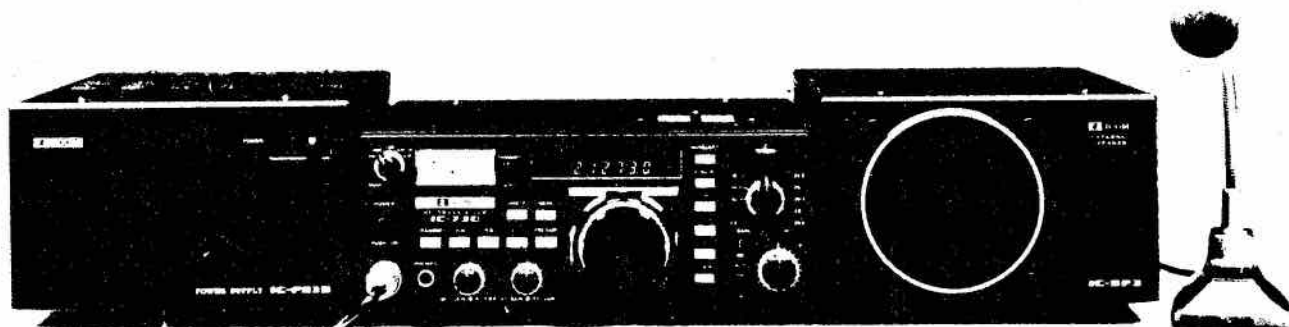
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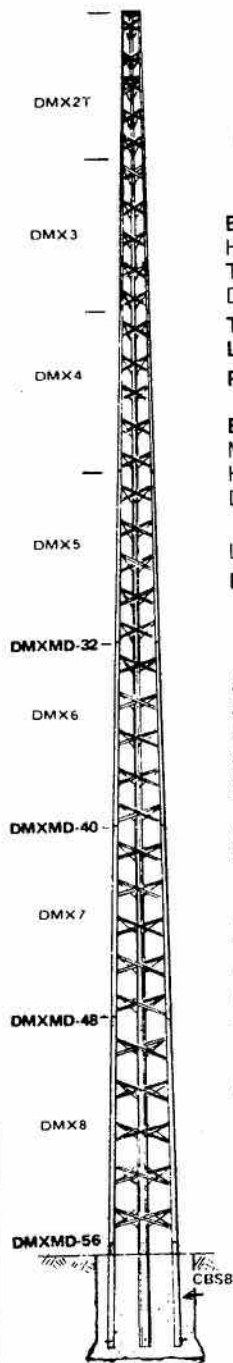




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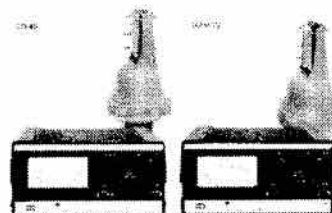
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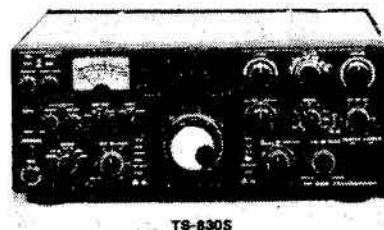
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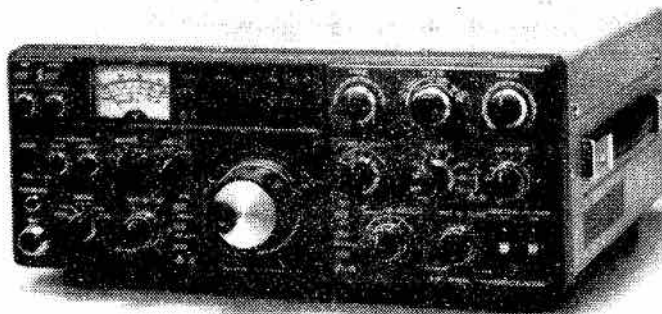


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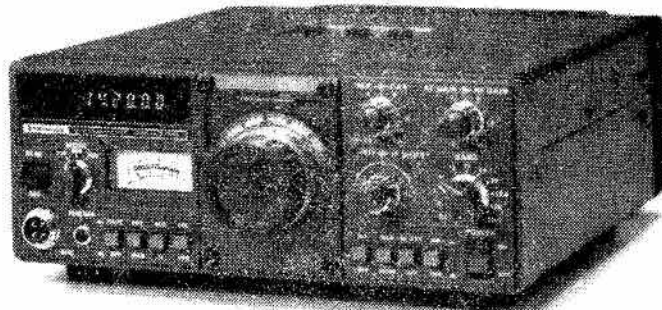
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Letters:

Dear Editor

I've just read the April issue of TCA to Gordon Webster of Victoria; you're most welcome for the Multi-7 article and I'm glad it has been of help. To the editor, your reply to VE3MFO complaining of "lack of material" I regard as so much bull-feathers!

My Multi-7 article was lost by your technical editor for almost a year after submittal. He subsequently apologized, asking for another copy (which I sent) and proceeded to misplace that one for several months.

Before Christmas last year, I submitted an April-Fools type of article, figuring it would be in plenty of time for the April issue. To date, I have yet to receive even an acknowledgement of receipt. Oh well, maybe you've decided to keep it for next April.

I enjoy writing these articles and I hope they are informative or entertaining but if the TCA staff keeps this up, I don't think you'll be seeing any more of my material in TCA.

Yours truly,
Ken Grant, VE3FIT
46 Merryfield Dr.
Scarborough, Ont.
M1P 1J9

Thanks for your comments Ken. I agree, lost articles are a pain for both author and editor, but it does happen. Case in print, your April Fools article. I lost it I think. I remember reading it and labelling it for April. After that, I cannot recall where it went. My records do not show that it exists even though I know it does.

As for technical articles, I can assure you that they rarely get lost. They are delayed because most of them are sent out to be redrawn if they include diagrams. We have standards we must keep and so we have someone redraw all diagrams to conform with our standard. This

causes a delay of up to two months. It cannot be helped.

I, for one, enjoy your articles and I hope you continue to submit them.

Dear Editor:

I found the article in May TCA, "A Wide Area Linking Idea" interesting although it still is taking a while to fully sink in.

Perhaps Northern Ontario is one area where wide area linking is badly needed. The south already has the VE3RPT UHF linking system which does a fine job.

Technically, linking can be done. In the north, the concept of linking faces not a technical challenge but a financial one.

There are still many areas in the north that have poor or no Repeater coverage at all but should. Just getting up a Repeater in these areas, where the Amateur population is small, is a great accomplishment. Even if an old tube type Repeater can be scrapped up from some basement, the cost of other items such as duplexer, heliax, antennas, etc. makes it far too costly for a small group. Such a venture in a larger city would be difficult.

For linking to be feasible up here, more sites will firstly have to be obtained for Repeaters. This is battle number one. Figuring out where the funds will come from to put up this Repeater will be battle number two. If one gets past those two hurdles, then linking could be looked at. However, at this stage, the cost would be beyond most groups.

Although there is a fair bit of Repeater activity in Northern Ontario, less than 50% of these Amateurs financially support a Repeater group on a regular basis. If one considers the rather small number of Amateurs we are talking about, it is not hard to see why

funds are very limited. In my experience most Repeater groups in the north have enough trouble meeting their existing operating budget without having to worry about link projects.

In conclusion, I think the Repeater linking idea is great. However, unless someone devises a method or scheme of financial funding such a project, it will never become a reality, unfortunately.

Gordon Woroshelo
VE3EYW

Dear Cary:

This is to congratulate you on the excellent article in the TCA for May 1982 titled "Inside the Department of Communications." This is certainly a subject on which Canadian amateurs should be informed, and the article should help in that direction.

I would also like to commend you for the continuing high quality of TCA, which regularly contains a great deal of information of direct interest to Canadian amateurs by Canadian amateurs.

I believe CARE is fulfilling a very excellent and useful service for Canadian amateurs. While I maintain membership in the other group, I do look to CARE for leadership in areas requiring a truly Canadian view.

Sincerely,
W.A. Roorck, VE3MBF

Cary:

Many thanks for the cover photo on the April issue of TCA. Was quite a surprise to all the Yukoners and myself.

73's VYIDD
Frank

Sixth Annual Amateur Radio Symposium Scarborough, Ontario, May 29, 1982

This sixth annual National Symposium on Amateur Radio once again gave the opportunity to discuss ideas and problems with representatives from the Department of Communications, and formed recommendations concerning our hobby for presentation to DOC.

When this Symposium takes place in your part of the country, my recommendation is to allow yourself time to attend. It is a "learning" session as well as a "working" one.

Welcoming remarks and explanation of the day's procedures were given by CARF President, DON SLATER VE3BID.

Participants then proceeded to the workshop of their choice for the morning session. All three workshops ran concurrently.

SYMPOSIUM CONCLUSIONS

Workshop 1 HF SPECTRUM PLANNING AND MANAGEMENT Moderator - Dick Atkinson VE3- JBO

US phone expansion on 20 metres

We usually have great difficulty operating in the "U.S." portion of this band. It was said that the U.S. already has the larger part of the phone band and concern was shown regarding loss of space for CW operation, with some wondering if Canadians would seek to make a downward move to accommodate established nets, as these would be curtailed.

The operating procedures of U.S. Amateurs, in many instances, leave much to be desired. Lower power restriction was suggested as a possibility, but unlikely ever to be instituted.

Although ARRL wants expansion, they oppose FCC's particular class split.

Nationally, a concerted effort should be made against expansion of U.S. phone bands.

11 of 15 showed hands to send a proposal to FCC. When writing to the FCC on this subject, one should read the Notice of Inquiry very carefully and address as many of the seven questions, (beginning of page 5, docket 82-83), as is appropriate. Some are inappropriate for Canadians to answer.

It is recommended that:

resistance and objection be made to the FCC proposal to expand U.S. phone allocation down to 14.150 MHz,

we endeavour to protect other bands from similar expansion, we protect existing 20M operation, local and national,

we protect international phone operation, and

we recommend power limitation associated with phone expansion.

These were accepted by the plenary session of the Symposium.

Japanese request for reciprocal operating privileges

Other countries polled have not responded. With 8600 first class operators (12 wpm - complex theory - allowed 500 watts); 35,308 second class (9 wpm - general theory - 100 watts); 58,485 novice (5 wpm - general theory - 10 watts); 803,000 no-code class (no code - simple theory - 10 watts allowed); it was suggested to allow first class only, subject to Canadian regulations as well as Japanese.

Some difficulties were noted: Canadians would need Embassy approvals, 6 months residence and station inspections. But, JARL claim they will assist with obtaining privileges before Amateurs arrive in Japan.

Information to Amateurs planning a trip to Japan, should be made available through the organizations.

It is recommended that:

reciprocity with Japan be restricted to Advanced Canadian and first class Japanese Amateurs,

Canada eliminate the endorsement by the Canadian Embassy,

Japan eliminate the checking of power input, etc. before entry.

Accepted.

Other concerns and uses of the HF bands

Regarding beacon frequencies, it was agreed they should be protected under "gentlemen's agreement" and that a list of frequencies be published. Amateurs should avoid beacon frequencies at all times.

The DOC is not considering legislation of a 160M bandplan. There was some feeling that a bandplan should exist in opposition to MCW on 160, while others felt control by "gentlemen's agreement" was a better method and that MCW could be encouraged on VHF to protect HF spectrum. Some thought that, because of HF congestion, code practice should be discouraged in these bands.

It is recommended that:

publicity be given to HF and VHF beacon frequencies and that Amateurs give protection to these frequencies by "gentlemen's agreement", and in the low portion of the 160 metre band, MCW and code practice be discouraged.

Accepted.

Contests and contesting -

It was felt that restraint should be used in creating and assigning new contests, as weekend priority on bands seems to be wanted by



Dick Atkinson, VE3JBO, moderator of the HF Workshop.



The plenary session begins.



Leigh Hawkes, VE1ZN, CARF Atlantic Ass't. Director.



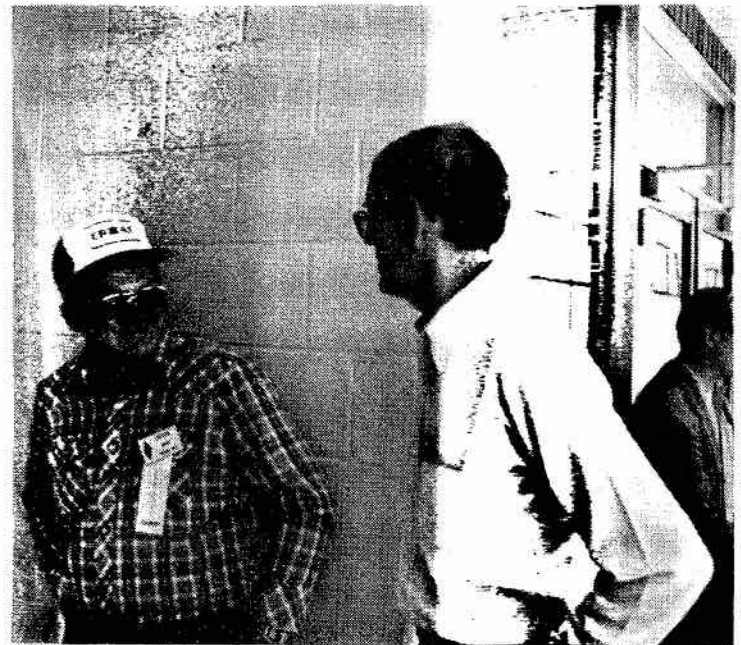
Paul Edgley, VE3PQ, reading summary from Workshop No. 2.



Jean Evans, VE3DGG, had a chance to meet with Ontario New Ass't. Director E. Carew, VE3MEW.



Don Slater, VE3BID, discussing with DOC's Lloyd Nelson.



Geoff Smith, VE3KCE, Ontario Director, we get to meet the past director, Norm Waltho, VE5AE. Norm gets an award.

all groups for contests. Restraint in issuing special prefixes was also suggested.

In order to open up new blocks of 2 letter calls, VA and VF might be used.

No recommendations.

Workshop 2 VHF SPECTRUM PLANNING AND MANAGEMENT Moderator - Paul Edgley VE3PQ

Six metres

It had been proposed that the 6 metre band could be used for inter-repeater linking in some areas of Canada where 2 metre repeaters were too far apart for linking on UHF frequencies. It was argued that this could lead to increased interest in this band. However, it was pointed that linking is not permitted on frequencies below 220 mhz according to licensing policy (guidelines).

Opinions were offered with respect to reliability of propagation for such applications. Interference could be a problem, both to and from the linked system.

Show of hands: 3 in favour, 7 against

The growth of the 6 metre band will be gradual, dependent on increased availability of equipment and Amateur interests.

It is recommended that:

there be no regulation or guideline changes at this time.

Accepted.

220 mhz band (see Sept. 81 TCA, page 26)

It was noted that the 220 MHz band is not being more fully utilized because (1) a large area reserved for packet radio use only has not had the expected acceptance and growth within the hobby as anticipated, when the sub-band was set aside; (2) cable TV interference makes large portions of the remaining unuseable. (see "CATV INTERFERENCE" in this issue).

There were few people in attendance at this workshop who had experience in packet techniques.

The opinion was stated that packet was a spectrum efficient technique, which could co-exist with other modes and therefore the large portion of spectrum reserved was unnecessary.

It was recommended by the workshop that:

the packet restriction be removed and assignment of sub-bands for various techniques be left to the Amateurs,

on the same basis, similar reserved segments of other bands as specified in TRC25, schedule III also be reviewed, (a bandplan as proposed by VE3HWN was suggested as a starting point), and possibly section 51 of TRC-25 should be reworded: (presently implies that packet is a pulse mode).

Plenary discussion:

Eventually Amateur Radio will likely move more in the direction of packet transmission. For the present requirements, the band width may be a bit elaborate.

The digital system permits teletype users to access a node using the same equipment they have today, and at any speed with no additional expense. Their transmissions get out on an inter-node link to another node and consequently conserve the use of the HF spectrum.

It was felt that before any proposal was made to DOC, that a small task force be formed to look at previous symposia and the rationale behind their decisions and come up with a more realistic proposal, based on the analysis of what the requirements actually are and probably will be over the next two decades.

It is recommended that:

a committee should be established to study the requirements of each mode on the 220 mhz band and to develop a new band plan, which takes these requirements into account.

Accepted.

This band is presently restricted by DOC regulation to use of A3 and F3 modes only. There is a growing interest in the use of other modes in this area.

An Ottawa Amateur requested authorization for use of A5 in this band, but was refused on the basis that the band is shared with the Fixed service, which has primary use. Amateur use must be compatible.

According to the DOC, use by the Fixed service is increasing.

It is recommended that:

Amateurs should move only systems which will be compatible with the Fixed Service into this band from other bands to clear spectrum space. Example — inter-repeater links could be moved from the 430/450 band, clearing a space on that band for increased use by ATV and/or satellite users.

Accepted.

Repeater Co-ordination

Problems of co-ordination of repeater frequencies by regional repeater councils are being encountered in some areas of the country.

It is recommended that:

DOC could require that an applicant for a repeater licence have a letter of approval from his local repeater council or individual responsible for co-ordination of repeater frequencies, before said licence is issued. (This is reportedly being done unofficially by some DOC regions).

Plenary Discussion:

Although presently on the west coast, if application is made for a repeater (a request for a land station not on premises), the DOC refrain unless the repeater council involved has endorsed the pair, this is not a national policy.

On the new licence application, there is a box to be checked if applying for repeater use.

It was felt that, in this informal way of requiring a letter from the repeater council, no extra work load would be added to DOC, as

CRAG (*Canadian Repeater Advisory Group*) and the repeater councils would handle all the research. More co-ordination would be needed between councils.

While DOC may have power to institute such a requirement, the very nature of Amateur Radio Regulation does not envisage this.

The question of whether operational preferences of these councils may be such as to curtail special use of frequencies (experimentation) arose.

Caution was suggested in requesting more regulation as that type of activity could develop further, giving second order consequences.

Beacon frequencies

Although not dealt with, because of lack of time, the moderator asked that VHF, UHF and microwave beacon frequencies be shown on future bar charts.

(Although I promised one for this issue, it became necessary due to its complex nature, to put it off until September. Ed.)

Workshop 3 INTERFERENCE AND REGULATIONS

Moderator Keith Bentley VE3DHL

(a) Enforcement and LACK of enforcement by DOC

Resources, not legal powers, is a problem as far as implementation of regulations by DOC is concerned. Enforcement is expensive, time consuming and good solid evidence is necessary when presenting a case.

On the average, there have been 6-12 prosecutions annually. Most of these have been for unlicensed or out-of-band operation or illegal use of linear amplifiers.

Attempts to resolve problems by mutual agreement; letters of warning; and temporary suspension of licence (which requires the Minister's approval), are the usual sanctions before a court case is considered.

In the particular concern of illegal activity below the 10 metre band, once again lack of resources

and cost were cited as reason not to have flying investigation squads used by DOC. The possibility of these offenders gaining privileges by "squatters' rights" was pointed out by the Amateurs.

In regards to radio gear, DOC said possession and use without a proper licence is illegal, but importation and manufacture is not; and to search and seize require warrants.

Suggestions to the Amateurs were to obtain and document as much data as possible before calling DOC; to educate their members about the situation in general and how to handle it; not to take vigilante action and to publicize instances of prosecution.

It is recommended that:

CARF should obtain information about prosecutions from DOC in Ottawa for publishing in TCA and distribution to other organizations for publication in their own journals. *(See Editors Comments in the next issue of TCA.)*

CARF should issue an article on what Amateurs can do to help, for publication in club journals as well as TCA, and

DOC should prosecute one or two offenders a year to encourage Amateurs to observe the Regulations.

Accepted.

(b) CATV (see CATV INTERFERENCE, in this issue)

Cable TV interference to Amateurs and other services, as well as the susceptibility of the cable to incoming signals, are serious concerns to the Amateurs.

In a large number of cases, radiation signals well beyond standards, are being emitted into the 2 metre and 220 MHz bands by the cable companies. With channels proposed throughout the HF spectrum for Telidon, concerns regarding reverse channels were also viewed.

Even though the DOC would back the Amateurs, it was thought that the problem could become political, due to pressure from the large TV viewer group to stop interference, even though we have

every legal right to operate.

The question of whether the required standards are adequate, even when cable companies do adhere to them, arose.

To change standards is very difficult, and the suggestion for new technology, was to try to affect it when it is initiated, rather than change it later.

The DOC meets with cable companies and there are practices which must be followed and compliance must be shown when installation is ready for use.

Although licenced by the CRTC, DOC, through BP23 and 24, do have control over the technical performance of cable systems.

It was asked that the DOC investigate whether a directive to a CATV for moving frequency could be made by DOC on their own authority.

Maybe 15 or 20 years down the road, fiber optics will resolve these problems, but for now, the DOC will be negotiating with cable companies who are not following requirements regarding leaking, and it won't be an "overnight" cure.

It is recommended that:

CARF should establish a CATVI committee to study this entire subject and to maintain liaison with DOC, becoming much more competent and informed about the whole problem,

liaison with other services such as police, land mobile, air service, security, etc. be introduced.

TCA keeps people informed of what is happening. *(You help supply the information and I will publish it. Ed.)*

Plenary discussion:

The points made in the workshop were reviewed and discussed in full. The fact that an EMI committee already exists was brought to attention, but it was felt that this CATVI problem required special attention.

Accepted.

Industrial noise in the Radio Spectrum

Spray noise from paging transmitters is effectively desensitizing 2 metre repeaters and possibly individual stations operating with weak signals on the low end.

Evidently regulations are not adequate, since pagers are apparently within the specification, or else spray noise is not covered.

REPORT ON EMI/EMC STANDARDS

(Electromagnetic interference and compatibility)

In order to improve the interference situation, with respect to both susceptibility of domestic equipments to radio transmitters and unwanted radiation in the ham bands, standards of EMC performance must be written and applied either voluntarily or by legislation.

The EMC standards activity in CSA ground to a halt over a year ago, due mainly to lack of funds, and is still halted. There is hope that it will revive in the late summer or fall. In any case your CARF representative serving on the appropriate CSA committees is frequently pressing CSA and government people to get on with it.

Reports on interference from TV cable systems in the 54-216 MHz region are increasing.

We are keeping close watch on the G.E. Halarc light bulb. This bulb provides 150 watts of light but consumes only 50 watts of power. To do this a 20 - 40 KHz, 1000 volt 10 watt RF oscillator (complete with harmonics) strikes an arc in a gas discharge which is then maintained by the 120 V mains.

Reports of QRM from digital devices such as computers, TV games, etc. increases.

Apart from the CARF activity in the CSA standards meetings what can we do to support the programme?

Here are two suggestions:

1. At every opportunity tell people, particularly your M.P. of the potential seriousness of the EMI

problem (interference to vehicle electronic control, medical devices etc.) so that politicians will support DOC to get on with the job of EMC.

2. If you become aware of new sources of EMC or susceptibility that have a national interest tell the EMI committee in your club and/or provide a summary of the problem to CARF.

The CARF EMI Committee chairman is:
Barc Dowden, VE3 TT
29 Pellan Cr.
Kanata, Ont.
K2K 1J7

Plenary Discussion

SELLING AMATEUR RADIO Moderator Don Slater VE3BID

The image sometimes projected, in regard to Amateur Radio, was felt to be rather misleading. In particular when presented by some advertisers as being power, power, power oriented.

Rather than aiming to obtain a quantity of new people into the hobby, it was suggested that more assistance be given to those truly interested, who are trying to master the necessary information required.

With the forthcoming International Communications' Year, which is set aside by the United Nations, publicity for Amateur Radio should fit in very nicely.

Keeping close contact with teachers of electronics, and more material under the hobby section in libraries by various Canadian groups were also suggested.

It is recommended that:

CARF further educate the public regarding Amateur Radio on a national basis.
Accepted.

A number of topics were unable to be covered due to lack of time.

Don Slater, CARF President, thanked all those who attended and participated in the Sixth National Symposium. Special thanks was given to the Scarborough ARC.

On behalf of the Scarborough Club, Tom Hedges VE3GZV thanked the Symposium for the opportunity to host this year's meetings and especially thanked Thelma Woodhouse VE3CLT of the Scarborough Club.

JOAN POWELL VE3FVO
Symposium secretary

In attendance were:

Bill Rook	VE3MBF	Agincourt
Leo Kelly	VE3HUN	Scarborough
Tony Fegan	VE3QF	Scarborough
Tom Hedges	VE3GZV	Scarborough
Mary Hedges	VE3COH	Scarborough
Geoffrey Smith	VE3KCE	Aurora
John Illiffe	VE3LEC	Newmarket
Phil Gebhardt	VE3ACK	Aurora
Joe Fairlie	VE3LUJ	Weston
Thelma Woodhouse	VE3CLT	Scarborough
Steve Clare	VE3DBT	Don Mills
Gordon McEachern	VE3MUI	Toronto
Serge Bertuzzo	VE3CHZ (DOC)	Weston
Lloyd Nelson	(DOC)	Ottawa
Bill Dillon	VE3KDX	Toronto
Tom Atkins	VE3CDM	Willowdale
Paul Edgley	VE3PQ	Agincourt
Irene Williams	VE3AUR	Agincourt
Leigh Hawkes	VE1ZN	Armdale N.S.
Keith Bentley	VE3DHL	Kleinburg
Craig Howey	VE3HWN	Waterloo

Norm Waltho	VE5AE	Moose Jaw, Sask	Rick Page	VE3IQZ	Peterborough
Bill Carew	VE3MEW	Peterborough	Johannes Holmboe	VE3LKR	Don Mills
Terry Darling	VE3CAB	Clarksburg	Ivan Payne	VE3INQ	Weston
Bill Wilson	VE3NR	Ottawa	Mike Connolly	VE3MDC (DOC)	Toronto
Doug Burrill	VE3CDC	Ottawa		C)	Toronto
Larry Allen	VE3FXQ	Weston	Mike Power	(DOC)	Newmarket
Reg Pearson	VE3RG	Toronto	Fred Robinson	VE3GCP	Hamilton
George Bennett	VE3DHU	Scarborough	C.B. Taylor	VE3OR	Ottawa
Don Slater	VE3BID	Lombardy	Cary Honeywell	VE3ARS	Ottawa
Jean Evans	VE3DGG	Downsview	Lloyd Morgan		Toronto
Joan Powell	VE3FVO	Nepean			
Carman Knox	VE3NLK	Don Mills	Larry Greetham	VE2TE(DOC)	Gatineau
Jerry Slattery	VE3MBL	Scarborough	Harry MacLean	VE3GRO	London
Gerry Robertson	VE3GNI	Scarborough	Raymond Mercure	VE2BIE	Hull
George Wilson	VE3GEW	Scarborough	J. Cabeclin	VE3ABG	Willowdale
Joe Knight		Scarborough	Jason Lauckner	VE3LFT	Wheatley

ACKNOWLEDGEMENTS

The CANADIAN AMATEUR RADIO FEDERATION wishes to thank all those who made the 1982 NATIONAL AMATEUR RADIO SYMPOSIUM a successful and rewarding event —

— to those Amateurs across Canada who sent in written material.

— to those who gave of their time and money to attend personally,

— to the DEPARTMENT OF COMMUNICATIONS for its support and the participation of its officials,

— to the Moderators of the various sessions

Don Slater VE3BID
 Dick Atkinson VE3JBO
 Paul Edgley VE3PQ
 Keith Bentley VE3DHL

— to the SYMPOSIUM Committee

Craig Howey VE3HWN
 Debra Bee VE3IEH
 Irene Williams VE3AUR
 Bill Rook VE3MBF
 Gord MacEachern VE3MUI
 Steve Claire VE3DBT
 Thelma Woodhouse VE3CLT
 Jean Evans VE3DGG
 Reg Pearson VE3RG
 George Bennett VE3DHU
 Jerry Slattery VE3MBL
 Bob Chrysler VE3IEL

— to the SCARBOROUGH ARC for their sponsorship.



The CARF crew at the Symposium in Scarborough. Left to right: Bill Wilson VE3NR, (Past Pres.); Doug Burrill VE3CDC, (CARF News Service); Don Slater VE3BID, (President); Bill Carew VE3MEW, (Ass't. Director, Ontario); Morm Waltho VE5AE, Mid West Director; Craig Howie VE3HWN, (Ont. Director); Geoff Smith VE3RCE, (Ont. Director); Gary Honeywell VE3ARS, (The Editor); Sitting: Jean Evans VE3DGG, (CARF QSL Bureau Manager); Thelma Woodhouse VE3LLT, (Symposium Chairperson); Joan Powell VE3FVO (CARF QSL Bureau).

If you have any questions about the operation of CARF please feel free to ask. Write to:

The Canadian Amateur, Radio Federation, P.O. Box 356, Kingston, Ont. K7L 4W2.

See your name in print. Write for TCA. Deadline for October is Sept. 1, 1982. Send material to:

TCA, P.O. Box 2610, Stn. D, Ottawa, K1P 5W7.

We goofed — Sorry!

In the last two issues, there were mistakes, misprints and outright blunders. For instance;

May TCA page 18 -VE3UD goes Silent Key. The comment on the iceless antenna should have read "He was the inventor of the 'Iceless Antenna' (using coax for antenna wire)."

Page 21 - Canada Awards Update. I am not sure but I think the Canadian Awards directory is \$8.00. Check with Garry Hammond, VE3GCO, or Eric Walden VE3HLL. R.R. No 1, Gowanstonn, Ont. NOG IYO. We will try to correct

ourselves by the September issue if we obtain the info.

I have been informed by Martin MacGregor, VE7CGM, that there are circuit errors in his article "Two Gallons by the Bootstrap". I will try to include them in the next issue.

June TCA page 9 - Watch Out, Part 2, Second last paragraph, second sentence should read "CARF can **hardly** be held responsible for events stemming from a concession sought by an American organization and promoted by the

CRRL for the benefit of American Amateurs."

Page 19 - A New Dial for the Big Talk.

Page 39 - A Custom Console. Credit should have been given to Don Prickett, VE5KP. 41 McAskill Crescent, Saskatoon Sask. Missing credits has been a problem with TCA for a number of years. For those who have been victims I am very sorry. Be assured that with our new system (see FROM THE EDITOR) these problems and others are behind us, we hope.

ALL ADVERTISERS NOTE:

As of July 1, 1982, all advertising copy, material and changes should be sent directly to:

DON SLATER
Advertising Rep., T.C.A.
P.O. Box 356
Kingston, Ont. K7L 4W2

From the Editor

VE3 ARS

Ok, you asked for it. In letters, phone calls and recommendations at symposiums, you, the Canadian Amateur, have asked for an Editor's Comments column. The reason being that you would like a column that you can address directly when commenting on matters concerning Amateur Radio in Canada. You may not like what I have to say but if I can get you thinking about important questions and issues, at least I will have accomplished something.

TCA — THE FUTURE

You have probably noticed the new look on the inside of TCA this month. We have changed printers. The new company is RUNGE NEWSPAPERS of Renfrew, Ontario. I won't go into the reasons for the change, except to say that the Editor will now have complete control over the content and make-up of TCA. This is not to say that the Editor did not, in past, have control over Editorial content, but that the operational running of the magazine was split too many ways, with the publisher having the final say. Nor did we have a proper method of proofreading, which explains the number of errors that crept into each issue. The production is very important to the overall running of the magazine, and I am sure everyone in CARF realizes the fantastic job that Steve Campbell did in developing TCA into what it is today. There have been many issues in the past where we were glad to have Steve around to "gloss up" and expand the content with his artistic ability and organizational talents. When I first took over the job as Editor, in the summer of 1980, I relied heavily on Steve for help in putting out my first issue. His work on the October issue of that year can only be described as extraordinary. The reason? The deadline for the October issue is in August. Who wants to write for any magazine in the summer? The pressure to fill an

issue is greatest at this time. Invariably, Steve would come up with something to help save the issue.

You have all seen the covers for TCA over the past 8 years. You have all commented favourably on them for the past 8 years. The thanks for these and other artistic aspects of TCA go wholly to Steve.

Beginning with this issue, all jobs aside from the actual layout and fabrication of TCA will be entirely mine. I will need lots of help. This is especially true when it comes to articles. Please, when submitting articles, follow the guidelines set out for you in the article "Guidelines for the Preparation of Articles for TCA — The Canadian Amateur", printed elsewhere in this issue. More important, please submit articles for publication. I would like to expand TCA and make it larger. This requires input from YOU the reader.

As of September, we will be paying for articles on acceptance rather than on publication. If an article is not accepted, we will write and tell you why. Payment will be immediate rather than delayed as is the case now. Return of material cannot be guaranteed unless requested. The same is true for pictures; however, if return is requested, you will speed the process up by supplying a self-addressed, stamped envelope with your article. This will be returned to you with the article as soon as it is returned from the publisher. Hopefully you will receive both article and payment before seeing it in print. One of our improvements.

Finally, TCA now has its own post box and telephone. This will make it easier to get in touch with me. No longer will my neighbours receive letters for me and have to deliver them by hand. All correspondence to the Editor and articles for publication must now be sent to P.O. Box 2610, Station 'D' Ottawa, K1P 5W7. Do not send anything to the old address. Also, all material for the column writers,

(ie Contests, DX, CRAG, VHF/UHF) and all technical articles **must** be sent to the address of the people writing these columns, **not to me**. It takes much longer if I have to deliver them. As for the telephone number, this is a convenience more for me than for TCA. I never liked being interrupted at dinner or after 11 at night. My wife's objections were a little more strenuous on the subject as she has to use the phone too sometimes. The number for TCA is now (613) 731-6102. Ninety percent of the time a machine will answer, because I have better things to do than sit by the phone. I know most people dislike talking to a machine, however if you want to get through to me this is how it is done: The machine will answer. My voice will identify the line, and then ask you to leave your name, number, the time you called, and the time that you may be reached. I will call you back. There is an advantage to this. You may now call at off-peak hours, when calling is cheap, and leave a 45 second message or request a callback. During the weekdays, I will call, usually during the evening, except when I am able to check the machine from work, in which case I may be able to call you immediately. The best time to call is still around 9 pm weekdays and all day Saturday and Sunday.

These changes have been made to improve TCA for you the reader. If you disapprove, please let us know why. If you approve, spread the good news around.

TCA is becoming known around the world as well. We have a reputation for accuracy that is acknowledged and appreciated by many other National Societies. This is your magazine. Make it work for you.

SECTION 50

I thought that while I was on the subject of accuracy I would defend what we have been saying about Section 50. As most of you

must know by now, CARF has maintained that Section 50 is only a statement of what has been DOC policy since 1952. CARF also went on to say that allowing American Amateurs the use of the DX (or Canadian) subbands would be the thin edge of the wedge in allowing the US to expand the US phone subbands. The Canadian Division ARRL, or CRRL, has maintained that it is a change of policy which should be changed back to the way it was. In a well-circulated story call "Section 50, A CRRL View" (and various other names) CRRL stated that people were wondering if they were getting the full story out of CARF regarding Section 50. They then went on to retell the story of how the DOC was disregarding the needs of Amateurs by modifying or changing their policy on the section. The premise for this whole thing rests on whether or not DOC has changed the policy. Please read the following letters directed to Art Stark, VE3ZS, CARF/DOC liaison and others:

May 25, 1982

Mr. A.P. Stark, VE3ZS
Canadian Amateur Radio
Federation Inc.,
(DOC Liaison)
22 Lyall Avenue,
OTTAWA, ONTARIO
K2E 5G8

Dear Mr. Stark:

This is further to my letter of May 5th and refers to our meeting on May 12th concerning section 50 of the General Radio Regulations, Part II.

We have been unable to confirm that this question of the interpretation to be placed on Article III of the Canada-US Convention (Treaty Series 1952 No: 7) was ever in the past referred to a departmental lawyer for an opinion. However, notwithstanding whatever explanations or instructions may have been contained in Radio Inspector's Manuals of Instructions, we know that on a few occasions at least the question was dealt with in the Licensing Policy and Regulations Section. For many years that Section was

responsible for expression of legal opinions, with or without the advice of a departmental lawyer. Consequently, I am attaching a copy of the policy statement that was prepared to accompany a letter of February 15, 1971 to Mr. Welling, Editor Election Magazine, which was signed by Mr. Wilson, then Director General, Telecommunications Regulation Branch.

I trust that this documentation will confirm that **section 50 is merely the legal expression of what has been the official policy of the Department throughout the years since 1972.**

Yours truly,

G.C. Brooks,
Director,
Operations Branch
Telecommunications Regulation
Regulatory Service.

Attachs.

(Bold type is ours. Ed.)

Dear Sir:

Attached for your information is a statement concerning policies and procedures in respect of the authorization of licensed amateurs of other countries to operate while temporarily in Canada, including a list of countries with which reciprocity is recognized for that purpose.

Yours truly,

W.J. Wilson,
Director-General,
Telecommunications Regulation
Branch.

RECIPROCAL AMATEUR OPERATING PRIVILEGES IN CANADA

1. Canadian regulations provide for authorizing non-resident amateurs to operate an amateur station while temporarily in Canada if they hold a licence issued by their own country and that country grants similar privileges to Canadian amateurs. For that purpose, Letters of Authority valid for the duration of the visit or for a period of up to one year are issued which **permit operation in accordance with the**

provisions of the foreign licence, but only to the extent that there is no conflict with Canadian regulations. This includes the use of their own call signs, appropriately suffixed to indicate the Canadian area of operation. The Letter of Authority is issued free of charge and may be renewed if necessary.

2. Reciprocity is recognized in respect of licensed amateurs of Belgium, Ecuador, The Federal Republic of Germany, France, the Grand Duchy of Luxembourg, Israel, Mexico, the Netherlands, Nicaragua, Norway, Peru, Senegal, Sweden, Switzerland, Uruguay, the U.S.A., and Venezuela.

3. In addition, licensed amateurs who are citizens of any Commonwealth country are eligible for reciprocal amateur operating privileges in Canada *unless* there is evidence that such a country does not grant similar privileges to Canadian amateurs.

4. A Canadian citizen residing in any of the countries listed above or a Commonwealth country may, similarly as a citizen of that country, be authorized to operate an amateur station while temporarily in Canada.

5. In considering the granting of *temporary* operating privileges to visiting amateurs, Regional office have been requested to base their decisions on documents submitted by mail or in person and not to require a personal interview or examination. This procedure in most cases should enable the visiting amateur to obtain authorization by mail before coming to Canada and thus avoid border crossing difficulties.

* Visiting U.S. amateurs are authorized by a special pre-printed permit because of the volume of applications.

(Editor's Note: Bold printing is ours. The "pre-printed permit" for U.S. visitors abolished in 1979, eight years after the above was written.)

CARF has been telling you the truth! DOC has confirmed our stand on Section 50. It is a pity that we had to expend so much time, energy and money only to confirm

something that we knew as fact many years ago. It is also a pity that so many of you believed outright what the CRRL was saying. Since the CRRL went to so much trouble to make sure their article received the greatest amount of publicity possible, I can only shudder at the amount of damage they have done. They had the same information and facts that CARF had. They chose the one path that would do us the greatest possible harm in our relations with DOC, misrepresenting DOC policy on a national and international basis.

Perhaps a little bit of background is in order here to help explain CRRL's actions. In 1980, Canadians were asked to comment on Section 50 by both CARF and CRRL. Shortly after CRRL brought up that subject, FCC began making noises about expanding the U.S. phone Sub-bands. There was not sufficient positive comment on either issue in order for FCC to pursue the matter. Except for the widely publicized campaign by CARF to set the matter straight on Section 50, very little was done in Canada either. CRRL was quite put out by a CARF News Service bulletin that claimed that CRRL had not done its homework on Section 50 and should at least know the facts before making claims. A follow-up article by VE3ZS, "More on Reciprocal Operating", and a CARF article, "Canadian/U.S. Reciprocal Operating -- The Real Story" both in November 1980 TCA spelled out the policy of DOC in 1980. The article also went on to state CARF policy on the subject. That policy, which has been supported by the letter from DOC, is the same one that CARF has upheld to this day. Unfortunately CRRL had their own interpretation. They are now claiming that they meant practice, not policy. If they had meant practice they would have said practice. DOC, by the way, is not in the habit of agreeing to the violation of international agreements.

It might interest you to know as well that not only did CRRL decide on its own that DOC was changing policy, it even managed to con-

vince ARRL in Newington of the same thing. Mitch Powell, Canadian Director for the ARRL, and CRRL president, drafted the proposal submitted to DOC by ARRL on the same subject, based on the same error of fact. This was done on behalf of Canadian Amateurs! At least one bulletin editor decided to speak up. This west coast Amateur asked DOC if they were considering a change to Section 50. He was told that CRRL had told them that this is what Canadian Amateurs wanted. CRRL never asked me about it! Did they ask YOU? CARF has been asking for comments on this matter since 1980 and a vast majority (over 80 %) have said they reject any change to the system as proposed by CRRL. The west coast editor asks the same question. Who did they ask? As far as I can gather, they asked themselves, and ARRL.

Since CRRL decided to make public the letter from the President of the CRRL to the President of CARF, I will join the fray. I reprint only the text, since the list of officials contained on the letterhead include an Amateur who was not an official of CRRL at that time. He was not pleased.

Letter

Mr. Donald Slater, VE3BID
President, Canadian Amateur
Radio Federation, Inc.
Box 356
Kingston, Ontario K7L 4W2

Dear Don,

I would like to acknowledge your article "Watch Out" in 1982 March TCA, and make the following comments.

1. ARRL is not using CRRL in order to have DOC modify Section 50. ARRL does not interfere in Canadian affairs.

2. Elimination of Section 50 will not be a cause of U.S. phone band expansion. Retention of Section 50, as it now stands, could be a cause. Let's reason this out. FCC thinks that DOC is being unfair. If U.S. phone bands were expanded to become the same as Canadian phone bands, U.S. amateurs could once again operate on Canadian phone bands while in

Canada. The warning signs are already there. FCC is prepared to give phone privileges on 14.15-14.2 MHz to all U.S. Amateurs, General-class and higher, even though ARRL asked that such privileges be for Advanced and Extra-class Amateurs only. FCC is also talking U.S. phone band expansion on 80-10 meters, something that ARRL never requested.

I'm sorry, Don, but I think you have it all wrong. I'm afraid that Canadian amateurs may be paying dearly for the hard line you are taking.

Yours truly,
A. Mitch Powell, VE3OT
President, CRRL
Canadian Director, ARRL

In view of what I have previously stated, paragraphs 2, 3 and 4 are open to a lot of questions as to their accuracy. Paragraph 1 is ok. If you notice, the petition they circulated recently did not ask for comment on Section 50. How could they? They know the answer and how different it would be from their proposals.

As a side note to this, the expansion of the U.S. sub-bands is almost assured, and not just the 20 metre band. The ARRL president has already stated in the 'W5YI Report' that the long range ARRL plans are to achieve the expansion of all the US sub-band allocations, and that Region 2 IARU members have agreed not to object to move. I wonder how the Mexicans are going to take that. I know I don't like it, and I am in Region 2 as much as you are! Yes that is right. According to the President of the ARRL, Region 2 IARU, (US, CANADA, MEXICO being the large part of it) is not objecting to the expansion. Is this what ARRL is telling the FCC? It is important that all of us comment to FCC on the matter. Make sure you address all of the questions they ask. We can still fight. You never know, we might yet prevail.

If you have stayed with me this far, you will also be interested in the next bit. Where is your money going? In CARF, your \$15 goes into producing TCA, regulations manuals, Amateur and Advanced

Amateur certificate guides. Your money goes to support the CARF's outgoing QSL bureau, the national symposiums, and support to clubs across Canada. It provides transportation for your **elected** officials to the annual directors' meeting and the Annual General Meeting. Your money provides a very small amount of the expenses incurred by the Ottawa Committee in defending your rights and privileges to DOC and other Government agencies. The rest of these expenses are contributed by the people involved. I, as Editor of TCA would love to come and speak about TCA at your club. I cannot, because neither I nor TCA nor CARF can afford it. We have money, but we spend it for the good of Canadian Amateurs. When requested to do so, CARF will, on some occasions, send a representative from the head office to a major convention. Our normal method, however, is to send the Director from the region.

The CRRL, on the other hand, was given (or voted) \$8000 (US) by the ARRL board of directors. According to May 1982 QST, \$9000 was given to the Canadian Director alone. Canadians get (at most) 3 pages in QST. CRRL will counter that most of your money is going to QST and to the support of the field activities. Yes the SCM's, SEC's, STM's and Managers of QSL bureaus also get sums of money. I quote from their own words "For certain travel in furthering ARRL organizational activities" (same issue QST). Most of you don't know it but the SCM's SEC's are responsible to Newington, not London, Ontario.

Figure it out mathematically. Let us take approximate figures. If we take only the money put into Canadian Amateur radio and money taken from Amateurs it looks like this:

CARF Membership (approx)	5600
CARF Fees per year	\$15
Total	\$84,000
amount working for Canadian Amateurs	\$84,000

CRRL Membership (approx)	5700
CRRL Fees per year	\$38 (depends on exchange)
Total	\$216,000
amount working for Canadian Amateurs	\$17,000 (US)

The membership figures are not accurate. CARF has increased several hundred members since the start of the year. We are still down from last year by quite a few members. The CRRL has dropped nearly 1800 members since the start of the year. (If you don't believe me check the figures.) With the Section 50 fiasco and the drop in memberships on their minds, I can assure you that CRRL treads quietly whenever ARRL decides to act against the interests of Canadian Amateurs. American Amateurs are not pleased with CRRL either: "A part of ARRL protesting and opposing a submission by the LEAGUE?! What nerve!"

Unfortunately, some Canadians are taking the same tone. At a recent club meeting, a CARF regional assistant was on the hot seat for the "Watch Out Part 2" article in June TCA. First of all, I did not write that article although I agreed with it. Second of all, neither did the regional assistant involved. TCA is here for ALL Canadian Amateurs. CRRL seems to have made it a policy of circulating official letters and comments far and wide containing their interpretation of the world as it is. Why is it that CARF cannot do so as well without incurring the wrath of those who are only vocal when they see ARRL being criticized. Can they not see the undistorted facts? They are there for all of us. The same information is there for CARF, CRRL and the Canadian Amateur who has the time or the inclination to look for them. This goes into TCA!

It has been CARF policy for many years that no official of CARF would take cheap shots at CRRL, in print or otherwise. CARF has lived up to that policy, and has only commented on CRRL actions

whenever it was appropriate. The Section 50 issue was too important to be left alone. At other times when it was obvious that CRRL was taking advantage of this, CARF officials just ground their teeth, and carried on. (Recently a CRRL news bulletin stated that CRRL had been invited to represent Amateur Radio to the recent EPC conference at Arnprior. The implication is there. CRRL representing ALL Canadian Amateurs. Not so. CARF and RAC-QUI were also invited. The plans for the conference were unveiled at the CARF national symposium in Winnipeg last year. The Tarriff issue: CARF spent months preparing a proposal to the government regarding the removal of the tarriff on Amateur equipment. I am sure CRRL spent time on it too, but it seems that the entire credit for the results go to CRRL, according to CRRL. I challenge anyone to examine the proposals on this issue. I am sure matters will become crystal clear. This editorial is not an official CARF statement of policy. It is only the opinion of the Editor. This opinion is shared by many people, and it would seem that the time is coming when the merger idea will be brought up again. They may also decide to try to go completely independant from the League.

To this I can only say WATCH OUT!

The time is also coming when the League in Newington is going to look at the operation up here in Canada. The Canadian division gets more money from the League Board, than most other divisions. This is still not enough for the division to carry on the operation of a national society in a country the size of Canada. Canadians will not be satisfied with one page of outdated news about Canada in QST when they can get up-to-date information from TCA. With membership fees going up, and membership numbers going down, it won't be long before the League pulls the plug on CRRL. We will lose the League in Canada for good! I agree that the presence of the League in Canada has its good points. For one, QST. It might be possible for QST to be mailed in Canada through CARF

Publications. We could bulk buy QST from ARRL for our members or for those who wish to receive it. Services from ARRL would also be purchased for our members. Should CRRL decide to go independent, they would soon disappear. They have neither the funds, facilities nor manpower to carry on such a business operation. NTS could still be operated from Newington for Canadian traffic handlers. CARF would provide the Canadian input to the system based on the Canadian situation. CARF and ARRL publications could be co-ordinated in Canada

so that duplication of effort would be eliminated. (saves money). Representation to the League Board of Directors would be made in such a way that no influence, detrimental to either parties, would or could be made. Canadians could still be members of ARRL without feeling that they are a small cog on a large American wheel. They could financially support the field organizations and receive QST without feeling that they were supporting a cause. Alternately, Canadians could subscribe to QST without joining the League. There are many

possibilities to consider. CARF, ARRL and the Canadian Amateur must decide soon before ARRL finds the situation in Canada too expensive to continue operating here. The ARRL must re-structure their Canadian operation and eliminate the conflict. We have no conflict with ARRL in general. CRRL, on the other hand has demonstrated its inability to handle matters in the best interest of both ARRL and the CANADIAN AMATEUR.

What would you do if you were the League?

Points to be Made in a letter to the FCC re: U.S. Amateur phone sub-band expansion

1. One third of the world's Radio Amateurs are U.S. Amateurs and they are concentrated on one continent. On the whole U.S. Amateurs use more power and antenna gain than most other of the world's Amateurs. Consequently, U.S. Amateurs are dominant in the H.F. phone sub-bands that they are permitted to use.

2. The result is that most of the rest of the world's Amateurs tend to operate in those H.F. sub-bands which they are permitted to use and which are outside of the H.F. sub-bands dominated by U.S. Amateurs.

3. We recognize that U.S. Amateurs who use phone in the H.F. bands may feel that they need more phone spectrum.

4. However, in the interests of freedom of Amateur H.F. radio communications, some consideration has to be given to the facts that most of the Amateurs of the world outside the United States have less spectrum, lower power limits and less technically sophisticated equipment and, thus, will be affected adversely by a Commission decision to expand the Amateur H.F. phone bands.

5. We are unable to estimate the consequences of such a decision

but we think that good-will towards U.S. Amateurs should be an important consideration.

6. We do not agree with the Commission's statement, "...we do not anticipate a significant detrimental impact on international operations from our proposal..." (paragraph 16). We expect that Canadian Amateurs will seek a compensatory revision of Canadian phone sub-bands. We expect that Amateurs in other countries where sub-bands are in effect will seek similar adjustments. Amateurs in those countries where no sub-bands exist will just adjust automatically. U.S. Amateur international operations will be affected accordingly.

7. Points to be included in the answers to the 7 questions asked in para. 17.

A One cannot reasonably consider domestic and international telegraph operations separately. There is no doubt that expansion of the U.S. telephony sub-bands would have an impact on both classes of operation. If unduly squeezed, telergraphy operations could be moved into the phone bands to the detriment of phone operations since telegraphy is more tolerant of interference than phone.

B Since the U.S. dominates Amateur radio, the U.S. could reasonably show some consideration by not swamping the operations of less fortunate Amateurs outside of the United States.

C The current trend is towards transceivers with a dual frequency capability. Thus, an increasing number of stations will have the capability of operating "split frequency". Hence the reservation of frequencies for contacting foreign stations should be continued.

D No Comment.

E No Comment.

F No Comment.

G Spectrum congestion in the 40 meter band due to international Broadcasting and U.S. Amateur operations resulted in Canadian Amateurs not being able to work Amateurs in other parts of the world on phone. Canadian Amateurs sought and eventually obtained authority to operate in the 7050 - 7100 kHz sub-band to get around this problem. If the U.S. chooses to expand its Amateur phone bands, it can expect other countries to take similar steps in self defence.

Plan to attend the R.S.O. convention which is being held once again, in Waterloo, Ontario, on the weekend of October 2, 1982. Further details in the September issue of TCA. The following letter from Garry Hammond, VE3GCO may be of interest to those of you who plan to attend.

Hi,

I'd like to invite your participation in the DX FORUM at the R.S.O. (Radio Society of Ontario) Convention in Waterloo, Ontario on October 2, 1982.

Plans are underway for an audio-visual presentation of CANADIAN DX'ers. I, along with lots of others, would enjoy seeing you on the screen.

The last time I took on such a project was for the 1972 convention. The OM's and YL's who attended, plus the numerous clubs which later saw it said it made for interesting viewing.

Ten years have gone by. We're all a decade older, have worked more countries, have no doubt made equipment additions, moved QTH, and are swinging different antennae.

How can you help? I would like to receive 1, 3 or 5 coloured 35 mm slides from you of

- a) you and your rig
- b) your QTH and antenna(s)
- c) any special operating aids . . . computers, etc.
- d) any homebrew projects you use
- e) any trophies, etc. you have won, etc.

Also . . . please send a blank personal QSL for me to make into a title slide by using a copystand process.

Please have the slides and information sheet sent to VE3GCO to arrive no later than September 10, 1982.

If you know of other DX'ers (WHO ARE ACTIVE) in your area please extend an invitation, on my behalf, to also participate by sending in slides and information.

73, Garry V. Hammond, VE3GCO, VE3LSS
5 McLaren, Listowel, Ont. N4W 3K1

Convention '82

DATE & QTH: Friday, August 20 until Sunday, August 22, 1982 at the University of Prince Edward Island, University Avenue, Charlottetown, P.E.I.

REGISTRATION: \$35.00 per person.

Friday 3:00 p.m. - 8:00 p.m.

Saturday 9:00 a.m. - 12:00 noon

ACCOMMODATIONS

Three University residences can provide accommodation for approximately 390 people on a first-come, first-served basis. Room rates are as follows, and are subject to 10% Provincial Sales Tax.

Marion Hall

Single \$14.00/night

Double \$20.00/night

Bernadine Hall

Single \$16.00/night

Double \$22.00/night

Blanchard Hall (apartments)

1-2 persons \$34.00/night

3 persons \$40.00/night

4 persons \$44.00/night (\$11.00/person/night)

The Convention Committee

cannot accept reservation requests for any motels, hotels, campgrounds, etc. Please contact the Tourist Information Centre or the hotel/motel of your choice.

RAFFLE:

We offer you a chance to win a Delta Ten Tec 580 HF Transceiver, with power supply and CW filter, or an IC-2AT 2 meter hand held. Tickets sell for \$5.00 for a book of three, or \$2.00 per ticket. Monies for tickets will be accepted with your registration.

CRAFT TABLE:

We encourage all craft people to take their wares. XYL and OM crafts are most welcome. Proceeds from your sales could defer your convention expenses.

SWAP SHOP:

Clean up the shack, collect your goodies and make a deal.

Program includes a talk given by Gerry King, VE3GK on "The New 20 Metre Gain Game using UHF - VHF Remote Control. Also on the program is Cary Honeywell, VE3ARS, Editor of TCA who has consented to give a talk on "TCA

and The Canadian Amateur" at The CARF Forum.

DOC forums, Slow Scan tv, Computers, CDN DIV/ARRL (CRRL) Forum, Banquet and Dance are all included.

Should you have any questions, please contact one of the committee members (VE1BHP, VE1ZV, VE1ABU, VE1CCO, VE1YN, VE1ARB) on the Maritime Net, or at the above address.

The welcome banners are ready. We look forward to seeing old friends and meeting new ones, and we feel certain you do as well. Convention '82 begins August 20th. See you there. Drive carefully.

Special Events

VE3SAS Salvation Army Scouts; will be operated from Victoria Lake, Northern Ontario, Camp Madawaska, from July 31, to Aug. 8, 1982, 80 to 10 meters, phone and cw., looking for other Boy Scouts stations, special QSL card available for contacts and SWL reports, SASE, 2-IRCs to VE3FOI, Dave Digweed, 12 Frederick Street, St. Catharines, Ontario, L2S 2S2, Canada.

Teaching Ham Radio Effectively

Part III — Presenting the Theory

As mentioned in Part I, the organization of an amateur radio course is divided into long and short-term planning. The short-term plan prepares you to tackle the concepts which you expect to present in a single session. By following a few simple guidelines, your classes can be effective, informative and interesting.

Establishing a plan for each session allows you to select the important points to cover. What the important points are is a matter of your perception of the material and also your approach to the teaching of the course. It may be that you choose concepts which you feel will allow the students to build upon when they study individually at home; you may choose to include concepts which you feel the students will find particularly difficult to grasp; the concepts presented may simply be selected to give a rapid overview of the topic. What you present is important; how you present it is equally important. The short term plan therefore equips you with a logical order to present the material, and thereby makes it easier for the students to follow your explanations. From your standpoint, a plan avoids the omission of major concepts, and permits you to gather materials needed for demonstrations and experiments.

The following four items are a starting point. Using them, you will get off on the right foot. As you gain more experience, you can elaborate on them to perfect your instruction.

1. Avoid just talking

Although talking must be a part of any theory presentation, there is more to presenting the material than simply standing in front of the class and talking. Keep in mind

that most of your students will have already worked an 8-hour day and that they will be tired. Two straight hours of talking will be dull and their minds will wander easily (if they don't fall asleep). Besides, electronics concepts are difficult to put into words in the first place. And finally, when an instructor relies solely on talking, the concepts follow one another too quickly for a beginner to grasp and, as a result, most of the information is lost.

2. Teach from the known

Even basic principles are difficult for the beginner to grasp quickly. This is particularly true in electronics where we frequently are dealing with abstract ideas. The students therefore need all the help they can get.

Many of you will recognize the typical solution which follows. Figure 1 shows a simple atom sketch. The standard introduction to the make-up of an atom goes as follows. "To visualize an atom, think of the solar system."

Bang! A link has been established between something with which the students are familiar and the concept you wish to convey. With that one simple sentence, you can explain that an atom has a nucleus at its centre, there are smaller bodies revolving about the nucleus, and that these smaller bodies occupy orbits at different distances from the nucleus. And the students will grasp every detail you present, because they will have an image in their minds to which they can relate what you say.

In dealing with electronics principles, you need to carry the technique one step farther. You should always start with a concrete object which you can show

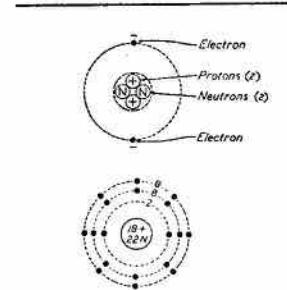


Fig. 1 - Introducing an unfamiliar concept by relating it to a commonly known concept helps the students to grasp information quickly. Atomic theory can be introduced through a comparison of the solar system and the Bohr-Rutherford model of atomic structure. Other topics may require a more elaborate comparison as described in the article. 1

to the class. For example, when you start to introduce transmitters, use the circuit illustrated in Figure 2 to get the class thinking about the basic concept of a transmitter.

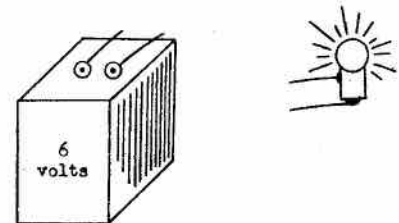


Fig. 2 -Showing the class a concrete object such as this circuit will help them to visualize the more abstract concepts related to radio theory.

With the battery in your hand, you can explain that transmitters are devices which generate energy. By connecting the transmitter (the battery) to a set of wires, we can transport the energy to a load (the lamp) which sends

Teaching Ham Radio

Continued from page 22

out or radiates the energy. Once the idea has been planted in their minds by means of the battery they see in front of them, move on to a system with which they are familiar, but which you did not bring to class. That is, something which they will need to recall in their minds. In this case, you could ask them to think about an automobile generator. It produces energy which is transported through wires to the load. With the image of the automobile generator fixed in their minds, you can now move to the totally abstract concepts of a device with which they may never have had any contact - the radio transmitter. You have established a link with something they know and upon which you can draw parallel principles.

If you plan beforehand and have the materials and ideas ready, the whole process will require only three or four minutes - time well spent considering that the class might otherwise not grasp any of the material you present.

3. Use the students

Draw the students into the course material. By having an active rather than passive role, they will develop more interest. The net result is that they will pay more attention and they will more easily absorb the details.

There are a number of ways to utilize class members. One is to simply ask questions. This gives them a chance to talk rather than listening to you continually. It will also provide you with some indication of their understanding of the topic you are teaching. Another method is to allow someone who has some knowledge of the topic at hand to relate his or her information to the rest of the class. Finally, whenever possible have the students help with demonstrations and have them perform simple experiments.

4. Start by reviewing

Start every class (except the first one obviously) with a review of the previous week's material. There are a number of reasons for

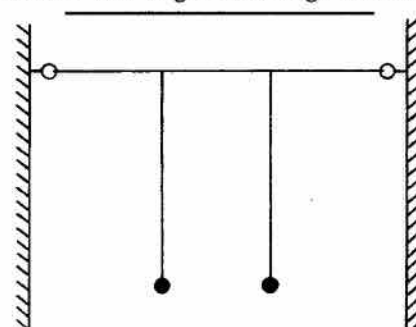
this approach. First, it prepares the class to think about the course. It may take five minutes or more for everyone to focus their attention on the session. If you start teaching new material right from the first minute, most of the class will have missed your opening remarks. If the remainder of the theory is dependent on an understanding of the first few statements of the evening, then you will have lost the class for the remainder of the time. Second, it reminds the students of words or ideas they have already learned and might use in the present session. Finally, it provides you with a link from last week (what they already know) to this week (the material you are about to present).

There are various techniques for presenting theory in interesting, informative ways. Some are listed below, with an explanation.

1. Demonstrations

These are performed at the front of the class by one person (usually the instructor) while the class watches. They reinforce or introduce concepts. As with experiments, always try the demo at home first. A possible demonstration is shown below.

Refer to figure 3. Two pendulums of equal length are suspended from a common wire (or string). Starting from rest, one pendulum is set in motion. After a short period, the second pendulum will begin to swing. This il-



lustration of mechanical coupling can be used as a basis for discussion of coupling in electronic circuits.

Fig. 3 - Twin pendulums can be used to visually illustrate coupling. One pendulum could be considered the resonant circuit at the drain of a FET, the second pendulum would be the tuned circuit at the gate of the following stage, and the wire joining the two would be equivalent to the coupling capacitor.

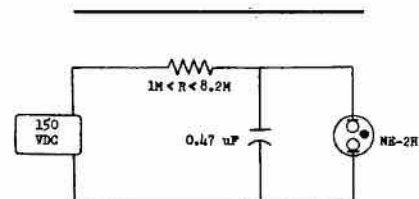
lustration of mechanical coupling can be used as a basis for discussion of coupling in electronic circuits.

The same set-up can be used to illustrate phase, and with slight modification it can demonstrate resonance.

2. Experiments

Performed by the students, the experiments must be simple, easy to set up, and fast.

Figure 4 shows the schematic for a simple circuit to illustrate the



concept of time constants. Since the materials required are few, the experiment is well suited to a class activity where everyone can build an individual circuit. The neon lamp provides a visual indication of the charging rate of the capacitor and by varying the value of the resistor or capacitor, the rate can be altered.

Fig. 4 - If a picture is worth a thousand words, then a simple experiment has even greater impact. To be useful in Amateur Radio courses, experiments must be simple, easy and fast.

This circuit has an added benefit. It effectively underlines the need for power supply bleeder resistors. By removing the bleeder from the power supply, you will see the neon lamps continue to flash after the supply is disconnected from the 117 VAC source.

3. Studying components

Try making resistors and capacitors. Dimensions for a waxed paper capacitor are given in figure 5. Once built, the capacitors can be tested in the time constant circuit previously described by using the homemade capacitors in place of the 0.47 uF unit.

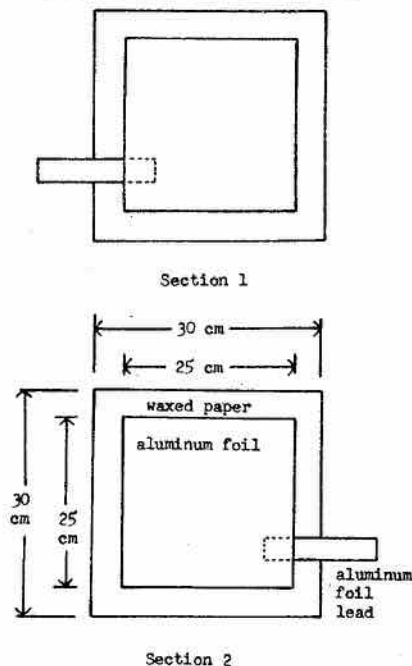


Fig. 5 - Making simple components such as resistors or capacitors helps the students to visualize the inside of the device making the theory easier for them to accept. In the waxed paper capacitor shown above, the two sections are identical except for the direction of the lead Section 2 fits directly over section 1 to form a four-layer stack. The whole assembly is then rolled and taped.

4. Building simple circuits

Once you have introduced the various components, your class can build a simple circuit. This will give them an opportunity to handle components; it will emphasize concepts such as polarity of capacitors and transistors in configurations; it provides soldering experience; it reinforces basic circuit theory since the circuit consists of two identical basic amplifiers which are thrown into oscillation using feedback; and the circuit is so simple that it is almost guaranteed to work.

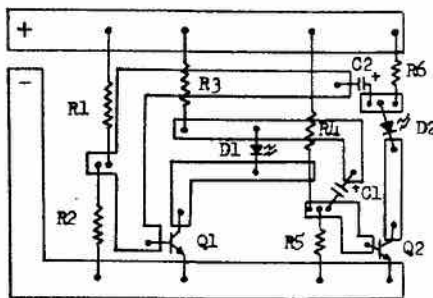
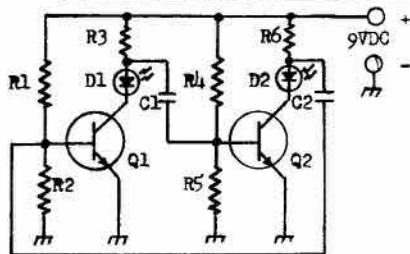
This is an evening's activity however, so you may want to call an extra class one week to devote to building the circuit.

5. Films

Films are fine teaching devices. However, they rarely cover only the material you want to em-

phasize, and quite often they are long. Only use what you need - if that represents 3 minutes of a 20-minute film, fine. The other 17 minutes will only eat up class time and obscure the important 3 minute segment.

It is difficult for the viewers to pinpoint concepts rapidly while watching a film, therefore, show your film segment twice. The second time, the class will know what information comes in what order. As a result, they can concentrate on details. In addition, give the class some questions to make sure they zero in on the concepts you wish to highlight. For example, "How many types of bias were shown?" or "What problem does emitter bias overcome?"



6. Guest speakers

None of us are experts about every facet of ham radio. Therefore, if you are unfamiliar with a particular topic, perhaps RTTY or SSTV, and if there is someone in the club who is active on these modes, have him or her present the theory. Not only will it ensure that the class receives accurate information, it will also provide you with a week off and a chance to learn something new about your hobby.

7. Field trips

Nothing makes an impression

like seeing an actual station in operation. Sometimes you can bring the equipment to the class for a demonstration. An example would be teaching from theory and bringing in a mobile 2-metre rig to operate through a repeater. Equipment is not always so portable. Therefore, you might consider teaching the theory one evening and then visiting a station another evening to reinforce the theory with a practical demonstration.

Even having the students present while you operate in a contest can be a learning situation. They will gain an understanding of the type of information which goes into a contact; they will be exposed to the jargon; and they can log for you.



Parts List
 R1, R4 - 100k, 1/8W C1, C2 - 10uF, 25V
 R2, R5 - 27k, 1/8W Q1, Q2 - 2N2222
 R3, R6 - 1k, 1/8W D1, D2 - LED

Fig. 6 - Shown is a simple circuit to reinforce basic circuit theory. Shown is the schematic, the traces (foil side), and the component layout (non-foil side). The circuit can be turned into a code practice oscillator by changing the component values and adding ear-phones.

8. Computers

Computers are great! Their potential as your teaching assistant seems almost limitless. Many published programs are available or, with a few books and a little practice, you can write your own custom programs.

The accompanying program represents a homemade effort. In addition, you can write programs to provide practice with Ohm's Law, the power formula, series and parallel resistor networks; to provide review; and to test the students' comprehension.

Since the programs can be stored on tape, the biggest job is the initial input. Once you have the program on tape you can use it whenever necessary.

9. Pocket calculators

Encourage the students to bring a calculator to class each week. Calculators mean that you can spend 5 minutes practising a fair number of Ohm's Law problems, power formula questions, and impedance calculations, and thereby ensure that the class understands the mathematics of electronics as well as the proper use of the calculator.

Calculators also allow you to draw the class into the lesson. For example, you could give each student a frequency and ask him (or her) to calculate the reactance of a 100 pF capacitor. When a chart is drawn upon the blackboard using their figures, the class will see firsthand the relationship between

frequency and reactance. In addition, they gain experience using the calculator, they have practice using the reactance formula, and since the students do the work there is no question that you have rigged the results by using 'special' values.

The four suggestions regarding the general approach to teaching and the nine suggestions on how to present the material do not comprise comprehensive lists. Rather, they will provide you with a basis upon which you can start. Once you have applied these ideas, more will automatically occur to you.

Part IV - Where To Get Help

By this time, you might well be pleading for mercy. How can one person, especially a volunteer (and perhaps without teaching experience) be expected to execute an effective course. The answer is a most emphatic, "It shouldn't be necessary!" Here then are some sources of help - financial, material and educational.

1. The Club

A club which sponsors a course would presumably wish to present the most effective course possible and therefore would feel obliged to support you in whatever manner is necessary.

The first step is to establish that any course fee collected from the students is to be used for the course. This will provide you with the money required to buy or rent materials which you cannot obtain by other means. Only money left at the end of the course should be turned over to the club. Naturally, if items bought, borrowed begged or otherwise obtained are properly stored from year to year, then the club's share of the money will increase the following year. Remember: without adequate funds you cannot teach effectively - ask any teacher.

Individual members of the club can also help. Many of them have junk boxes. They should be able to supply you with a good assortment of resistors, capacitors, tran-

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10 CLS
20 PRINT @ 20, "GRAPH OF XL VS FREQUENCY"
30 PRINT: PRINT "WRITTEN BY PHILIP GEBHARDT, VE3ACK"
40 PRINT "COPYRIGHT, SILVER PLUM EIGHTY, 1982"
50 PRINT: PRINT TAB (4) "THIS PROGRAM AUTOMATICALLY GRAPHS THE RELATIONSHIP BETWEEN"
60 PRINT "FREQUENCY AND THE INDUCTIVE REACTANCE (XL) OF AN INDUCTANCE YOU"
70 PRINT "CHOOSE."
80 PRINT TAB (4) "THE Y (VERTICAL) AXIS REPRESENTS VALUES OF XL BETWEEN 0 AND"
90 PRINT "450 OHMS. THE X (HORIZONTAL) AXIS REPRESENTS FREQUENCY BETWEEN"
100 PRINT "0 (DC) AND 10 MHZ. VALUES ON THE GRAPH ARE ONLY APPROXIMATE."
110 PRINT "THE VALUE OF INDUCTANCE YOU HAVE CHOSEN IS PRINTED ON THE GRAPH."
120 A$ = "TO CONTINUE, TYPE 'PAGE 2' AND ENTER": PRINT A$
130 INPUT B$
140 IF B$ = "PAGE 2" THEN 150
150 CLS
160 PRINT "THINGS TO WATCH FOR:"
170 PRINT: PRINT TAB (4) "TRY SEVERAL VALUES OF INDUCTANCE, NOTICE WHERE THE LINE"
180 PRINT "STARTS EACH TIME."
190 PRINT TAB (4) "NOTICE WHAT HAPPENS TO THE VALUE OF THE REACTANCE OF A";
200 PRINT "GIVEN INDUCTANCE AS THE FREQUENCY IS INCREASED."
210 PRINT TAB (4) "NOTICE HOW THE REACTANCE OF A 3 UH COIL CHANGES AS THE"
220 PRINT "FREQUENCY IS INCREASED. NEXT NOTICE HOW THE REACTANCE OF A 7 UH"
230 PRINT "COIL CHANGES AS THE FREQUENCY INCREASES. WHAT ABOUT AN 11 UH"
240 PRINT "COIL?"
250 PRINT""
260 C$ = "TO CONTINUE, TYPE 'PAGE 3' AND ENTER": PRINT C$
270 INPUT D$
280 IF D$ = "PAGE 3" THEN 290
290 CLS
300 PRINT "CHOOSE AN INDUCTANCE BETWEEN 3 and 11 UH."
310 PRINT: INPUT "WHAT IS YOUR VALUE": L
320 IF L < 3 OR L > 11 THEN 300
330 CLS
340 PRINT @ 128, "XL IN OHMS"
350 PRINT @ 237, "L = "; L; "UH"
360 PRINT @ 194, "450": PRINT @ 514, "225"
370 PRINT @ 834, "0": PRINT @ 851, "5": PRINT @ 871, "10": PRINT @ 883 "FREQ IN MHZ"

```

380 FOR OVER = 0 to 1	500 IF L < 8.334 THEN 510 ELSE 520
390 FOR DOWN = 9 to 44	510 DOWN = 42 - ((3 * FR * L)/50): GOTO 530
400 SET (OVER, DOWN)	520 DOWN = 43 - ((3 * FR * L)/50)
410 NEXT DOWN	530 IF DOWN < 10 THEN 560
420 NEXT OVER	540 SET (OVER, DOWN)
430 FOR OVER = 0 to 100	550 NEXT FR
440 FOR DOWN = 42 to 42	560 FOR B = 1 TO 5000: NEXT
450 SET (OVER, DOWN)	570 GOTO 290
460 NEXT DOWN	
470 NEXT OVER	
480 FOR FR = 0 to 83	
490 OVER = FR	

sistors, i-f transformers, coils and so forth. Further, those who have a particular expertise (e.g. RTTY, SSTV) should be encouraged to spend an evening teaching their subject. Part of any worthwhile course, is the inclusion of operating practices. Talk to club members about opening their stations to the class for an evening or a Saturday morning. Or if the club has a station, club members could demonstrate there.

2. The Library

The local library is a good source of electronics books. The books may not be specifically oriented toward Amateur Radio, but you may be able to pick up ideas for an angle on presenting a certain topic; there may be demonstrations or experiments suggested; or you may find a particularly good technical explanation. Keep an open mind when you look for books: physics books often include suitable material, and chemistry books can provide useful information related to atomic structure, conductors, insulators and semiconductors.

Your library may also have films and projectors for loan. Even if they do not have a specific film you need, they may have access to it through other libraries within their system.

3. Amateur Radio Organizations

Both the ARRL and CARF produce materials to assist instructors. Simply based on population, the ARRL has the funds to support a training department and therefore has a more extensive selection. However, the material is geared to the American licence requirements and should be adapted to our needs. The material nevertheless is excellent and you should send for it immediately.

There are a few films available, some free of charge, and a letter to the CRRL or CARF should net you a list of them.

4. Elementary and Secondary Schools

Schools are a goldmine. The trick of course is to access the wealth of information available.

Within the school you will find textbooks - textbooks about physics, chemistry, electricity and electronics. And all of them are specifically written for formal education situations and contain many useful ideas on approaching various topics. You will also find teachers, each with a vast amount of teaching experience. Although any teacher can provide you with some guidance in the correct methods of instruction, obviously one who specializes in electronics would be most beneficial. Finally, schools have duplicating equipment. Teachers use the equipment to produce handouts for their classes. You may recall the distinctive purple colour from your days of labeling the part of flowers and other assorted objects.

Now, how do you get to this gold? Make an initial contact with a school principal and indicate who you are, what project you are undertaking and what type of assistance you could use. The principal may be able to suggest a particular teacher who would be willing to spend a little time with you explaining some teaching basics. If the staff member happens to be an electronics teacher, you may get some tips on successful as well as unsuccessful attempts at presenting theory. The principal may also give you limited access to texts, allowing you to pick out two or three for a short term loan or for use until the completion of the course. The least

likely prospect, but one you should try for anyway, is the duplicating machine. This will allow you to produce handouts for your class at a modest cost. Although you might have access to the machine, it will be unlikely that you will be permitted to operate it, therefore you will need to produce the master copy well in advance and submit it to the staff member who will run off your copies. If you do you not know how to make the master, ask any teacher. It is reasonable to expect that the club will be required to buy the masters and the paper you require.

One last cautionary note: schools are not established to serve the needs of outside groups, and are not in any way obliged to help you. Therefore, any help you get is better than none, so treat it as the privilege it is. You can be sure that if you become a nuisance the assistance will be unceremoniously withdrawn.

5. Industry

The next possibility is any electronics industry in your area. Once again, explain your position and ask for samples of whatever the company makes or uses. For example, rejects can be used to illustrate transistor size, pin configuration or case style. Or, you can cut open rejects to view the interior. (Be careful with components, some types are made of poisonous materials.)

As with the information provided in Part III, the above list is not extensive. However, the possibilities will get you started in the right direction. You cannot expect to do everything yourself, so plan now. Decide what help you will need, who can be of assistance, and use the time from now until the course starts to establish yourself.

Next issue: Reinforcing Your Teaching (Part V)
Getting Ready to Face the Exam (Part VI)

Reference

1. A.G. Croal, Senior Chemistry for Secondary Schools, Copp Clark, Toronto, 1955

15 JUN 1982

ALL PRICES SHOWN IN THIS CATALOGUE WERE IN EFFECT AS OF JUN 15, 1982. SINCE THAT TIME PRICES MAY HAVE GONE UP OR DOWN. IT IS WISE TO CHECK WITH US ON ANY MAJOR PURCHASE BEFORE BUYING ELSEWHERE. THE ITEM MAY HAVE BEEN REDUCED OR MAY EVEN BE ON SALE.

NEW PRICE LIST, SAVE FOR FUTURE REFERENCE

WE WILL BE AT THE CHARLOTTETOWN, P.E.I. CONVENTION IN AUGUST WITH OVER \$50,000.00 IN STOCK. IT'S YOUR CHANCE TO TAKE A FIRST HAND LOOK AT ALL THAT GEAR YOU'VE JUST SEEN PICTURES OF. IF THERE IS ANYTHING SPECIAL YOU WOULD LIKE TO SEE GIVE US A CALL OR WRITE AND WE WILL MAKE SURE TO BRING IT ALONG IF IT'S AVAILABLE. YOU CAN SAVE A BUNDLE IN SHIPPING COSTS BY ASKING FOR HF ANTENNAS. I WANT BE BRINGING TO MANY EXCEPT THOSE ASKED FOR BECAUSE OF THE SIZE AND WEIGHT. WHEN YOU GET TO THE CONVENTION ASK FOR OUR SPECIAL SHEET AT THE REGISTRATION DESK. READ IT. THE SPECIALS WILL ONLY BE IN EFFECT DURING THE CONVENTION. YOU'LL MISS OUT ON SOME SUPER BUYS IF YOU WAIT TILL AFTER THE CONVENTION TO READ THAT SPECIAL SHEET. WE WILL ALSO BE BRINGING ALONG ALL OUR USED GEAR. SOME OF IT WILL BE ON THIS SHEET, AND THERE WILL BE OTHER USED GEAR. IT'S ONLY ONE OF A KIND SO GET TO US QUICK AND CHECK IF YOU'RE INTERESTED IN USED EQUIPMENT. AGAIN CHECK THE SPECIAL SHEET FOR A FULL LISTING OF THE USED EQUIPMENT WE BROUGHT ALONG. WANT TO MAKE TRADES? SURE WE'LL MAKE TRADES AT THE CONVENTION. BRING ALONG ALL ACCESSORIES, BOXES, MANUALS ETC. REMEMBER THOUGH THAT WE CAN ONLY ALLOW WHOLESALE VALUE ON YOUR TRADES. BUT BRING IT ANYWAY. YOU MIGHT BE SURPRISED, OR YOU MIGHT SELL IT DIRECT YOURSELF. SEE YOU IN CHARLOTTETOWN.

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PACKAGE SPECIALS:				
1982 U.S. & DX CALLBOOK	\$3	\$4	\$3	\$39
1982 U.S. & DX CALLBOOK & MAP LIB3	\$4	\$5	\$4	\$45

A-R-R-L-PUBLICATIONS

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1982 RADIO AMATEUR'S HANDBOOK	\$2	\$3	\$3	\$13
1982 HARD COVER HANDBOOK	\$2	\$3	\$3	\$22
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FX & REPEATERS	\$1	\$2	\$2	\$8
LOG BOOKS - 4 \$3.50 + \$2 S&H, 5-9 \$3.25 + \$3 S&H, 10-19 \$3.00 + \$4 S&H, 20+ \$2.75 + \$5 S&H				

FOR OTHER A.R.R. PUBLICATIONS PLEASE WRITE.

AMPLIFIERS

2M 4-4RP 10X, 7amps, NOM MAX 4 in 40 out	\$175
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2M10-80P 8X, 12amps, NOM MAX 10 in 80 out	\$265
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2M10-200P 20X, 30amps, NOM MAX 10 in 200 out	\$485
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PREAMPLIFIERS

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YF-901A 6MHz 2nd IF	50	50
YF-901-5V BOARD	60	60
YF-901-447Hz BOARD	60	60
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YV-75 STANDARD HAND MIKE	15	15
YV-40 FLEX NECK DESK MIKE 500/500 ohms	49	49
YV-200 LARGE 200 WATT PAIR/REAR SPEAKER, RMS=125	119	119
YV-200A LARGE 200W/200W REAR/RS WATTMETER	165	159
GENERAL COVERAGE RECEIVERS		
FRG-7 ANALOG RECEIVER, 500kHz-30MHz	445	425
FRG-7 BATTERY HOLDER	85	85
FRG-7700 DIGITAL RECEIVER, 1.0MHz-30MHz	749	699
FRG-7700W 10 CHANNEL MEMORY LNC FOR 7700	199	189
FRG-7700DC DC KIT FOR 7700	85	85
FRY-7700 RECEIVE ANTENNA TUNER	89	89
FRY-7700 VFO CONVERTER (DIFF COVERAGES AVAILABLE)	159	149
FRY-7700 ACTIVE RECEIVE ANTENNA	89	89
FRS-700 10 BAND FILTER, CUT OFF ABOVE 520kHz	22	22
YF-45 COMMUNICATOR (SBS 5000-2000)	24	24
GTR-240 DELUXE 24 HOUR QUARTZ WORLD CLOCK	65	65
VHF UHF TRANSCEIVERS	REGULAR	CHEQUE
FT-2089 2M FM HANDHELD, 1/4W-2.5W, 10 MEM, SCAN, 64-9	\$259	\$259
FT-2089 440 FM HANDHELD, 1/4W-2.5W, 10 MEM, SCAN, 64-9	\$399	\$399
NC-6 DESK CHARGER, BULK, S.D., TRICKLE & DC-DC	\$125	\$99
NC-9R WR-3 CHARGER, STANDARD W/ 200, 700, 800	19	19
PA-3 DC-DC ADAPTOR & CHARGER	29	29
YM-240 SPEAKER MIKE FOR 202 207 208 700	40	40
YV-2 NICAD PACK FOR 207 208 700	44	44
YV-2 NICAD 3.6V RECHARGE PAB-2 IN NC-6 PLONE	8	8
YV-10 MOBILE HOLDER FOR ANY HANDHELD	10	10
YV-15 LEATHER CASE FOR 200, 700, HEAVY DUTY	59	59
TRONNY 1/4 WAVE TELESCOPIC W/10	12	12
CANADIAN MADE 5/8 WAVE TELESCOPIC W/10	12	12
FT-2089 2M ALL MODE PORTABLE, 1/4W-2.5W, 10 MEM, 64-9	\$459	\$449
FT-600R 6M ALL MODE PORTABLE, 1/4W-2.5W, 10 MEM, 64-9	\$449	\$449
NC-10A WALL CHARGER FOR 200, 630	16	16
YV-11 5.12 IN DIA BRACKET, AUTO ANTENNA DOWN	12	12
CSC-11 GEMMETTE CASE FOR 200, 630	12	12
YV-240 SPEAKER MIKE FOR 200, 630, 230	35	35
FL-2018 6M ALL MODE AMP, 2.5W 1W/10W out	\$125	\$119
FL-6020 6M ALL MODE AMP, 2.5W 1W/10W out	\$99	\$99
FL-2089 2M ALL MODE AMP & PREAMP, 10W 1W/50W out	\$239	\$229
FT-2389 2M FM 25 WATT 10 MEM SCAN LCD DISPLAY	\$459	\$449
FT-4889 2M ALL MODE 10 WATT 4 MEMORIES SCAN	\$639	\$639
FT-6889 6M ALL MODE 10 WATT 4 MEMORIES SCAN	\$625	\$625
FT-7889 440 MHz ALL MODE 10 WATT 4 MEMORIES SCANS 819	\$769	\$769
SC-1 STATION CONSOLE 400/700 CW/PAW SUPPLY	\$225	\$209
YV-38 FLEX NECK DESK MIKE WITH SCAN CONTROLS	53	53
TOUCH TONE MCKES FOR ALL YAESU, SPECIFY RECEIVER	90	90
DISCONTINUED ITEMS		
FD-107 ANTENNA TUNER, DUAL METERS, BEIGE	WAS \$259	\$219
PA-1 DC-DC ADAPTOR FOR FT-2089	WAS \$49	\$29
FT-7200R/VA 7200R 572 572C COMB ETE 2M/440 FM W/881/409	\$899	\$899

hy-gain

ROTATORS	REGULAR	CHEQUE
MDT-320 Digital Control Box, 25 sq ft antenna	\$675	\$629
TAL-TWISTER, Heavy Duty, 20 sq ft antenna	\$449	\$399
HAY IV, The Popular Choice, 15 sq ft antenna	\$319	\$289
CD4511, 8.5 sq ft antenna	\$165	\$149
AR-40, Automatic, Solid State, 3 sq ft ant	\$165	\$155
AR-22XL, Automatic, 3 sq ft antenna	\$165	\$149
TAL-TWISTER ROTOR ONLY - NO CONTROL BOX	\$275	\$249
HAY IV ROTOR ONLY - NO CONTROL BOX	\$125	\$115
CD4511 ROTOR ONLY - NO CONTROL BOX	\$95	\$89
AR-40 ROTOR ONLY - NO CONTROL BOX	\$95	\$89
AR-22XL ROTOR ONLY - NO CONTROL BOX	\$69	\$65
SOFT CENTRE SCALE KIT - 12X, HAY IV, CD4511	\$75	\$69
LOWER MAST ADAPTOR, HEAVY DUTY, 12X, HAY IV	\$75	\$69
HF MULTIBAND ANTENNAS		
18V Single Freq Vertical 10-80M Coverage	\$79	\$72
12AVD/45 10, 15, 20, 40M Trapped Vertical	\$99	\$89
8AVT/45 10, 15, 20, 40M Trapped Vertical	\$175	\$159
18-TS 10, 15, 20, 40M, Special Order Only	\$649	\$599
DP10/15AS 10, 15M Duoband 8.4cb 12.7' boom	\$299	\$269
W4M32 2 element Triband 5.5cb 6' boom	\$299	\$275
W4M33 3 element Triband 8.5cb 12' boom	\$395	\$355
W4M34 5 element Triband 8.5cb 12' boom	\$435	\$395
W4M35 7 element Triband 8.5cb 24' boom	\$675	\$625
W4M36 KIT, Converts your W4 to W4M35	\$249	\$249
W4M37 9, 10, 15, 20M, Special Order Only	\$475	\$475
2800 42/80M DUAL ET	\$85	\$79
LD-1 1/2" TUNING ARRESTOR	\$85	\$79
AR-86 BRUNL, Recommended for all HF beams	\$29	\$29
HF VHF MONOBAND ANTENNAS		
12CBAS 3 element 12' 8.5cb 8' boom	\$115	\$99
12CBAS 5 element 12' 12cb 24' boom	\$235	\$219
12CBAS 7 element 12' 8.5cb 12' boom	\$339	\$325
12CBAS 9 element 12' 12cb 26' boom	\$329	\$319
22CBAS 3 element 20' 8.5cb 16' boom	\$235	\$229
22CBAS 5 element 20' 10cb 26' boom	\$425	\$409
22CBAS 7 element 20' 11.6cb 34' boom	\$549	\$519
42CBAS 2 element 40m 4.9cb 3' boom 45' ele	\$375	\$359
64S 4 element 64' 12.7cb 12' boom	\$95	\$89
66BS 6 element 66' 5.5cb 24' boom	\$135	\$129
25B 5 element 25' 9.1cb 6.25' boom	\$33	\$33
28B 6 element 28' 11.8cb 12.3' boom	\$46	\$46
24B 4 element 24' 3.3cb 15' boom	\$55	\$55
244B 4 element J-Pole 2V 6cb cant, 9cb elipt	\$125	\$119
V-25 2V Co-linear Vertical	\$69	\$69
3000R 2V Ground Plane	\$38	\$38
TELESCOPIC TOWERS		
CANADIAN FLAGS - F.O.B. SAINT JOHN, N.B.		
NS78S 37' Self Supp, 9 sq ft, 20.5' Nestic	\$195	\$175
NS85S 52' Self Supp, 9 sq ft, 20.5' Nestic	\$395	\$355
NS92S 72' Self Supp, 9 sq ft, 20.5' Nestic	\$595	\$555
NS99S 92' Self Supp, 16 sq ft, 20.5' Nestic	\$795	\$755
NS106S 112' Self Supp, 16 sq ft, 21.5' Nestic	\$1195	\$1155
NS113S 132' Self Supp, 16 sq ft, 21.5' Nestic	\$1395	\$1355
NS120S 152' Self Supp, 16 sq ft, 23' Nestic	\$1795	\$1755
NS127S 172' Self Supp, 16 sq ft, 23' Nestic	\$2195	\$2155
U.S. FLAGS - F.O.B. CLOSSETT, U.S. ADDRESS TO YOU		
NS78S USA with antenna/rotor purchase	\$539	\$539
NS85S USA with antenna/rotor purchase	\$825	\$825
NS92S USA with tower purchase, U.S. Delivery	\$215	\$215
NS99S USA with tower purchase, U.S. Delivery	\$172	\$172
T-70X/745 acc 1:25; TAL-TWISTER/AY IV acc 1:75		
BUTTERNUT		
MF-6V 5 BAND 10-80M VERTICAL, incl. 30M NO TRAP	\$195	\$185
***ELECTRIC POWER 160W RES FOR HF5 & HF6 - 59	\$4	\$4
20W-160W 100 WATT RADIAL KIT FOR ROOF MOUNT	\$42	\$42
57-111 STUB POINT MOUNT incl. TRIPOD & STR KIT	\$65	\$65
30W-300 AMP POWER AMP CONVERSION KIT FOR HF5'S - 59	\$63	\$63
20WV 2M 3/2 WAVE CO-LINEAR VERTICAL, BAYPA FEED	\$69	\$69
UNADILLA		
W20U 1015 SIGNAL BRUN 11'	\$25	\$25
BRUN 41'	25	25
DIPOLE TRAPS SPECIFY 10 12 15 17 20 30 40M PAIR	36	36
DIPOLE TRAPS 80M SPECIFIC CW OR PHONE	PAIR 75	75
INSULATOR - CENTRE INSULATOR FOR DIPOLE	15	15
End Insulators - END INSULATORS FOR DIPOLE	PAIR 6	6
W20U/AYV5 5 BAND ANT KIT, BRUN TRAPS WIRE INS	\$79	\$79
HAY CLUB KIT-6 BANDS incl 10 15 20 30 40M TRAPS	\$225	\$225
ALINCO		
EL-234R ALL MODE LINEAR AMPLIFIER FOR 2 METERS	\$129	\$119
THIS SUPER AMPIFIER DELIVERS 30 WATTS OUTPUT W/ ONLY 2 WATTS INPUT, REQUIRES 4 PMS @ 13.8 VDC, HAS SSB (SLOW) AND FM (FAST) ACTION W/ SWITCH, ALL THIS IN AN EXTREMELY SMALL PACKAGE (91mm x 78mm x 115mm)		
SPECIAL PRICE OF \$99 EXPIRES JULY 15, 1982.		
YAESU		
SERVICE MANUALS & TUBES		
ALL HF SERVICE MANUALS - SPECIFY TRANSCEIVER	\$30	\$30
ALL VHF, UHF SERVICE MANUALS - SPECIFY RECEIVER	\$19	\$19
ALL OPERATING MANUALS - SPECIFY TRANSCEIVER	\$9	\$9
12B7A DRIVE TUBE	\$7	\$7
6146B FINER TUBE	\$18	\$18
6150C FINER TUBE	\$18	\$18
572B FINER AMPLIFIER TUBE	\$55	\$55

cushcraft

PRICES 5-000 ARE THE NEW JUNE 15, 1982 PRICES. SOME ANTENNAS STILL LEFT AT OLD PRICES, CALL.

HF MULTIBAND ANTENNAS	REGULAR	CHEQUE
A3 3 element Triband, 8cb, 14' boom	\$389	\$369
A4 4 element Triband, 8.9cb, 18' boom	\$515	\$479
A7A3 30/40M add on kit for A3	\$148	\$138
A7A4 30/40M add on kit for A4	\$148	\$138
A83K Stainless Steel hardware kit for A3	\$79	\$79
A83X Stainless Steel hardware kit for A4	\$89	\$89
R3 10/15/20m HALF-WAVE VERTICAL	\$515	\$479
HF VHF UHF MONOBANDERS		
40-200 2 element 40M	\$589	\$549
20-400 4 element 20M, 10cb, 32' boom	\$545	\$509
20-300 3 element 20M, 8cb, 28' boom	\$389	\$365
15-400 4 element 15M, 10cb, 28' boom	\$235	\$219
15-300 3 element 15M, 8cb, 17' boom	\$219	\$205
10-400 4 element 10M, 8cb, 17' boom	\$225	\$199
10-300 3 element 10M, 8cb, 12' boom	\$175	\$159
PS2-6 6 element 6M, 11.2cb, 20' boom	\$189	\$175
RS2-5 5 element 6M, 10.5cb, 12' boom	\$148	\$138
RS2-3 3 element 6M, 8cb, 6' boom	\$106	\$95
R144-11 11 element 2M, 11cb, 12' boom	\$85	\$80
R144-7 7 element 2M, 10.5cb, 8' boom	\$65	\$65
R432-11 11 element 440MHz, 13.2cb, 4.7' boom	\$79	\$75
BOOMERS & STACKING KITS		
67-15R 6 element 6M, 14cb, 34' boom	\$489	\$379
32-19 19 element 2M, 15.2cb, 22' boom	\$189	\$175
214R 14 element 2M, 15.2cb, 15' boom, SSB, CW	\$155	\$145
214FB 14 element 2M, 15.2cb, 15' boom, FM	\$155	\$145
220B/2214R & Stacking Kit, 18.2cb	\$419	\$390
220B 17 element 220MHz, 17.2cb, 19' boom	\$170	\$159
418B 10 element 432-435 MHz	\$129	\$129
415B 5 element 432-435 MHz	\$129	\$129
424B 24 element 432-434 MHz	\$134	\$134
225K Stacking Kit for 2 214's	\$89	\$89
325K Stacking Kit for 2-32-19's	\$95	\$95
225K Stacking Kit for 2-20B's	\$89	\$89
6175K Stacking Kit for 2-6175's	\$129	\$129
220VX Vertical Stacking Kit for 2-214B's	\$175	\$159
220-2M Stacking Kit for 4-220's	\$465	\$435
224-DM Stacking Kit for 4-214's	\$465	\$435
324-DM Stacking Kit for 4-32-19's	\$689	\$639
FOR PRICES ON POWER DIVIDERS WRITE OR CALL		
SSB TWIST ANTENNAS		
R44-10T 5 el vert, 5 el horiz, 2M	\$120	\$120
R44-20T 10 el 10 DM 2M	\$135	\$135
R42-20T 10 el 10 DM 440 MHz	\$120	\$120
DX ARRAYS & STACKING KITS		
DX120 20 elements 2M, 14cb	\$140	\$140
DX200 20 elements 200MHz, 14cb	\$125	\$125
DX420 20 elements 440MHz, 14cb	\$180	\$180
DX140 Stacking Kit for 2/120's, 40 elements	\$345	\$319
DX140 Stacking Kit for 4/120's, 80 elements	\$599	\$559
DX140 Stacking Kit for 2/420's, 40 elements	\$155	\$145
DX140 Stacking Kit for 4/420's, 80 elements	\$275	\$275
DX-1 BRUN 11' for 120, 220, 432	\$39	\$39
FM RINGOS & RINGO RANGERS		
AR2 2M RINGO	\$49	\$49
AR2C 2M RINGO RANGER	65	59
AR2B 2M RINGO RANGER II (NEW & IMPROVED)	75	75
AR220 220MHz RINGO	49	49
AR220S 220MHz RINGO RANGER II	79	79

DENTRON

TRANSCEIVERS	REGULAR	DECODE
STATION-ONE 80, 40, 15M CW RECEIVER 25W DIGITAL	\$ 259	\$ 249
STATION-ONE WITH HEADSET, KEY, DIAPHRAGM, CASE MORE	\$ 289	\$ 275
HF-ACS DENTRON POWER SUPPLY WITH SPEAKER	\$ 185	\$ 175
35-7A 650W POWER SUPPLY FOR STATION-ONE	\$ 95	\$ 95
MLX-2500 9 BAND DIG RECEIVER, 500W PEP 400W CW	\$ 749	\$ 719

AMPLIFIERS	REGULAR	DECODE
G.L.A. 1000W 80-10M 1200/1000 PEP/CW INPUT	\$ 629	\$ 599
CLIPPER-DN 150-18M, 2000/1000 PEP/CW INPUT	\$1119	\$1075
GALION 1 9 BAND 160-10M 1200/1000 PEP/CW INPUT	\$ 975	\$ 939
GALION II 9 BAND, (213-500K, 2KW/1KW INPUT)	\$1679	\$1599
GALION III 9 BAND, (213-500K)	\$ 789	\$ 759
NLA-2500C 9 BAND 160-10M 2000/1000 PEP/CW	\$1519	\$1459
G.L.A. 500 W 2M, 500W INPUT, (1) 8122	\$ 839	\$ 799
NLA-2500V-F 5M & 2M, 1000/1000 PEP/CW, FV	\$1649	\$1589

ANTENNA TUNERS	REGULAR	DECODE
J.R. MONITOR	\$ 125	\$ 119
CLIPPER-DN 160-12M CONT. ANT SWITCH, METER	\$ 389	\$ 355
CLIPPER-DN-1 160-10M CONT ANT SW, METER	\$ 515	\$ 495
M.T.-2500 160-10M CONT. ANT SW, 2 METERS	\$ 619	\$ 595

ALL BAND DOUBLET \$ 65 \$ 65
 470 OHM BALANCED FEED LINE, 100 feet, 2KW \$ 20
 BIG DUMMY LOAD, 1 GAL CAN WITH OIL \$ 49
 G.L.A. 120W TUNED INPUT KIT \$ 95
 CW-4 TUNED INPUT ACCESSORY FOR ANY AMPLIFIER \$ 95

MANY OF THE ITEMS OFFERED BY THE NEW DENTRON COMPANY WILL TAKE SOME TIME TO GO INTO REGULAR PRODUCTION. PRICES MAY ALSO CHANGE BY THE TIME THESE NEW MODELS COME ON THE MARKET.

A. E. A.

KEYERS	REGULAR	DECODE
MY-2 MORSE/MATIC MEMORIES, RECALL, CODE GENERATOR	\$229	\$209
MY-2 2000 CHARACTER MEMORY EXPANSION FOR MY-2	\$ 65	\$ 65
CM-2 CONTESTER, MEMORIES, SERIAL NUMBERS	\$185	\$169
MT-2 KEYSER TRAINER, FULL KEYSER & CODE GENERATOR	\$145	\$145
CM-1 ORIGINAL CONTEST KEYSER WAS \$199 NOW ONLY	\$129	\$129
MT-1 ORIGINAL KEYSER TRAINER WAS \$199 NOW ONLY	\$129	\$129
MY-1 ORIGINAL FULL FEATURE KEYSER WAS \$119 NOW	\$ 79	\$ 79
AC-1 1.5VAC ADAPTOR FOR MYA, MYB, MYC, MYD	\$ 23	\$ 23
AC-2 1.5VAC ADAPTOR FOR ALL OTHER KEYSERS	\$ 15	\$ 15
DC-1 CIGAR 15-LEADER CORD FOR KEYSERS	\$ 11	\$ 11
DC-2 1500 PAK & CHARGER FOR CM-2 MT-2	\$ 65	\$ 65

ISOPOLE & FIBERGLASS ANTENNAS

ISOPOLE 144 NEW 1/2 WAVE ISOPOLAR DUAL COVE	\$ 60	\$ 60
ISOPOLE 144 JR. SINGLE COVE	\$ 45	\$ 45
ISOPOLE 200 DUAL COVE	\$ 60	\$ 60
ISOPOLE 220 JR. SINGLE COVE	\$ 45	\$ 45
ISOPOLE 440 DUAL COVE SUPP. WITH DECOUP. MAST	\$109	\$109
IS-200 2 1/2 WAVE FIBERGLASS—SPECIAL ORDER ONLY	\$149	\$149

MISCELLANEOUS

VBA-90 CW R.T.Y., ASCII, READER, 32 CHARACTER	\$455	\$399
HT-50V SPEAKER MICROPHONE	\$549	\$549
MYB FULL S'FINDER	\$ 8	\$ 8
MYD DIRECTION FINDER—SPECIAL ORDER ONLY	\$699	\$699
CMF DDF ANTENNA FOR ABOVE	\$379	\$349
PSX-1 POWER SPEAKER	\$ 60	\$ 60
TX-100V EXTENSION MIKE	\$ 25	\$ 25

Dalmar

TX-100 NOISE BRIDGE, 1-100 MHz, 0-250 ohms	\$ 95	\$ 95
V-C CONVERTER for reception of 10-500 kHz	\$125	\$125
KY-4 KEYSER CURTIS ION, HAM KEY MICROPHONE	\$205	\$205
BALUN - AL 25 SERIES FROM 1:1 to 16:1 specify:		
- 2W MODEL, 1:1 or 4:1	\$ 50	\$ 50
- 2W MODEL, 1:1 or 4:1	\$ 82	\$ 82
- KEYSER BALUN, 2KW	\$ 89	\$ 89
LA-1 1000 AMP LITER, requires plug in loops	\$120	\$120
PLUG IN LOOPS FOR ABOVE - specify freq range	\$ 95	\$ 95
YF-487 ANTENNA TUNER, 1.8-30MHz CONT, 300 WATT	\$825	\$825
YF-3002 ANTENNA TUNER, 3KW, CONT, NOISE BRIDGE	\$599	\$599
YF-827 AUTO SWR & POWER METER, 20/200/2kW, HF	\$150	\$150
P-305 RECEIVER PREAMP, 1.8-54 MHz, 9 VDC	\$159	\$159
P-308 RECEIVER PREAMP, AS ABOVE, 1.5 VAC	\$175	\$175
P-312X TRANSCEIVER PREAMP, 1.8-54 MHz, 1.5 VAC	\$209	\$209
P-312X TRANSCEIVER PREAMP, AS ABOVE, 12 VDC	\$209	\$209
P-502 PORTABLE 220 MHz QUDR	\$135	\$135
A-505 PORTABLE 220 MHz QUDR	\$135	\$135
T-2 DECODER, SINGLE DIGIT (SPECIFY), SPS7, 5amps	\$185	\$185
2-416 DECODER	\$599	\$599
BA-12 DECODER, 12 DIGIT, 12 OUTPUTS	\$275	\$275
BA-16 DECODER, 16 DIGIT, 16 OUTPUTS	\$319	\$319
PR-3 SEQUENCER, HANDLES 3 DECODER OUTPUTS	\$185	\$185
RL-1 RELAY LATCH	\$ 89	\$ 89
ED-1 ENCODER	\$ 89	\$ 89
PP-2 ENCODER	\$ 95	\$ 95

BENCHER

IAMBIC PADDLES	REGULAR	DECODE
BY-1 WITH SUPER HEAVY BLACK BASE	\$ 65	\$ 65
BY-2 WITH SUPER HEAVY CHROME BASE	\$ 79	\$ 79
BY-3 WITH SUPER HEAVY GOLD PLATED BASE	\$229	\$229
BENCHER HEAVY BRASS BELT BUCKLE	\$ 15	\$ 15

Kantronics

FIELD DAY II CW RTTY ASCII READER, 24 HR CLOCK	\$675	\$629
MNT READER - LINE FIELD DAY II BUT SMALL & 12V	\$435	\$399
SIGNAL ENFORCER - DUAL TUNABLE FILTER, EXCELLENT	\$455	\$429
VARIFILTER - SINGLE TUNABLE FILTER	\$189	\$179
MOUSE CODE LEARNING TAPES, VARIOUS SPEEDS	\$ 6	\$ 6

M F J

ANTENNA TUNERS	PRICE
MFJ-989 3KW ROLLER INDUCTOR DUMMY LOAD METER	\$495
MFJ-984 3KW DELUXE DUAL METERS DUMMY LOAD	\$495
MFJ-982 3KW TUNER WITH 7 POS ANTENNA SWITCH	\$359
MFJ-981 3KW TUNER WITH LIGHTED METER	\$359
MFJ-980 3KW TUNER NO SWITCH NO METER	\$315
MFJ-962 1.5KW LIGHTED METER ANTENNA SWITCH	\$345
MFJ-961 1.5KW WITH ANTENNA SWITCH	\$285
MFJ-949R 300W DELUXE METER ANT SWITCH DUMMY LD	\$210
MFJ-947C 300W METER REAR ANTENNA SWITCH BALUN	\$120
MFJ-943R 300W METER REAR ANT SWITCH NO BALUN	\$120
MFJ-943 300W WITH BALUN, NO METER, NO SWITCH	\$105
MFJ-901 200W ECOND TUNER WITH BALUN	\$ 90
MFJ-900 200W ECOND TUNER	\$ 75

KEYERS

MFJ-484 GRANDMASTER 12/2511/100 CHAR MEMORIES	\$210
MFJ-482 1/25 or 2/2511/50 CHAR MEMORY KEYSER	\$149
MFJ-481 2/50 CHARACTER MEMORY KEYSER	\$130
MFJ-410 P/F MORSE, KEYSER & CODE GENERATOR	\$195
MFJ-422 BASIC KEYSER MOUNTED ON BENCHER PADDLE	\$149
MFJ-488 FULL FEATURE KEYSER WITH SPEED METER	\$120
MFJ-485 FULL FEATURE KEYSER	\$105
MFJ-481 ECOND KEYSER	\$ 79

AUDIO FILTERS

MFJ-752R DUAL TUNABLE SSB/CW FILTER	\$135
MFJ-751 SINGLE TUNABLE SSB/CW FILTER	\$105
MFJ-722 ACTIVE SSB/CW SUPER SELECTIVE FILTER	\$105
MFJ-721 SSB/CW FILTER	\$ 90

MISCELLANEOUS

MFJ-102 24 HOUR CLOCK, LARGE .6in BLUE NUMERALS	\$ 55
MFJ-200 NOISE BRIDGE WITH RANGE EXTENDER	\$ 90
MFJ-200 30W Watt 30 Sec DRY DUMMY LOAD	\$ 40
MFJ-202 1/4W 30 Sec DRY DUMMY LOAD	\$ 90
MFJ-312 V/C CONVERTER 144-8/154-158MHz	\$ 79
MFJ-312 V/C CONVERTER 144-8/154-8 & 160-4MHz	\$ 95
MFJ-495 500K KEYBOARD AC, ASCII, BUFFER, KEY	\$529
MFJ-494 KEYBOARD AS ABOVE, FEWER FEATURES	\$435
MFJ-115VAC-DC ADAPTOR FOR KEYSERS & FILTERS	\$ 15

ABOVE ITEMS USUALLY IN STOCK. OTHER MFJ PRODUCTS ARE AVAILABLE ON SPECIAL ORDER. DELIVERY IS 4-6 WEEKS ON SPECIAL ORDER ITEMS. TAKE U.S. LIST PRICE TIMES 1.6 FOR APPROXIMATE CANADIAN PRICE.

AZDEN

PCS-3000 2W 25W FM PORTABLE 8 KEY SCAN TT KIT	\$429
ECX-9V EXTENSION CABLE & MOUNT FOR REMOTE MOUNT	\$ 55
CS-TM T.T. PAD ASSEMBLED IN EXTRA MIKE BACK	\$ 65
DC CABLE, EXTRA DC CABLE	\$ 7
ECDD T.T. PAD IN KIT FORM, STANDARD WITH 3000	\$ 19
CS-MB EXTRA MOBILE BRACKET	\$ 12
CS-SR SERVICE & ALIGNMENT MANUAL FOR PCS-3000	\$ 5

PCS-3000 HANDHELD 2W FM 3M 8 MEM SCAN T.T. PAD \$429

HT-50V SPEAKER MICROPHONE	\$ 45
MT-1 DC-DC CHARGER, ALLOWS TRANSMIT	\$ 53
MT-2 DC-DC CHARGER, NO TRANSMITTING ALLOWED	\$ 25
HT-1C LEATHER CASE	\$ 49
TRIDYX 1/4 WAVE TELESCOPING ANTENNA	\$ 12
CON MADE 5/8 WAVE TELESCOPING ANTENNA	\$ 15
HT-BAT EXTRA NICAD BATTERY PACK WITH CHARGE PLS	\$ 44
HT-R DUAL P. TONE ENCODER/DECODER, SUB-AUDIBLE	\$ 60
HT-SV SERVICE & ALIGNMENT MANUAL	\$ 5

K. D. K.

KDK 2025A MARK II 2W 25W FM MOBILE 10 KEY SCAN	\$379
DM-TT TT MIKE OPTION FOR 2025	\$ 29
DM-TT T.T. MIKE PURCHASED SEPARATELY	\$ 65
KDK 2025 SERVICE MANUAL	\$184
KDK FM 2028 2W WATT 2W FM 10 KEY etc. etc.	\$399
KDK TM-2 TT MIKE OPTION FOR ABOVE	\$ 39
KDK TM-2 TT MIKE SEPARATELY WITH UP/DOWN	\$ 69
KDK 2028 SERVICE MANUAL	\$184

MISCELLANEOUS

KENWOOD TS-830S	\$1289
HENRY RADIO 2W FM AMP 1-5 in/25-30 out	\$ 129
HENRY RADIO 2W FM AMP 5-15 in/80 out	\$ 199
HENRY RADIO 2KDS HF AMP	\$299
ANTENNAS FOR HANDHELDS/BAC	
TRIDYX 1/4 WAVE TELESCOPING, incl. SWR	\$ 12
CANADIAN MADE 5/8 WAVE TELESCOPING, incl. SWR	\$ 15
VOICOR SHORT STUBBY DUCK, incl. SWR	\$ 26
LARSEN RUBBER DUCKS - ANY CONNECTOR - from \$15 to	\$22
TRIDYX 1/4 WAVE TELESCOPING 90 deg SWR	\$ 12
TRIDYX 1/4 WAVE TELESCOPING 90 deg SWR	\$ 12
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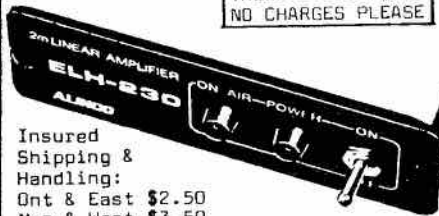
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VHF/UHF News

John Dudley VE5JQ

By the time this reaches you we will have hopefully had many openings on our VHF/UHF bands. Sporadic E propagation peaks in mid-summer and also there should be a number of tropospheric openings, so I hope your patient monitoring has paid off.

E.M.E. News

The ARRL E.M.E. contest weekends in April and May received variable reviews. According to some reports, activity was down a bit, while aurora and bad weather also contributed to operating difficulties. K1WHS seems to probably be the overall winner again this year.

The Lunar Letter, the two meter E.M.E. Newsletter mentioned in my January column, has expanded into a much nicer publication. Starting with the March issue it is a monthly magazine of about 25 pages packed with photos operating and technical news. The 432 AND ABOVE EME NEWS bulletin put out by K2UYH is also included in The Lunar Letter. A1, K2UYH, will still publish the bulletin separately for those who do not take The Lunar Letter, just send him S.A.S.E.'s.

A one year subscription to The Lunar Letter is available for \$7.50 (US funds) from The Lunar Letter, 314 12th Avenue South, Nampa, Idaho. 83651.

SIX METER AWARDS

There are numerous awards available for the avid certificate chaser on 6 M. I have attempted to compile a listing of some of those known to me. I would appreciate hearing about others.

The awards available can be split into two main groups, awards for which endorsement for 50MHZ is available and awards specific to 6M operation.

In the first group are clustered

the familiar, Worked All States (W.A.S.), Worked All Continents (W.A.C.), Canadaward, United States Country Hunters Awards and the Japan Amateur Radio League series of awards. W.A.S. is probably the most sought after award on 6M and about 600 have been awarded to date. It presents a considerable challenge and usually requires several years of keen activity to achieve. W.A.C. is also popular but can be very difficult (it still eludes your writer!) despite the goof F2 propagation of sunspot cycle peaks.

The beautiful Canadaward is not too easy either, only about 20 having been issued for 50MHZ so far. Due to the propagation quirks of the band, the award may be easier to obtain from a stateside location than from within Canada. The Country Hunters and J.A.R.L. awards are well known and make for interesting challenges after knocking off W.A.S., W.A.C., Canadaward, etc.

The second group of awards, those specific to six meters alone, are also formidable challenges in their own right.

The ARRL sponsors the ARRL 600 Club award based on a point system. Details and application forms are available from ARRL headquarters. SMIRK (Six Meter International Radio Klub - see April VHF/UHF column) has two awards available to members. The first is for working members, i.e. 100, 250, 500, 1000 and 2000, details and application forms available from WB5SND. The other SMIRK offering is The DX Decade Award (DXDC) available for working DXCC countries, 10, 15, 20, 25 and up. There is a special 50 country award now available, details for the DXDC are available from W5NKG.

The Greater Pittsburgh VHF Society sponsors the 50 MHZ Quarter Century DX Award, available to those who have con-

firmed 6M contacts with 25 DXCC countries. An application form is available from W3BWU. Another set of awards emanating from south of the border is presented by The Society for the Preservation and Encouragement of Six Meters (SPESM). This group has awards for working 77, 99 and 149 members plus a crossband award. Details are available from SPESM, P.O. Box 268, South Elgin, Illinois. 60177.

Our enthusiastic 6M brethren in Japan have made several awards available. JH3WXB and the Kyoto DX Club offer an award for working 50 different prefixes on 50MHZ. JR3DDQ is the awards manager for the Japan Osaka Century Certificate while JA7 GZA looks after the South/North Corners Club Award for working 10 or 20 countries. These gentlemen will be happy to supply you with details.

I hope this information will help you in your quest for 6 meter wallpaper. I can also supply more details for some of the awards mentioned.

6 METER DX REPORT

March and April were very quiet here on 6M with the exception of a few aurora's. The coastal regions fared better with regard to F2 propagation during this time I understand but details were not available to me.

May has shown a slow start to the sporadic E season from here with only a few single hp openings to the West Coast. May 28th was the most interesting with an auroral E opening to Maine and Labrador.

A FINAL NOTE

Please be forthcoming with your comments, reports, etc. I dearly want to know what is happening elsewhere and what your interests are.

Contest Scene

by: Dave Goodwin Ve2ZP

4 Victoria Place, Aylmer, Quebec, J9H 2J3.

TCA Contests Column for July/August 1982

Contests Calendar

July

1 CARF CANADA DAY CONTEST

10-11 IARU Radiosport

17-18 International QRP Contest

August

14-15 European DX CW

21-22 All Asia CW

September

11-12 European DX SSB

18-19 Can-Am SSB

18-19 Scandinavian Activity CW

25-26 Can-Am CW

25-26 Scandinavian Activity SSB

I apologise for not getting my column together for the 1st issue. There is an awful lot that must be brought up to date.

The major event of the spring, the WPX SSB enjoyed excellent conditions, and probably more than a few records were set. VE6OU and VE7BTV led the all-band contenders, but I have not yet heard any score from either of them. Yuri VE3MB is rumoured to have beaten his old 21 MHz mark, and VE3EEW is reported to have moved the 7 MHz mark to an incredible 800k—. Multi-single entrants included VE1DXA, marking a fantastic score of 8.2 meg, almost 50 % higher than the record they set last year. The multi-single surprise was XK5XK, using the only special prefix from Canada managed a superb score of 7.5 meg. VE3PCA came just short of the old record with 5.5 meg. VE7ZZZ went multi-multi for fun and did quite well, perhaps 9 Meg.

The WPX CW was, for most of us, a washout. A major flare just before the contest produced some of the most discouraging conditions for those of us in the east, CZ3PCA and VE5DX each thinking the other had quit. Comparing notes with VE1DXA, it seems from Ontario east conditions were very poor on 80 and 10 metres, 15 was never really very good for much, and most of the traffic (almost exclusively to the USA and Europe) was carried on 20 or 40 metres. For VE5DX, however, conditions were wierd. At times, they observed very poor conditions, yet experienced unusual openings at unusual times. 15 was great to Europe at about 3AM local time. Some 500 or so JAs were worked on 40. A great 10 metre opening to the southwest USA also filled up the log. For stations in eastern Canada, it was as if a separate contest was held. VE3KZ was observed on 80 early in the contest, but suffering for the conditions. VE3BMV appears to have gone 20 single band, and VE6OU is believed to have been on all bands. Conditions were so poor for us in the east, and have been since the contest that very few details are known with an estimated 2.5 meg, and VE1DXA and CZ3PCA appear neck-and-neck at around 2.1. If VE7ZZZ was on, we didn't hear them, nor much else from Canada.

The second running of the CARF Phone Commonwealth Contest enjoyed conditions almost as good as the WPX CW. A near washout of propagation kept

scores way down from the CW version. 20 was the only band of substance for most people. C3FXB fought his way through a most frustrating 24 hours to make a top score less than half of last year's high mark. Al took first place, it appears, with VC3KZ and VC5RA in hot pursuit. A number of logs were received, and results should be prepared by October TCA.

Seeing as conditions are so poor this time of year, it is nice to see results of contests when conditions were much better. The ARRL 160m contest saw a high level of VE activity, with VE3BVD coming very close to VE3BMV's 86k record. Complete results are below:

ARRL 160m Contest 1982 results

VE3BVD	85,618
VE3INQ	59,150
VE2ZP	45,684
VE1AXT	27,918
VE3KZ	23,760
VE5XU	14,4090
VE4MP	11,316
VE3CKR	11,200
VE2MJ	10,584
VE7SL	10,296
VE6AQi	10,164
VE2QO	7,560
W1TZ/VE7	3,256
Multi-op	
VE3BXI	7,350

It has been many years since a VE has appeared in the top ten, or even placed a score close to the top ranks in this contest. All may change, however, when we are

permitted to use the same power on 160 as we are on the other bands. That will be happening shortly.

After a lapse of a few years, the Calgary Amateur Radio Association sponsored trophies appear to be moving again. CARA has sponsored a trophy for the top-scoring Multi-single VE in the CQ WW DX SSB for some years now, but the last few years have seen no trophies issued. Now they are going out again.

The National Amateur Radio Symposium was held on the CQ WPX CW weekend this year, which pretty well precluded any sort of discussion of Contest issues. The special prefix question was mentioned, but no decision was made in the face of any visible mass desire among contesters. Let us hope that the next symposium will be held on a less strategic weekend next year, and that we will have not only contesters, but many letters from contesters supporting the idea.

Summertime is not a great time for contesting, or for the HF Bands in general, but there are a few contests worth noting coming up. By the time you read this, the IARU Radiosport will have taken place, and the European DX contests will soon be approaching. The EDXCs are a great deal of fun, and are very well attended by Europeans. The rules are also quite unusual, and require some getting used to. The QTC rule,

which essentially allows you to send your log in small groups to European Amateurs, makes this contest very interesting. You really have to play around in these contests once before you enter seriously. The All Asia CW should be of interest to those of you in the west. Very few Canadians ever enter this contest, and hence when they do show up they are very popular.

European DX Contests

Period: CW: 0000z 14 Aug. to 2400z 15 Aug.

SSB: 0000z 11 Sept. to 2400z 12 Sept.

Bands: 3.5 through 28 MHz bands (exc. 10 MHz).

Classes: Single op all bands; or Multi-op single transmitter.

Single operator entrants may work up to 36 hours, and multi-op may change bands once every 15 minutes, unless they are collecting new multipliers.

Exchange: RST and QSO serial number.

Points: 1 pt/QSO with Europe only. As well, non-Europeans may send Europeans reports of previous QSOs. Each QTC consists of the time, call and QSO number received. Up to ten previous QSOs can be reported in any QTC, and any QSO can only be reported once. A typical QTC would be: "1300 DA1AA 134". A book number should be sent with each QTC, indication which

number report you are sending, and the total of QSOs being reported. If you were sending your 5th report, and you were reporting 10 previous QSOs, your book number would be "5/10". You may report up to 10 QSOs in any QTC, and no more than 10 QSOs may be reported to any European, made up of any number of books.

Multiplier: Total of WAE countries worked on each band. 3.5 MHz countries are multiplier by 4, 7 MHz by 3, and 14/21/28 MHz by 2. WAE countries include: C31, CT1, CT2, CT3, DL, EA, EA6, F, FC, G, GD, GI, GJ, GM, GM Shetland Is., GU, GW, HA, HB9, HBO, HV, I IS, IT, JW, JW Bear, JX, LA, LX, LZ, MI, OE, OH, OHO, OJO, OK, ON, OY, OZ, PA, SM, SP, SV, SV, Athos, SV5, SV9, TA1, TF, UA1-3-4-5, UAIP, UA2, UB5, UC2, UN1/UAIN, OX UO5, UP2, UQ2, UR2, Y2, YO, YU, ZA, ZB2, 3A, 4UITU, 9H. For Europeans, each Canadian Call area counts as a separate multiplier.

Awards: Certificates will be awarded to top scorers in each class in each country. Continental winners in each class will receive a plaque.

Entries: Official forms are available for an SAE and IRCs from DARC Contest Committee, P.O. Box 1328, D-895, Kaufbeuren, Federal Republic of Germany. Logs should be sent before 15 September for the CW, and 15 October for the SSB contest.

The Canada Contest, 1981 Results

The Canada Contest of last December was quite a success. Participation was much higher than it was last year, and the general level of scores was also higher. Although only two years old, it appears that the Canada Contest has arrived. Some 117 Logs were received, including 43 from Amateurs outside Canada. Logs were received from Amateurs in every province and territory except Newfoundland. New records were set in the single op, all band, and 21 MHz single

band classes, and also in the multi-operator class. The high mark for Amateur class entrants was also moved up several notches. A new, and probably very difficult to beat multiplier record was set.

Conditions were generally very good. Coast-to-coast openings appeared on all bands except 160 metres. Unfortunately for those of us in the Maritimes and Central Canada, there was little in the way of short skip on 10 or 20 metres to help run up QSO totals. Many people commented on the level of

Canadian participation, saying it was low. No doubt it could be improved but if VE5DX can manage almost 700 QSOs with Canadians, there must be Canadians active, and in quite respectable numbers. I know of no other contest that gets Canadians out like this one. I am sure that mix-up which resulted in the rules not appearing in TCA was responsible for some people not knowing about the contest, but the CARF news service and word of mouth did a lot to help.

Sub-competitions were one interesting aspect of this contest for some people. VE6BNE and VE6YB had a little contest going on between them, with VE6BNE taking the Alberta award, and VE6YB taking the QRP award. Tom, VE3MFT did a fine job rolling up an eighth-place score, without being able to pick up phone multipliers on any bands except 160, 10 and 2 metres. Tom wins the Amateur Class Certificate for his effort.

W6PRI set a new 21 MHz record, although I am sure this can be improved upon. The moaning some Canadians have been doing about poor activity on 15 metres appears to be well illustrated by this result. Why, then weren't those same people out there competing, and trying to encourage activity on 15 in this contest? Last year, the 15 metre high mark went to a West German Amateur, and this year to an American. Does that provoke any thought?

New Western CARF Director, Norm VE5AE handily beat all comers on 20 metres, and set a new record while doing so. Of all the single band entrants, Norm did the best job of collecting multipliers.

Last year we had no 1.8 MHz entries. This year we did. G3XWZ made 10 QSOs, all with Europeans, collecting no multipliers, and so holds the 1.8 MHz single band record with 0 (yes, zero) points. Any challengers?

The biggest story of the whole contest was the superb effort of Jim Bearman, VE5DX. Jim set himself the objective of working 1000 VEs in this contest, but had to settle for a mere 690. (mere?) Coupled with the 120 multipliers he collected, Jim beat his own record, set last year, by more than 100,000 points and so wins the Canada Contest plaque the second year in a row.

Other major scores included the Multi-single effort of VE1ASJ, manned by Andy himself and Dave VE2ZP. Rolling up just short of 800 QSOs, and a record 131 multipliers, they moved the multi-single mark up by about 90k points.

VE6CNO came within 2 multipliers of beating the record set last year on 28 MHz by

VE6CKW. VE7FCK was right on his heels, also putting in a fine ten-metre performance.

As for participation from outside Canada, there were 47 entrants from 14 countries involved this year. W5WG put in a fine effort, placing well ahead of all comers. As opposed to some comments, W5WG felt there was not enough SSB activity, and he made most his contacts in CW. WB9POH turned in a competitive 28 MHz entry, and a group of Amateurs in Chomutov, Czechoslovakia got together at their club station to work the contest multi-single.

There was some confusion about how you compute your multiplier total. In the past, this has been phrased in a somewhat confusing manner. Allow me to clarify this point: Your multiplier total is the total number of provinces and territories worked on each band, added together. CW and SSB operation on the same band is considered to be as if on different bands. Do not simply multiply the number of bands you operated on by the number of modes you used by the number of provinces you worked. You must collect a separate series of multipliers on each mode on each band. Whew!

If you haven't worked a contest before, this one may be a good place to start. The next running of the Canada Contest will be on 19 December. Don't miss it.

VE2ZP

Comments:

Tnx fer fun contgest - my first try at a major contest - VE1CBFI nearly doubled my score from last year's contest - VE3LQJ. My first effort and I thoroughly enjoyed the experience - VE3LMG Antenna tossed together two hours before contest - VE7SK VE6YB and I had our own little contest within

the contest, and this made it even more interesting - VE6BNE.

All contacts made QRPP running 2 watts output - VE6YB. An Advanced class licence sure would help the multiplier total - VE6CCO.

I expected more VE stations - JH3AIU

I hope more Canadians will participate - VE3AHA

Fun contest. Hopefully will have RFI problem which showed up cured - VE7DLM

Tnx for fine contest - VE4YY

My first Canada Contest - it was great - W6PRI

Why..big gap VE / 10, US / 1 points..? K9GDF

Like the present rules as they stand - VE6CNO

Seems like VE contests are improving - W5NR

Next year I'll be back to battle the best for the 10 metre position in Canada with a 5 element quad or yagi - VE2FWE

Would like to have more VEs point their beams down this way - VK4AIX

Happy to work VY1 - JH 4MUQ . A Computerized logger / dupe checker was successfully used for the first time. The program also printed out QSL cards - VE3TCA (VE3JLG)

This has been my first contest - G4LZD

Excellent contest!! Get more VE8s on the air - WB9POH

I wonder why there wasn't more activity on 15 metres - VE3LNY

Don't see why 6 and 2 m were included. It would make it unfair for sparsely populated areas - VE3LMN

I enjoyed the contest, and want to thank all who gave me contacts - VE1BWP

Working as a portable...was a different experience for me - lots of technical problems to solve - VE6AMY/6

A CW contact with VE1ASJ left my pencil smoking - VE 7DJR

Multiplier leaders									
	160	80	40	20	15	10	6	2	total
VE1ASK	12	20	22	24	24	23	6	0	131
VE5DX	5	22	22	23	22	22	2	2	120
VE7SK	10	12	20	20	21	19	0	2	104
VE1BCZ	7	14	13	16	10	11	0	0	71
VE6BNE	0	11	15	19	10	13	0	1	69

Canada Contest 1981 Results

C1	Call	Score	QSOs	Pts	Mult	C1	Call	Score	QSOs	Pts	Mult
C1	VE5DX	876,000	1000	7300	120*	A	JR7XBN	138	10	46	3
A	VE7SK	292,760	356	2815	104*	A	VYIDV	120	4	40	3
A	VE7VX	226,088	417	3832	59	A - all bands. AA- Amateur Certificate. AQ - QRP. 28 - Single band MS - Multi-operator, single transmitter.					
A	VY1DD	148,932	302	2364	63*	28	VE6CNO	36,955	262	1955	19*
A	VE2DU	146,300	404	2926	50*	28	VE7FCK	33,696	333	1872	18*
A	VE6BNE	121,992	214	1768	69*	28	WB9POH	22,990	399	1210	19*
A	VE3LMG	121,684	235	2089	58*	28	VE7CXC	22,059	297	1161	19
AA	VE3MFT	119,088	546	2481	48*	28	VE3KOY	21,981	339	1293	17*
AQ	VE6YB	117,120	243	1830	64*	28	VE1CBF/ns	16,968	226	1414	12*
A	VE1JW/ns	85,214	346	2516	34*	28	VE3LQJ	16,352	247	1022	16
A	VEIDX/pei	80,223	171	1573	51*	28	NF6W	10,176	149	636	16*
A	VE5AAD	71,080	283	1777	40*	28	VE3MKP/3	9,456	203	788	16
A	VE3LNY	70,616	162	1261	56	28	VE3KRO	9,279	149	1031	9
A	VE3MRX	69,188	204	1412	49	28	XE2MX	6,138	69	682	9*
A	VE3DDU	69,137	227	1471	47	28	JA7OWD	6,032	97	754	8*
A	VE1CEG/ns	67,275	323	1495	45	28	G4LZD	5,694	50	438	13*
A	VE2MUV/2	66,015	278	1467	45	28	DF6VE	5,265	80	585	9*
A	VE4ZH	63,136	242	1973	32*	28	VE3LQS	4,736	124	592	8
AA	VE3NBE	46,528	247	1454	32	28	LA4HH	4,432	57	554	8*
A	W5WG	43,700	110	1151	38*	28	YUINR	3,784	58	473	8*
A	VE4ABN	41,838	164	1101	38	28	DF6JC	2,856	41	357	8
A	VE6CCO	31,246	138	919	34	28	GM3ZRT	2,640	32	330	8*
A	VE8XO	28,805	85	823	35*	28	VE2FWE	2,490	100	415	6*
A	VE3LMN	27,724	117	945	29	28	VK4AIX	1,400	23	175	8*
A	NL7Z/0	27,492	145	948	29*	28	JH4MUG	996	30	138	7
A	W9RE	24,616	102	724	34*	28	OK2QX	895	25	179	5*
AA	VE1BWP/nb	22,850	193	914	25*	28	N0CZO	804	17	134	6*
A	VE6AMY/6	19,833	59	601	33	28	JA1JGP	635	19	127	5
A	W8WVU	19,725	85	789	25*	28	JR7TJP	624	40	156	4
A	VE7BAG	19,282	61	622	31	28	J13JQQ	425	13	85	5
A	K6XO	18,950	155	758	25*	28	JG3WCZ	264	16	88	3
A	WA2HFI/0	15,340	58	590	26	21	W6PRI	2,208	50	276	8*
AQ	VE5ACY	13,530	109	902	15*	14	VE5AE	31,185	240	1485	21*
A	EA21A	11,373	84	559	17*	14	VE7DLM	20,260	146	1013	20*
A	N4EDX	10,406	50	473	22*	14	VE7CMK	12,160	102	760	16
A	VE3IQZ	9,775	39	391	25	14	VE4YY	10,572	187	881	12*
A	WA3JXW	8,400	42	420	20*	14	VE1BSL/ns	2,002	70	286	7*
A	VE4SK	7,406	34	322	23	14	JH8NYK	1,600	15	160	10*
A	W5NR	6,750	35	450	15	14	VE4IN	1,128	15	141	8*
A	VE4QST	6,300	99	450	14	14	JK1LUY	12	3	12	1
	VE4MG, op.					14	YU3NP	11	2	12	1*
A	KJ9R	4,508	33	322	14	14	JA7UFZ	10	1	10	1
A	DF2XJ	4,256	61	304	16*	7	VE7BS	7,882	106	583	14*
A	K9GDF	4,096	40	256	16	7	VE4AEB	3,008	61	376	8*
A	G5MY	4,050	25	270	15*	7	VE1CCM/ns	2,198	51	314	7*
A	W4KMS	3,840	23	240	16	1.8	G3XWZ	0	10	10	0*
A	LU1EWL	3,084	39	257	12*	MS	VE1ASJ/nb	687,095	789	5245	131*
AQ	N8CQA	2,607	29	237	11*	MS	VE1BCZ/nb	142,284	326	2004	71
AQ	W8EAO	2,600	20	200	13*	MS	VE3TCA	122,472	287	1944	63*
A	HI3AMF	2,530	22	230	11*	MS	OK1KSO	76,325	216	1775	43*
A	W5EIJ	2,470	17	190	13	MS	VE7DJR	67,858	225	1834	37*
A	JMINKT	1,930	31	193	10*	MS	VE3VCA	9,956	81	524	19
A	JH3AIU	1,448	46	181	8						
A	HB9APJ	990	10	110	9*						
A	VE3GWM	972	18	162	6						
A	WA4JJY	240	5	60	4						
A	JH0QYS	172	41	86	2						

Canada Contest Record Scores

MS operators:

VE1ASJ: + VE2ZP

VE1BCZ: + VE1AXT, VE4AHT, VP2EM,

J. Kavanaugh.

VE3TCA: VE3s FXI, JLG, JWP, KMV, MHN, MPI,

MPX, D. McDougal, G. Berthiaume.

OK1KSO: OK1AEZ + Chomutov Radio Club

VE7DJR: + VE7DKS

VE3VCA: VE3s HWS, IDW, LGG.

C1	Call	Score	Mult	Year
A	VE5DX	876,000	120	1981
AA	VE3MFT	119,088	48	1981
AQ	VE6YB	117,120	64	1981
28	VE6CKW	39,160	22	1980
21	W6PRI	2,208	8	1981
14	VE5AE	31,185	21	1981
7	VE7BS	8,932	14	1980
3.5	VE2JV	8,000	10	1980
1.8	G3XWZ	0	0	1981
MS	VE1ASJ	687,095	131	1981

Adventurs of a Canadian Army Signalman

The year was 1942...They came from all over the province these volunteers for the Canadian Army. They were lean and they were tough...they had just come through the great depression and knew what it was to be hungry and kicked about...There was no welfare payments for these boys!

Then 60 days intensive basic training...just 60 days...and they were ready to take on wildcats!

We knew nothing of regiments, or areas of service...we hadn't heard about "the Engineers" or "the Signal Corps"...Coming from civvy life as an electrician, I had heard there was a group called "the Ordinance", in which electricians were in demand. I figured that was a good place to be.

Today, an interview was scheduled with a placement officer who informed me, "we are not recruiting for Ordinance" but for "the Artillery" and the "Signal Corps"...Now there is nothing for you in the Artillery..."what's your choice?"

"What's a signal corps" I asked?...thus at Vimy barracks in Kingston began an exciting adventure, which if I had to make the decision again as to where to serve, it would again be my

choice....Thus I found myself with other tradesmen located in the tent lines of "Trades Co."

There were rows of neatly parked wireless vehicles on the parade square with small oversized balloon tires and canvas covers over metal frames of the boxes...You could just picture going through the dust of the desert pursuing that desert fox Rommel...with "Fords" and "Chevies"...with their reversed sloped windshields..Oh, it was all very glamorous to day-dream!

There also were beautiful new huts, with hardwood floors and oil heating, spring cots, kapoc mattresses, new washrooms..but not for Trades Co, who had straw mattresses, no beds and out-houses...No, these were for radar mechanics, radio operators...and draftees! The food was terrific in clean messing huts, and table cloths...but not Trades Co. volunteers in the "active army"...and it was the cool Fall of the year...the rainy season..bell tents...half with wood slat floors...a mudhole...we ate in a circus tent...and the food was poor! Being an independent type, I said to my buddy..."We wear the same uniform, get \$39.00 per month..come on lets eat!" So we

regularly hit three messing huts each evening...and never had it so good!

One day I saw a group of draftees lined up for new mattresses, walking-out uniforms...nice leather oxfords (we only had boots)...swagger sticks, shirts with collars, and ties (we had none of these)...So I fell into line and got completely outfitted..took my new mattress, moved into a new hut with Radar Mechanics, put my name card on a spare bed. (same as they)...and joined these fellows each evening in a country hoedown with mouth organ, guitar and violin..We had a ball..it was two months before it was discovered that I wasn't in the tent lines..but it was too late!

Snow came that night...and Trades Col had taken enough!

Brandishing fireaxes, they flattened the circus tent...knocked down the tents!

There were new tenants in the new warm huts that night...Oh, "the Brass" huffed and puffed...but the Press was there with pictures...and nothing more was said about it. The moral was clear...a Canadian volunteer will take just so much abuse...then watch out!

DX Column for July/August, 1982

by D. W. Griffith, VE3KKB

QSL MANAGERS -82

Conditions for the past month remind me of the joke about the guy who was looking really down in the dumps, and a friend asked "What's the problem?". The first fellow told the friend, who thought for a moment, and then said "Don't worry, things can always get worse.", and of course they did! For those of you who tend to be more sports minded, let's put it this way: an A index as high as a good football score, a K index that would be the envy of any hockey team, and the solar flux sounding like an NBA basketball score. In short, other than a few mornings, conditions have just not been great! Having never survived a sunspot minimum, I'm beginning to take a good hard look at basket weaving as an alternative passtime if conditions continue to deteriorate (and I have it on good authority that as sure as the sun rises in the East every day that conditions will get worse over the next few years). Ah well, there is the Fall to look forward to.

Finally, after several unsuccessful attempts at getting a special prefix, one was granted in time for the WPX CW Contest at the end of May. While on the subject of lousy conditions, wouldn't you just know that I'd get the prefix for a weekend where conditions were just that - LOUSY! Further, it came at a time when everyone else had access to one.

The only saving grace was that the one allocated to your scribe was different. Thus, CZ3PCA was able to make a bit of a splash during the contest. Based on early results, it looks as though CZ3PCA, and VE1DXA are within 100K points of each other in the multi-operator, single-transmitter class, with the edge going to the latter station. One of these days Alice!

On a more serious note, the FCC has extended the deadline for

comments on Docket 82-83 (re: the U.S. phone band expansion) to August 16, 1982, and replies will be forthcoming by September 16, 1982. If you haven't made your views known, please do so in writing. Please don't adopt a "Why should I write, it won't do any good" attitude, because one never knows. Your comments may just be the ones to tip the scales.

If you wonder why the QRM from S. America has been less in recent months, Amateur Radio has been suspended in Argentina since April 29, 1982. This as a result of the conflict between that country, and Great Britain. For the same reasons, there has been no activity from either S. Georgia, or the S. Orkney Is. Hopefully, with the end of fighting in the S. Atlantic, we will see amateur activity return soon in these areas.

Thirty meters is now available to Canadian Amateurs, CW only. A fair number of European stations are being worked, as are a few Australians, and New Zealanders.

Since this is a new band, I would appreciate hearing from as many people as possible as to what they are working, or in lieu of that, at least what they have heard. I hope to get a least a delta loop operational by this Fall, and plan to spend a fair bit of time on 10 Mhz.

No word yet on the 18, and 24 Mhz bands but the Amateurs of certain European countries have already been given consent to use these bands. These include Denmark, Faroe Is., Greenland, Fed. Rep. of Germany, and Switzerland (all on a non-interference basis).

Send all material for this column to DW Griffith VE3KKB, 33 Foxfield Drive, Nepean Ont. K2V 1K6.

06-17-82
CALL SIGN

3D2EH
3V8DX
4X2BYB
5R8AL
5Z4CS
5Z4CV
8Q7DL
9K2BE
9Q5ZA
9X5SP
AH8AA
C53DZ
CN8CY
CZ3PCA
D68AAB
DAZAR/HBO
EF5SSC
F0DYM/FS
FK8DD
FO0KP
FO0WA
J3AVT
J6LOV
OD5LX
OH0BA
T32AF
TU2IE
TYA11
V2ADX
V3ME
VK9ZD
VK9ZG
VK9ZH
VK9ZR
VP2EC
VP2ED
VP2EE
VP2VIC
VP5JEX
VW9CW
VS6JW
WBOMKR/KH3
XK5DX
XZ5KNU/9
YK3AB
ZD8CG
ZD8MJH
ZD8MW
ZD9BV
ZK1XG
ZK2BB
ZLOAEO

GE 1
QSL VIA

K8VIR
G3SVK
WB2WDU
WA4VDE
J11VLV
W2KF
DL9BAF
G4GIR
ON6FN
DL8OA
W4FGX
DJ6SI
GW3IEQ
BURO
G4DYO
DA2DC
EA5BAA
W3HNK
KA3E
W6SZN
W6SZN
W8UVZ
K2QIE
SM0DJZ
OH2BAZ
WH6AIF
DL4BAM
ON5NT
W9SWM
G3OGO
VK6YL
VK6YL
VK6YL
VK2BJL
N5AU
AD8J
AA4NC
KA2IXW
W4DR
WB1DQC
G4LRG
KB2RV
VE5DX
DL1KAO
OE1DH
W9CN
G3GIQ
G3GIQ
W4FRU
DL1VU
VK3VU
WB8WMS

KC6 (Rep. of Belau) - DXCC - W. Carolines - Aug 8-11 by ADIS, and KHO (Saipan) Aug. 11-14, KX6 (Marshall Is.) Aug. 14-16.

As of January 1, 1981, Yap Is. counts as E. Caroline Is. not W. Caroline Is.

VEI - St Paul Is. - Two different groups are trying for mid-Summer DX'peditions to this Canadian lighthouse rock in the Atlantic. Keep your ears open.

EX5 was a special prefix commemorating the 1500th year of existence of the city of Kiev, in the Soviet Ukraine.

RX7 was a special prefix from UL-7-1 and to commemorate the 250th year of that region.

CZ3 was a special prefix used by two Ottawa area stations to commemorate the 150th anniversary of the completion of the Rideau Canal System.

Ezzat Ramadan, SU1ER, says that there are no QSL managers for any SU amateurs. QSL to the callbook address, or to Box 33, Air Post, Cairo, Egypt.

That's it for this month. I hope you all have a good Summer, and trust that the Fall will herald the return of better overall conditions on the HF bands. Many thanks to Long Skip, VE2ZP, RSGB, DX Report, and DARC DX Information Net for much of the material appearing here.

ZD7AL P.O. Box 25, St. Helena Is., South Atlantic Ocean.

BY1PK Box 6106, Beijing, People's Republic of China.

4x4VE / 5N8 P.O. Box 439, Kano, Nigeria.

3D6AE P.O. Box 1334, M'Babane, Swazila ND.

Y11AS Via DK2OC (New Address), Klokst OPSTR 2, D-1000 Berlin 21, Fed. Rep. of Germany.

W6KG / PZ1 Yasme Foundation, P.O. Box 2025, Castro Valley, California, 94546, U.S.A.

MIJ Raggio Borgo, 47031 Domagnano, San Marino.

CR9BH M. Laine, Pyorrekujä 4 C 43, CF-01 600 Vantaa 60, Finland

5B4JE Aris Kaponides, P.O. Box 1723, Limassol, Cyprus.

COMCON '82

Here's a little riddle for you.

What do you get when you take 85 people from three countries, all well-versed in their own communications field, and bring them together in one place for a conference on emergency communications? You get one heck of a good conference with a lot of ideas being tossed around.

From May 26 to May 28, I had the fortunate opportunity to attend COMCON '82, sponsored by Emergency Planning Canada, at their College in Arnprior, Ontario as the official representative of CARF.

In addition to myself, representing from CRRL and two from RA-QI attended with their **complete** mobile operations centre. Through the graces of Art (VE3ZS) and Dollard Electronics, and exhibit of amateur radio equipment was set up in the main conference building. The station consisted of and Icom IC-720 with an IC-AT500 antenna tuner connected to a vertical and a pair of dipoles on the roof. In addition, VHF and UHF handhelds were on display. RAQI set up their mobile command post outside, across from the main building and operated completely independent of power lines.

(What a field-day setup).

Canadian National Railways brought in their MOBILE 1 from its normal resting point in Brampton, Ontario and ran the unit through its paces for every-one to see. It's a nice piece of machinery but I think a bit pricey for what it can do (about \$500,000 per unit).

A consortium headed up by Blaupunkt demonstrated a system called ARI-EBS (Automated Radio Information - Emergency Broadcast System) which, if western Europe's example is followed, should be operational and in wide service in North America within the next five years. By doing funny things to FM radio signals the unit can provide traffic information or emergency information to the general public, even if the radio is switched off. The system encodes the signals and carries them in the standard FM broadcast, functioning in two or three modes - dependent on the sophistication of the receiver. By the way, retro-fit equipment will be available to modify existing equipment.

Two other demonstrations were also shown, covering one end of the spectrum to the other - ELF (voice) to microwave (satellite). The voice system was only a small

version of the systems that were available - 900 watts!! The system was demonstrated over roughly a one mile range with the speakers close to ground level. Even at that range, it's like talking to someone next to you. The big system (14,000 watts) is currently in use in Baghdad and covers 16 square miles from one set-up. Surprisingly, the system is very directional and is quite tolerable about 30 % off center-line. Using amateur radio, the exhibitor talked to the crowd that he was beside from the speaker system on the other side of the field. A VHF simplex link was set up and the output from the receiver was fed into the microphone of the amplifier system.

An example of satellite technology was demonstrated when a dish was set up to pick off a signal from one of the commercial satellites in orbit.

On the talk side, representatives were present from Teleglobe Canada, the Trans Canada Telephone System, CN-CP Telecommunications the Common Carriers Association (paggers, radio-telephone), Rapifax Canada, the Nova Scotia Integrated Government Communications

System, and the likes.

The talks were extremely interesting. Did you know that you can transmit a full page of information, over a VHF link so poor that voice signals are incoherent, in about 45 seconds? And the information is almost as clear as the original.

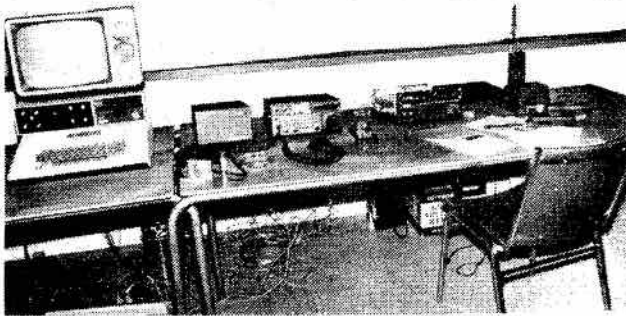
Another very interesting, but scary, talk dealt with the effects of EMP (Electro Magnetic Pulse) on all types of power and communications equipment. It seems that the only way to really deal with this thing would be to discon-

nect your radio system from all its antenna and power sources, put it in a metal box, and wait for the effects to wear down - unless you want to spend big bucks on protective equipment. Serious EMP is generated from a nuclear blast - it's most powerful when it is triggered outside the atmosphere.

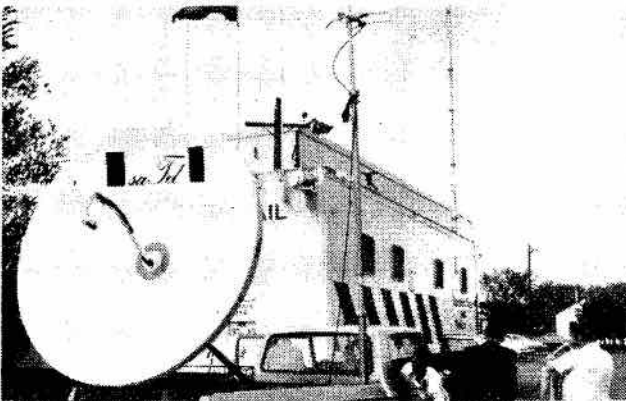
All in all, the conference was very informative and, at the closing session, it was decided that another conference should be scheduled next year to provide update information and establish guidelines for emergency com-

munications on a national level.

As a result of the conference, a new organization is being formed, in Canada to better prepare for emergency operations. The Canadian Emergency Telecommunications Association is a group of communications specialist from all aspects who will provide a guidance service to emergency agencies and liaison with government departments on communications matters. More about this association when information is available.



The demonstration Amateur data station set up by Art Stark VE3ZS, and Ken Kendall VE3IHX. Left to right, the Apple computer, ICOM power supply, HF transceiver, amplifier and assorted walkie-talkies. (Photo - Emergency Planning Canada)



CN Rail demonstrated its 45-foot mobile emergency command centre. The whole rig, including its special truck-mounted dish, can be sent by road or loaded on a flat car for dispatched to a disaster site. It has an ops room, kitchenette and a bunk. A complete communications room features all-band commercial radio links and satellite facilities. (Photo - Emergency Planning Canada)



COMCON '82 chairman 'Wiggy' Wigglesworth, VE3YE, flanked by Ken Hepburn, Assistant Deputy Minister, (l), Spectrum Management, DOC and the director of the Federal Training Centre at Arnprior, F.H.C. Gamble (r). (Photo - Emergency Planning Canada)



'Wiggy' Wigglesworth, VE3YE, who master-minded the conference, talks on the elaborate portable emergency equipment with which the Quebec radio society, RAQI, assists the provincial emergency agency, Protection Civile. Jose Mathieu, VE1ELQ, who was one of the main movers in setting up the emergency Amateur organization, looks on with a fatherly eye.

(Photo - Emergency Planning Canada)



Ken Kendall, VE3IHX, the CARF representative at COMCON '82 presenting his report on the conference to the CARF annual general meeting.

(PHOTO-VE3ZS)

EmCom



Emergency
Communications

Ken Kendall VE3IHX
777B Springland Dr.
Ottawa, Ont. K1V 6L9

The name of this column is EmCom, short for Emergency Communications.

The purpose of this column is to stimulate a positive dialogue between Amateur Radio operators across Canada to develop concepts for Amateur Emergency Communications at all levels of participation - local, regional, provincial and federal. This column can be a forum for these concepts.

If **you**, as an individual or as a spokesman for the group, have ideas that you think could be of benefit to all, by all means send them to me by mail. All thoughts and ideas are welcome and, if used, will be attributed to those who suggested them.

Thoughts put forth in this column are not necessarily those of CARF.

After a few months absence from writing articles (during which I changed employers), it is now time to get down to the serious business of writing articles about emergency communications.

A UNIFIED, COORDINATED SYSTEM

You will remember, in my last article, I mentioned that there should be a by-law in effect in your area that designates someone as the "emergency planning officer" who is responsible for, among other things, emergency communications. That is the person you should talk with about assisting in providing emergency communications. That is the person who is responsible for providing emergency communications for the community.

Coordinate your services through the EPO. Maybe the EPO has already made arrangements for emergency communications

with the local CB group or with various private commercial systems.

Just remember - two or more weak, uncoordinated groups can never replace one unified, coordinated system working together with a common command centre and standardized procedures; and any duplication of effort is a waste of manpower in an emergency situation.

HOW DO YOU APPROACH THE EPO TO VOLUNTEER YOUR SERVICES?

The biggest mistake you can make is to go stomping into the EPO's office insisting that amateur radio is the be-all and end-all of communications - that everyone else's system is obsolete - that police, fire, government, utility, etc. communications people are incompetent. (How many ham operators have 30 meg wide VHF synthesized **portables** with 30 direct telephone channels?) If you want to go out of an office on your butt real fast, use that attitude.

If you want to make a good impression, go in prepared. Briefly research existing communications facilities in your community. Find the shortcomings, the inadequacies - and determine if you can fill the gap. But don't go tearing around to the chief of police or the fire chief or any other person like that and start asking sensitive questions about their equipment.

These people think that their systems are practically infallible or, at least, will hold together in 99% of the situations. Normally, these people are resentful of anyone attempting to tear their facilities to pieces.

Once you have the existing facilities sized up, determine

where amateur radio can fill in the gaps and outline them in writing for the EPO. Just remember not to bite off more than you can chew. It is better to exceed your expectations than to let the EPO down in an emergency.

When you meet with the EPO, try to have a small demonstration prepared with fellow Ham operators to show **some** of the capabilities of Ham radio. It does not have to be fancy, but it should work properly. Be flexible to the ideas of the EPO. Answer any questions about capabilities truthfully, based on what **you or your group** can do as opposed to what the technologies of Amateur radio can do. Remember, your biggest weapon in your credibility. To be credible, you must, at least, be able to meet desired goals.

Use examples of where amateur radio have been of extreme benefit to communities in an emergency, citing how these emergency services could be similarly applied to the EPO's jurisdiction.

Above all, show how the amateur radio operator can assist the EPO to function more effectively. Be positive, but not zealous, in your attitude and be prepared for a generally hesitant reaction to any facility that you offer to an EPO. Any radical change to the status quo of an EPO's operating procedures can be almost disastrous in an emergency situation.

Send all comments and material for EmCom to Ken Kendall VE3IHX, 777 B Springland Dr., Ottawa, Ont. K1V 6L9.

TCA has a 24 hour phone for late news. Phone 613-731-6102 anytime and leave your message.

Guidelines for the Preparation of Articles for TCA — The Canadian Amateur

1. Both the Editor and the Printer have to gauge article lengths in order to layout the magazine properly. The present format of TCA runs about 900 - 1000 words to a page. Therefore it is most helpful if articles can be typed out at a rate of about 250 words to the page, ie. about 50 - 60 spaces per line and about 25 lines per page. This will also leave space on a normal page needed for minor corrections and editorial directions to the Printer.

2. Double space lines and indent paragraphs 5 spaces.

3. Articles should be typed or in clear, legible handwriting, also double spaced with adequate margins.

4. The author's name and full address must be included.

5. Drawings, tables and graphs must be on separate pages with good, clear printing and they must accompany the article. Size is not too important if the lines are clear: the Printer can make adjustments.

GUELPH FLEAMARKET 82

The Guelph fleamarket was held June 5th this year and boasted the biggest attendance yet.

CARF was there with Ontario directors' Craig VE3HWN and Bill VE3MEW and TCA editor Cary VE3ARS alternating at the booth.

Hammond Manufacturing had some really great deals on cabinetry and chassis for those in attendance including the remaining stock of their Amplifier cabinets.

Fred Hammond VE3HC had the Hammond museum open again during the event for anyone who had the chance to see it.

VE3HWN

6. Black and white photographs on glossy paper reproduce best of all in print. This presumes that they are clear and have good contrast. Colour prints can be used but they do not reproduce as well.

7. Clear, crisp writing in which the ideas flow logically and smoothly through to the article's end is much preferred to that in which the writing is verbose, wandering and repetitive.

8. Amateur should always have a capital 'A' and ham should never be used. A complete description of component parts in terms of basics (mmfd, mH, volts, mA, turns, diam, etc.) is to be preferred over a distributor's part number as Amateurs may have the part in their junk boxes, may have a substitute or may be able to make it.

Wanted for TCA: News items, pictures, original stories and technical articles. Make pocket money by writing for The Canadian Amateur!

Technical articles are especially welcome. We can use simple construction projects, antennas, hints and kinks, explanations of the theory and practice of modern Amateur operations and equipment.

Photos should be glossy black

9. Metre is a metric expression. Our bands are measured in metric form.

Meter is an instrument.

10. If return of material is required, please enclose a self addressed and stamped envelope. Return of material is not guaranteed unless this rule is followed.

11. Please identify all pictures. Captions, and names of people in photos are necessary.

12. Remember, articles which are of interest to the broadest cross-section of Amateurs are preferred to those which are of interest to a small number.

13. Deadline for material in the Editor's hands is the 1st of the month preceding the publication date.

and white prints, although we can use colour prints. Written material should be typed, double-spaced. Legible handwriting is acceptable. Finished artwork and drawings will add to the value, but sketches and rough drawings are acceptable.

Send **Technical material** to: Technical Editor, CARF * Inc., Box 356, Kingston, Ont. K7L 4 W 2. Send **all other material** to Editor TCA P.O. Box 2610 Station D, Ottawa K1P 5 W7.



Radio Regulations and the Competition for Spectrum

**Bill Wilson, VE3NR
Former Director General,
Telecommunications Regulations, DOC**

In these days when regulations seem to be complicating our everyday living and de-regulation is becoming increasingly attractive, it would pay us Amateurs to have a good look at the Radio Regulations and ask, "Why do we have these regulations?"

If you take a global view of the regs you will find that they are written with 3 major objectives in mind:

- a) to solve problems of competition for radio spectrum,
- b) to "harmonize" radio communications, and
- c) to control "harmful" interference to radio.

By far the greatest attention is paid to the first objective. There are a few other things thrown in like the control of tower heights, painting and lighting, divulgence of information, log-keeping and profanity but they are minor in the whole picture.

If you searched for the reasons behind the two huge volumes of ITU Radio Regulations you would find the same three objectives again, with 90 % of the attention being given to the first one.

The nature of the competition changes as needs and technologies change. The problems of competition for frequencies really began in the late 20s shortly after radio first caught on, and it has been growing ever since as the number of stations has increased. In the early days the competition was hot in the MF bands. Following World War II it expanded to cover the bands up to around 30 MHz. By the time of the ITU's Administrative Radio Conference of 1959 the battle involved the bands up around 6000 MHz. Today the competition for HF frequencies has eased, but in the bands from 50 MHz on up to 15,000 MHz (15 GHz) it is hotter than ever and a new dimension has been added. It involves the or-

iginal slots or windows needed for geostationary radio communications and broadcasting satellites.

The major instrument of control used by DOC the spectrum manager for Canada, is the frequency allocation table. When DOC allocates bands of frequencies to radio services it settles the competition between specific groups of users until the time when needs and technological developments make a reallocation necessary. Within a particular band, the problems of competition between factions of users are solved by sub-allocations, frequency plans, sharing criteria comprising such things as control of power, necessary bandwidths, frequencies, antenna height and directivity and frequency coordination procedures or some combination of these. Controlling access to the use of radio is another means for solving the competition. Some might say 'cooling' the competition because this tends to limit the number of users in particular bands.

We Amateurs are familiar with most of these techniques: the allocation of bands to Amateur Radio; separate sub-allocations for the users of CW and of phone; a band plan for 220 - 225 MHz; sharing criteria for the 160 meter band and finally examination and certification procedures for Amateurs to control access to the Amateur bands.

Harmonizing - a great ITU word - means making it possible for radio stations to intercommunicate! A number of examples of how this is done come to mind: putting stations used for a particular kind of communications in the same bands or sub-bands; agreeing to their using common sets of frequencies; agreeing to common procedures for the handling of all kinds of traffic (distress traffic for example); adop-

ting 'Q' Codes and other abbreviations; publishing lists of stations and call signs; etc.

Fifty years ago interference was defined as anything on one's radio that he did not want to hear. Today, however, spectrum congestion has forced us to distinguish between "interference" and "harmful interference"; the difference being that the latter inhibits the flow of communications while the former does not. DOC works in many ways to prevent harmful interference between radio systems, especially where communications relating to safety of life are concerned. They have legal authority to control radio interference from industrial equipment, but they have no legal authority to control interference due to the poor shielding and construction of consumer electronic equipment.

The licensing process ensures that applications to use radio conform to the Regulations and that the information needed for spectrum management is provided . . . along with the appropriate fees!

Of course countries compete for spectrum and that was the major reason for forming the International Telecommunications Union. It works at the international level along lines much the same as the DOC does in Canada at the domestic level. The tasks are slightly different as far as radio is concerned - there is no control of access to the use of radio and the control of interference is limited to that between radio systems.

Well, why should we worry about Regulations? It is simple. The Radio Regulations record the decisions taken by DOC (and the ITU, internationally) in the continuing competition for spectrum. We need frequencies to operate and so does everyone else. The spectrum is limited., Radio is a valuable asset. For example a

As of May, 1982, we now have a reciprocal operating agreement with St. Lucia.

NEXT MONTH IN TCA

Gerry King, VE3GK of Ottawa, is probably one of the best known Amateurs in Canada. A picture of his antennas appeared recently on the cover of CQ. The fall story, "GERRY KING — 2db AND 90 FEET OVER S9" will appear in the September issue. Also, the long awaited Amateur Band Bar Chart will be included.

vehicle that is equipped with radio communications to its home base can do the work of 5 vehicles which have no radio. Radio is essential for ships and aircraft; they cannot stop at a coin-box phone to communicate. Thus there are many who would be severely limited if they had no frequency.

The users of radio in Canada have formed eighteen different Canadian owned and controlled associations to represent their interests, to keep watch on how radio is used and regulated both in Canada and the United States and to ensure that their use of radio is not restricted. They are Canadian-oriented and they are always working to find more spectrum for their present and future needs. Needless to say, these organizations do not tell DOC that they do not need frequencies nor do they say they will agree to sharing unless changes in technology and operations have made such measures unnecessary. They do not put themselves in positions where they can be forced to give up frequencies. They pay a great deal of attention to strategy. Dog eat dog? Not quite, but...!

Your federation works in this environment on behalf of Canadian Amateurs. When new or changed regulations are proposed, take time to look them over carefully and do take time to tell the Federation and the DOC what you think of them and why. The intensity of Amateur feeling can only be gauged by the number and nature of the comments they receive.

The recent U.S. Federal Communications Commission docket 82-83 proposing the expansion of the telephony segments of the high frequency Amateur Radio Service bands for United States Amateurs is a case in point: The United States is very aggressive on frequencies these days and they

do not compromise readily. You should give this document your early attention and then let the Federation and the DOC know your views. Remember, good reasons for your recommendations are needed.

Finally, do not stop when you have finished with this FCC proposal. Keep your eye on all future proposed regulations changes and make your views known. Ninety-nine chances out of one hundred they will involve spectrum and that is our most important asset.

More Wallpaper

DOC has produced a new chart of the Canadian radio allocations resulting from WARC '79. It depicts in color the bands allocated to the various radio services in Canada.

At a little less than 2' x 3' it will make a nice showing on your shack wall, baffle your non-technical friends and provide you with very basic information.

Of the four errors on the chart, two concern the Amateur bands. The new 10.100 - 10.150 MHz band is shown as 10.005 to 10.100 MHz and the 142-144 GHz band is shown as shared with radio location instead of primary Amateur and Amateur Satellite.

The 20 shade color code for the various services will confuse anyone with a tendency to color blindness but it is actually a general pictorial representation of the new 'Canadian Table of Frequency Allocations' which gives the domestic allocations in detail.

The chart (Catalog number Co 22-33/1982) costs \$2.50 and the Table is \$9.95. Both are available from any authorized government bookstore agent or from the Canadian Government Publishing Centre, Department of Supply and Services, Ottawa, Ont. K1A 0S9.

AMSAT's Phase IIIB launch delayed again . . . Soviets launch satellite

AMSAT has been notified that the launch of the Arian L7 rocket carrying the Phase IIIB amateur radio spacecraft along with the ECS-1 (European Communications Satellite) has been delayed until January 1983. The Phase IIIB satellite will have a 435 MHz uplink and a 145 MHz downlink. The Ariane launch schedule has been set back due to a major malfunction aboard a test launch last December. The delay should have little effect on the AMSAT program, but as AMSAT's Vern Riportella (WA2LQQ) says, "It would have been nice to have had a launch this summer or autumn."

Meanwhile, the USSR has orbited ("tossed out" is a better explanation) another Russian Amateur Radio Satellite. It was jettisoned from the Salyut 7 space station by the Cosmonauts aboard. The 62 pound satellite, built by Russian engineering students, signs the call RK02 and has been heard on 28.878 and 29.576 MHz. AMSAT was notified of the impending launch by HA5WH (Dr. Andre Gschwindt of Budapest), Chairman of the IARU's Region 1 Satellite Coordination Group. The communique said the satellite was an "hf 21 $\frac{2}{3}$ 29 MHz" satellite, but so far nothing heard on 21 MHz. Its orbit carries it beneath the ionosphere, thus the hf frequency allowing signal refraction to earth. The world's first hf-to-hf transponder obviously has a problem since it has yet to be activated.

TCA: Technical Section

A Helpful Handful

by F.P. Hughes VE3DQB

Last weekend I took a long, hard look at the first piece of test equipment I made myself, when I was first licensed, a long time ago. It is naturally, an absorption wavemeter, made to a design that is an improvement on the usual handbook ones.

It uses a two-gang capacitor mounted on a piece of broom handle (Figure 1). Across one of the 250 pF capacitors is a 20 turn, 1-inch diameter coil of 20 gauge wire. Across the other, and at right angles to the first, is a 5 turn, 1-inch diameter coil of 10 gauge wire. One side of each of these coils goes to the ungrounded (stator) blades of its capacitor, the other two ends are grounded through a flashlight bulb holder.

I wish I had a nickel for every bulb I have burnt out in that holder. Such an indicator is all very well if you're sure of where to look for the oscillation you want to detect. If you are wrong, though, it can be annoying: the bulb flashes bright, "bang goes saxpence," and saxpences are never sufficient when you want to finance a station.

However, when I built the thing, 200 microamp meters were not going for a dollar apiece as they are today. Bless the CB boom! Enough manufacturers were sold up to keep us in equipment for many years. Upgrading the absorption meter can be financed, nowadays.

But what really made me go to a more sensitive device was the change-over from tubes to transistors. The smallest, lowest-powered tube oscillator puts out enough energy to give a dull red glow to an absorption meter lamp filament at its fundamental frequency. A bipolar transistor, or a FET, usually doesn't. So the old

wavemeter stood on the shelf (or rather, on top of the signal generator) for the last year or so, unused.

REBUILDING

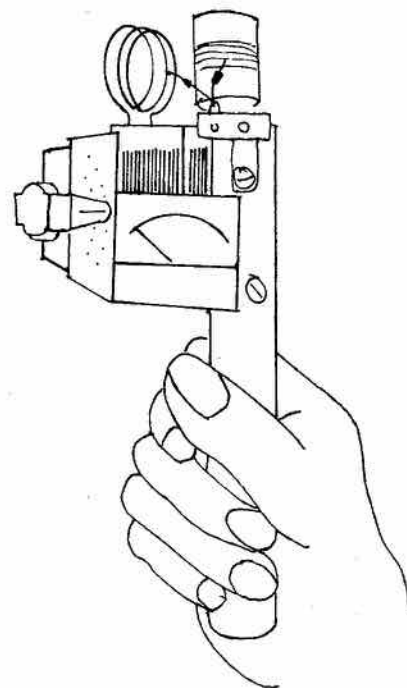
So I stripped off the lampholder, grounded the ends of the coils that went to it, and pondered what to do next. The 200 uA CB meter I had bought happened to be just the right size to fit between the piece of hardboard that holds the scale of the meter and the handle, so I mounted it there with crazy glue. One of its connections went to ground, the other to a terminal strip.

Now, making sure that the polarity of the diode matched that of the meter, I wired a 1N914 between the terminal and $1\frac{1}{4}$ turns up from the grounded end of the 5-turn coil. I wired another from the terminal to the fifth turn of the 20 turn coil. (Figure 2).

A 1 mF capacitor went over the meter terminals, and that finished the instrument. It worked like a charm. With the 20 turn coil close to the FET gate dipper, the meter went over to the pin. The indication (at 3.5 MHz) was sharp and repeatable. Tuning the wavemeter up showed the harmonic at 7 MHz, flipping the meter through 90 degrees coupled the 5-turn coil, and I could check emissions down between 10 and 50 MHz.

That is the beauty of this design: no coil changing. The sweep between 1.8 and 50 MHz is available immediately, simply by rotating the meter by its handle, and there is no box of coils to either get in the way or get lost (there is no intermediate location.)

The bells and whistles on absorption meters are two: You can put on a phone plug to listen to



amplitude modulation, and that's not worth adding these days. The other is a loop to pick up energy remotely. This I tried, but I found it didn't give much of an indication.

Perhaps I should have put more turns round the coil to increase the input. Instead, I soldered small extensions to the stator terminals of the capacitors, and I can connect them via a clip lead and a small capacitor to the circuit under test. This is simpler than putting on extra windings and fitting phono plugs to take the pickup extension.

If you cannot get hold of a 2 x 250 pF capacitor, use what you have. The popular superheterodyne gang, 365-180 pF or thereabouts, with 20 uH over the large capacity and 1.1. uH over the small will do perfectly well.

To calibrate the wavemeter, connect the output of a 100 kHz frequency standard to a small pickup coil, and couple the wavemeter to it. Mark the scale every 100 kHz at the low end, every 5600 in the middle, and every MHz at the high end. On the high frequency coil, every 5 MHz will do.

With the scale so marked, only one of the points need be identified to identify the lot. Pick the WWV signal that is loudest at the time, wind two turns of antenna around the wavemeter coil, thence to the receiver, and tune the wavemeter. At zero beat with WWV it will absorb energy from the antenna and the S meter will show the fall in received signal strength. This identified the point at the WWV frequency.

This technique allows the operating frequency of oscillations too weak to affect the meter to be found. Arrange to listen to the oscillation, or measure it in some way, couple the wavemeter to the oscillator, and note the frequency at which the signal strength changes as the wavemeter is tuned over the band.

DECORATION

A carefully made instrument deserves a good-looking scale. It need not be large, for the frequencies are not measured with great precision. Here is an excellent way of calibrating the scale.

Take a scrap of transparent plastic and cut it to fit the underside of the knob you plan to use, with a tongue about 1 inch long for a cursor. Scribe a line down the cursor, and at one end center a hold on it to fit the capacitor shaft.

At the opposite end of the line, drill two fine holes $\frac{1}{4}$ inch apart. Rub pencil lead or wipe drawing ink into the scribed line to make it easily visible. Glue the cursor to the knob, making sure the hole in the cursor will pass the capacitor shaft.

Then calibrate the instrument. As each point is zeroed in, push a pin through one of the fine holes to identify the spot. Ink these in when calibration is finished. Number the calibrations as neatly

as you know how. A fine-point felt pen can do a good job here.

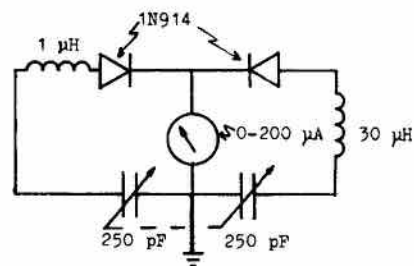
The key reason for having an absorption meter is its unambiguous indication. It tells you without fail what ballpark you are in. If it responds, there is energy being emitted at the frequency shown on its dial. Its accuracy is low, but as a ballpark indicator, it is unequalled. Other methods of measuring frequency are far, far more accurate, but using them one has to be sure that you are measuring what you want to measure, not a harmonic, or an image, or a harmonic of an image, or an image of a harmonic.

Young Mark Space fired up on what he thought was 40 meters, to have a little notice in the mail some weeks later telling him that he was putting out nicely on 20. An absorption meter would have told him without question that he had something mistuned.

BOX

The theory of operation of an absorption meter is simple.

When the coil intercepts an alternating magnetic field, a current starts to flow round the circuit coil-rectifier-meter-capacitor. If the frequency of oscillation is low, the capacitor acts as an open-circuit, and the current flowing is



small. If the frequency is high, the capacitor is essentially a short-circuit, but the impedance of the coil restrains the current flow. At only one frequency between low and high (the RESONANT frequency) will the negative reactance of the capacitor equal the positive reactance of the coil. The current is then restricted only by the resistance of the wire in the coil and meter, and the forward resistance of the rectifier. The 'low' and 'high' frequencies mentioned above are relative to the impedances of the coil and capacitor, of course. By changing either, the resonant frequency of the combination can be changed at will.

In this design the capacitor is variable and calibrated in frequency. If the frequency is too high for the large coil, it gets into range of the second coil, allowing the sweep of a wide band of frequency without coil changing.

Extend the Range of Your Frequency Counter

John Fincer, VE3DQM

The problem I had was that the frequency counter I have access to would not count beyond 32 MHz. This made netting of crystal frequencies in the 2 metre band rather difficult. It could be done if one could access the oscillator buffer, or early doubler stage in the transmitter, but then mathematics became involved etc. The solution was to purchase a counter that would encompass the 2 metre band. If you've got lots of money to spare, that's ok, but then you probably have a synthesized rig and don't need a counter anyway! This divide by 10 prescaler for the counter is the

next best thing. It's built around a Fairchild ECL chip (fig. 1).

The Fairchild ECL F10016 is a high speed, synchronous, presettable, four bit binary counter. The typical count frequency being 200 MHz makes this chip suitable for use as a divide by n prescaler for use with a frequency counter that has an upper frequency limit of 20 to 30 Mhz.

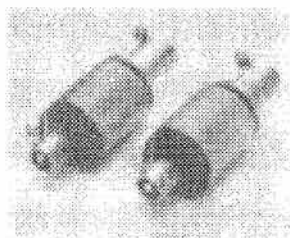
By loading parallel data set on P1 and P2 (pins 9 and 10) with the terminal count output (pin 4), this device behaves as a divide by 10 counter. Frequencies in the 2 metre range can then be coupled

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Range

into the clock input (pin 13) via the 0.05 mfd capacitor. Resistors R1 and R2 form a voltage divider to bias the input to the device.

In my test case, a 50 ohm termination was installed on my GENAVE GTX-1 2m H-T, and a short lead coupled the RF directly to the prescaler. (fig. 2) When the transmitter was keyed (low power), the counter displayed one tenth the true output frequency. It was then easy to adjust the crystal trimming capacitors to obtain the desired output frequency.

The Fairchild F10010 is a BCD decade counter similar in character to the F10016, and could be used as an alternate. However, if this device is chosen, the parallel inputs P1 and P2 must be left open.

Power consumption on this unit is quite high, so if you use a nine volt battery as I did, make sure the prescaler is turned off when not in use. If a five volt source that will deliver 200 mA is available, it would be preferable.

The circuit was constructed on a single piece of perf board 1.5 x 2 inches or 3.8 x 5 cm take your pick, they're both about the same size. I installed it in a Hammond handy-case fitted with BNC connectors on the input and output.

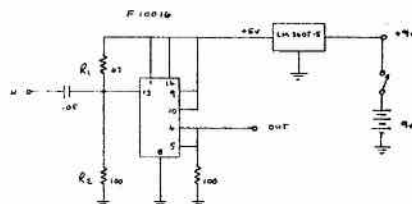


Fig 1.

DIVIDE BY 10 PRESCALER FOR FREQUENCY COUNTER

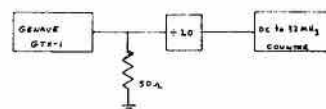


Fig 2.

SETUP USED TO MEASURE TRANSMITTER FREQUENCY

TCA: Technical Section

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Signal Tracer

GENERAL

One of the problems associated with building a project from a magazine article, for me at least, is that it doesn't usually work as described. I'm not saying that the one the author built didn't work. Often the first one will work to perfection. That's where the author normally stops. After all, he isn't interested in mass production; he only needed one in the first place. But then along came I, soldering iron in hand, eager to build the latest whatsit — and it won't work. Unless I make all kinds of changes.

The signal tracer described in this article is NOT (for me, anyway) in the above category. I have built several of these without any trouble (after the first). The first couple were stuck together on a Hammond bread board. The rest were built on a printed circuit board.

My old signal tracer, which used a National LM386, never had quite the pep I wanted. It always worked well and was eminently stable but it never had all the gain I sometimes needed. At various times I considered adding a preamp stage but never got around to doing it. When a customer, watching me check incoming tones on leased telephone control lines, asked if I would build him one, I made him a present of ol' faithful.

But now I had no tracer. I had several LM386 kicking around and could remake a copy of the old unit but the thought occurred to me that now would be a good chance to build an amp with the gain I wanted. Out came the spec sheets!

The final result is shown in schematic form in Fig. 1.

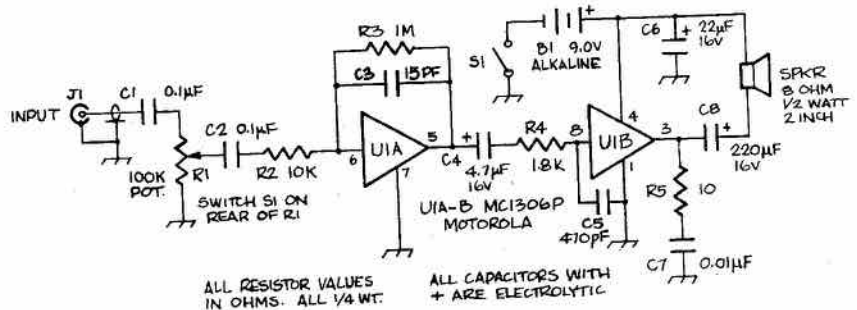


FIG. 1 SIGNAL TRACER

ELECTRICAL

The unit is built around the Motorola audio I.C. MC1306P. This is a two section chip with external control over gain and frequency roll-off. Motorola rate the output of this little item at a half watt with an input of 3 mV.

The signal comes from the input connector (a BNC in my case) via blocking capacitor C1 to the volume control. From there to the input pin 6 via capacitor C1 and resistor R1. R2 and R3 set the gain of the preamplifier stage. Motorola recommend that R3 be no larger than 1.0 Meg. for best stability. Increasing R2 and/or decreasing R3 reduces the gain. Capacitor C3 sets the high frequency response. The -3db point occurs when $X(C3) + R3$.

The signal then exits the preamp at pin 5 and is fed to pin 8 of the power amp through C4 and R4. C4 has a large effect on the bottom end of the audio range. Decreasing it rolls off the low frequencies. Decreasing R4 will increase the gain. Capacitor C5 kills an RF oscillation that occurred in every version built, whether breadboard or printed circuit.

Output to the speaker is taken from pin 3. An R/C network is connected from the output to ground to get rid of nasty little parasitic oscillations that may

result (not only may but very probably will — remember Murphy!) A 220 mF electrolytic capacitor couples the output to the speaker.

The audio output is not hi-fi but is just fine for the purpose. The -3db points are at 250 Hz and 9 kHz. Reducing R3 to 560 Kohms increases the high end to 13 kHz.

The electronics can either be put together on a printed circuit board or hard wired on pre-drilled phenolic.

The last few versions I built were done on p.c.b. using marking pen and fingernail polish as resists and ferric chloride as the etchant.

Fig. 1B shows the p.c. board layout. If you choose to use your own design remember to keep the inputs and outputs as far apart as possible.

MECHANICAL

The electronics are packaged in a Hammond cast aluminum case. These cases are very pleasant to work with as they drill with extreme ease. The drilling layout is shown in figure 2.

Tape a layer of paper over the bottom of the case and the outside of the cover. Transfer the hole locations to the protective paper and tap with a centre punch to locate the holes on the metal surface. For those with access to a

copier, simply photocopy figure 2 and tape in place.

Drill all holes with a sharp 1/16 inch bit. This provides pilot holes for all following bits. Drill all of the holes one drill size less than shown and then finish with the proper size. This method gives nice, clean, round holes.

Mount the speaker to the cover using the small clamps made from scrap .062 printed circuit board material. See Fig. 3. Mount the potentiometer and input connector. Solder the input capacitor between the pot and the connector.

Run small coax (RG174) between the wiper of the potentiometer and the input pads of the p.c. board. Use twisted pair for the speaker and battery leads.

Twisted lead is most easily made by clamping one end of the wires in a vise and the other end in an electric hand drill. Use the drill to provide the muscle power. Overwind slightly as the cable will tend to unwind a bit when released.

Mount the battery holder and the printed circuit assembly to the case using 4-40 hardware.

TESTING

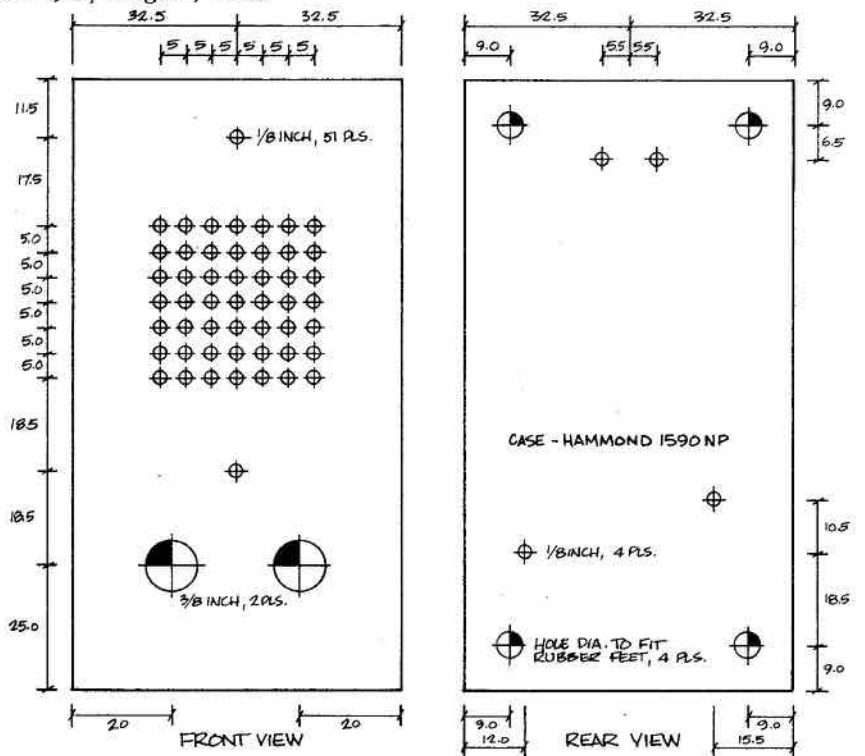
Connect a battery or a 9 volt power supply and turn the unit on. Increase the volume control to maximum. A low hiss should be heard from the speaker. Touching the input connector center pin should produce a nice 60 Hz. hum.

TEST LEADS

Various leads have been constructed to use with the tracer. One uses alligator clips for hands-off monitoring. Another is a probe for both modulated RF and normal audio. The circuit for this one is shown in Fig. 4. This probe should be built in a shielded enclosure. A short length of 1/2 inch copper water pipe with plastic end plugs does fine. For the tip, file a point on a No. 4-40x1 1/2 inch screw.

SUBSTITUTIONS

Very few circuits are so sacred that parts cannot be changed. A quick check through the IC substitution books show at least three suppliers providing direct replacements for the MC1306P. Resistor values can be changed to



ALL DIMENSIONS IN MM. UNLESS NOTED

FIG 2 DRILLING LAYOUT

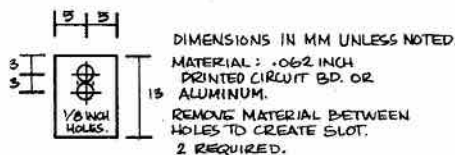


FIG. 3 SPEAKER CLAMP

suit the builder although it is best to stay within the limits set down. Capacitors can be changed as well.

Don't be afraid to change things. Who knows what you might learn!

MISCELLANEOUS

Uses for the tracer cover a wide range. As a piece of test equipment it ranks along with the trusty V.O.M. It makes a fine audio section for receiver prototyping. Connected to a keyed audio oscillator, it becomes a code practice unit with enough volume for most classes. With an Anzac or similar double balanced mixer, an RF oscillator and an antenna it makes a simple, small direct conversion receiver for copying CW and SSB. With a couple of speakers doubling as microphones, a pair of switches

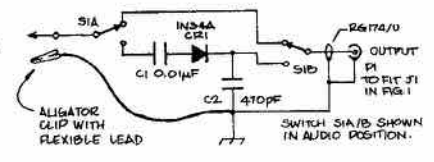


FIG. 4 RF/AUDIO PROBE

and some wire, it can be used as an intercom from the shack to the XYL.

Try building one — you'll find a lot of uses for this handy piece of test equipment.

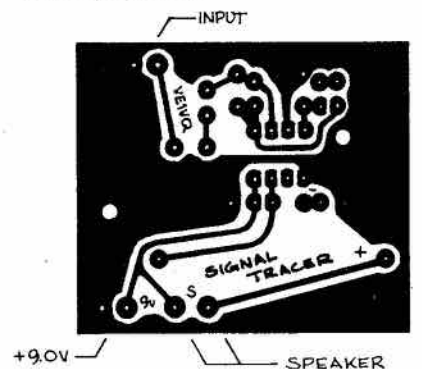


FIG.1B P.C. BOARD

Reference

Motorola, Semiconductor Data Library, Linear Integrated Circuits, Vol. 6, Ser. B, Pg. 7-13.

TCA: Technical Section

Studying for the Digital Amateur Ticket — Part II

For the benefit of readers interested in studying for the Amateur Digital Radio Operator's Certificate, here is another set of questions and answers.

(1) *What is meant by time domain multiplexing (TDM) of a radio channel?*

Time domain multiplexing means that each user of the radio channel must wait his turn in a round-robin fashion. For example, if there are ten users on the channel, and each user requires one second to transmit his data, then user 1 would transmit first, then user 2, then user 3, etc., and finally user 10. Then the entire process repeats itself in the following 10 seconds. Each user gets to send a one second message six times a minute. Because the users take turns, there is no interference.

(2) *What is the bandwidth of a pulse modulated (PCM) signal for a bit rate of 9600 per second without filtering?*

Pulse code modulation takes a time varying voltage and samples it periodically — typically at a rate exceeding twice the signal's bandwidth. The samples are converted to a sequence of digits representing the voltage of the samples. These digits are then transmitted serially (one bit at a time) over some channel, and reassembled at the receiver. If no radio frequency carrier is used to transmit the data, we have a baseband pulse system.

The serial bitstream is a random sequence of ones and zeroes (FIGURE 1). Such a signal has an average bandwidth as shown in FIGURE 2. From the diagram we see that the half-power or 3 db bandwidth is just over 4000 Hz (it is 4252 Hz according to the mathematics).

By intuition, one might deduce that a periodic sequence of ones and zeroes at 9600 bits/sec corresponds to a 4800 Hz square wave. True, but the problem stipulates a PCM signal, which is by nature random, and with random phenomena, it makes sense to speak only of averages and variances. Thus the bandwidth of a 4800 Hz square wave is not the correct answer to this problem.

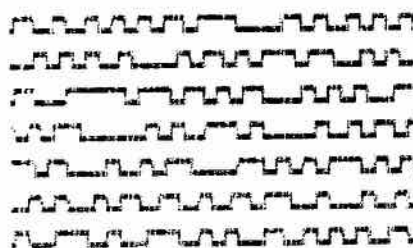


FIGURE 1
BASEBAND PCM SIGNALS

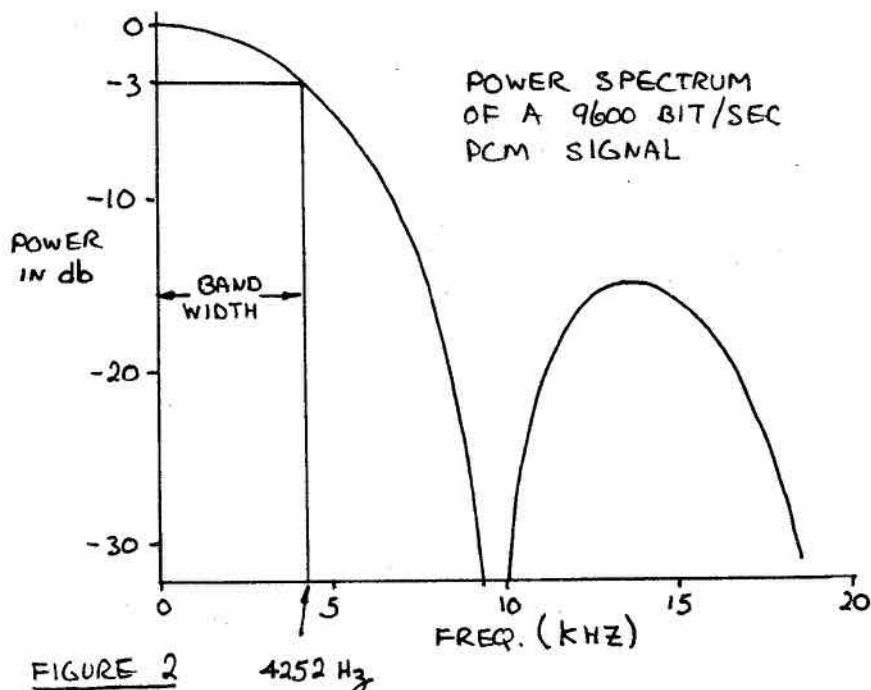


FIGURE 2
4252 Hz

(3) *What is a store and forward system?*

When packet radio stations are not within line-of-sight, they may communicate indirectly using a store and forward system of intermediate stations. Cooperating stations temporarily store all packets received, and retransmit them towards their destination as soon as possible along a suitable route.

(4) *Describe a Pure Aloha radio network.*

A single radio channel is shared by any number of packet radio stations. When one user wishes to transmit data to another, he composes a packet, or sequence of packets, and transmits them one at a time at random intervals. Immediately after sending out a packet, the station waits for an

acknowledgement packet from the destination. Getting one, the next packet is sent after a random delay. If a negative acknowledgement is received instead, the same packet is retransmitted after a random delay. If no acknowledgement is received, the sender may try a few more times until it is obvious that the destination is not active.

To receive a packet, a station merely copies all signals on the radio channel and examines the received packet to see if the station callsign is contained in its header. If so, the packet is displayed on a printer or display terminal, stored in memory, or saved on tape or disk for stations with computer systems. If not, the station may still save the packet (reading the mail), or choose to totally ignore it. If the packet is garbled, no station can respond to it — how could a station tell?

Since stations transmit at random times, it is possible for interference to occur when two or more station transmissions overlap. To prevent a recurrence of this collision of packets, the sta-

tions involved wait a random interval before retransmitting. Packet collisions are a way of life in the pure Aloha system. For that reason, the effective channel throughput is limited to 18.4% of the channel capacity, and this occurs when traffic is offered to the channel at 50% of its capacity. The difference is due to retransmissions.

The nice thing about Pure Aloha networks is their simplicity. New users simply use the channel, and old users simply shut down. Lots of users can join in, but eventually, if the total offered traffic increases beyond 50% of the channel capacity, net throughput is decreased. See FIGURE 3.

(5) *Discuss bit-oriented and byte-oriented protocol.*

Protocol refers to a collection of agreed-upon procedures that will be followed. In packet radio, we must agree on a protocol governing the exchange of data. One such protocol concerns itself only with sequences of bits. A block of bits may be divided up to represent various data items, and each data item may consist of any number of bits. Such protocols

tend to be efficient because no bits are wasted as 'fillers' or 'space savers'. The other protocol of interest is the byte-oriented one, simply because most microcomputers have memories which are byte-addressable. Data read from the receiver can go straight into memory. Being forced into eight-bit chunks, some data doesn't fit, leaving unused bits - a small inconvenience, considering the low cost of memory today.

(6) *Why are error-detection schemes used?*

Whenever data is transmitted over a channel, there is the chance that the ever-present noise there will combine with the RF waveforms, causing ones to be mistaken for zeroes and zeroes to be mistaken for ones at the receiver. To ensure the integrity of the received data, some error-detection scheme is used. A simple example is to add up all the bytes in the packet and transmit this sum with the packet. The receiver then adds up the bytes and compares the sum with that sent with the packet. If they match, there is a high probability



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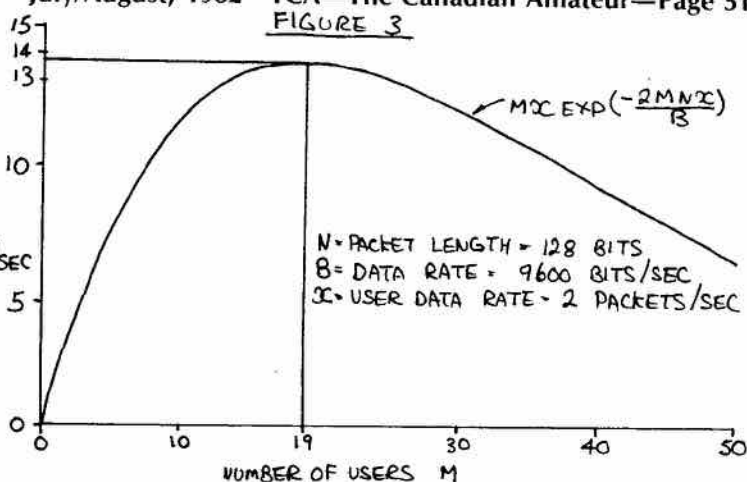
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that this data is the same as the original. If they don't match, there is an error in the data.

Of course in Aloha radio systems, error detection is necessary to detect packet collisions.

(7) Discuss the three elements of a packet.

A packet consists of a header, a body and an error-detection field. The header contains synchronization bytes, source and destination call signs, a sequence number, the length of the data, and miscellaneous bytes as required by the system. The body contains the data. This would typically consist of printable characters, representing a portion of a larger text. It might contain a program in BASIC or in machine language binary code. The error-detection field contains typically two bytes of information. Some error-detection formula is used to operate on the header and the data, and the result is compared to the error-detection field. This is important when transmitting a machine language program.



(8) Compare frequency shift keying (FSK) with phase shift keying (PSK)

Both methods take a sine wave and modify it to convey a binary zero or one. Consider a 1200 Hz sine wave. A zero is coded by sending one cycle. A one is coded by sending two cycles of 2400 Hz. Thus, to send the ASCII code for the letter "N", whose binary code is 01001110, we transmit 1200

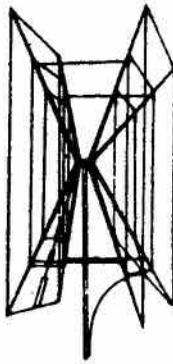
2400 1200 1200 2400 2400 2400 1200 Hz signals. See FIGURE 4(a).

PSK takes the same 1200 Hz sine wave and shifts the phase zero degrees to code a zero and 180 degrees to code a one. See FIGURE 4(b).

(9) Distinguish between the terms 'BAUD' and 'bits per second'.

Suppose we have a channel with 3000 Hz of bandwidth. Using FSK (1200-2400 Hz) we can send

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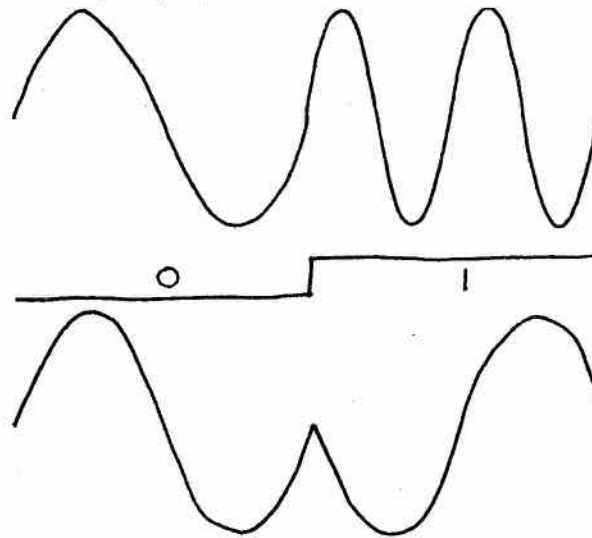
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1200 bits-per-second worth of data through this channel. Suppose we need to send 2400 bits-per-second through? It can be done using quad phase shift keying (QPSK), where the phase of each sine wave cycle is varied as follows:

phase shift	dibit represented
0 degrees	00
90 degrees	01
180 degrees	10
270 degrees	11

The signalling waveform is changing at the rate of 1200 per second, that is, at 1200 BAUD. Because each waveform represents two bits, the data rate is 2400 bits-per-second. With FSK, each waveform represents only one bit, and the data rate equals the BAUD rate. Some fancy modems use eight phase shifts to squeeze three bits into each waveform, and get $3 \times 1200 = 3600$ bits-per-second out of a 1200 BAUD channel.

From this one might conclude that any data rate can be squeezed out of a 3000 Hz wide channel. In practice, noise on the channel makes it difficult to distinguish waveforms representing more than about three bits. The error



(a)
FSK
WAVEFORM

BIT STREAM

(b)
PSK
WAVEFORM

FIGURE 4

rate increases to the point where the data rate cannot be increased further when more bits are coded on the waveform.

The following table shows the theoretical data rate possible on a channel versus the signal to noise (S/N) ratio:

Channel bandwidth =	3000
Maximum BAUD rate =	6000
S/N	Max data rate
1	3000
3	6000
7	9000

15	12000
31	15000
63	18000
127	21000

That marks the end of test no. 2. Again, I'll be delighted to answer individual reader questions if you write me. The replies will appear in a future article in TCA for the benefit of all our readers. Send our questions directly to:
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community activity, and to provide technical discussions, demonstrations and training for others.

The site our group has selected for the 30 watt repeater is on 7100 foot Mount Thompson, B.C. 49°05'30"N, 116°22'40"W, with the call sign VE7RCA. The receive frequency will be 146.200 MHZ and the transmit frequency will be 146.800 MHZ.

Sincerely,
Colin Sharp, VE7ERX
Secretary-Treasurer

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3. To act as a liaison and advisory agency between its members and the Department of Communications;
4. To promote the interests of Amateur radio operators through a program of technical and general education in Amateur matters.

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