

Second Class Mail Registration  
Number 5073

# TCA



\$1.50

JULY-AUGUST  
1983

The Canadian Amateur Radio Magazine



# KENWOOD

# TS-430S

HF TRANSCEIVER



Write for Catalogue Sheets  
c/o J.H. Williams VE3XY, Brian Riley VE3JEO

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# THE CANADIAN AMATEUR

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## EDITOR

**Cary Honeywell VE3ARS**  
P.O. Box 2610, Station D  
Ottawa, Ont. K1P 5W7

## ASS'T EDITOR, DESIGN

**Peter Hammond**  
163 Russell Ave.  
Ottawa, Ont.

## CONTRIBUTING EDITOR

(C.A.R.F. News Service)  
**Doug Burrill VE3CDC**  
151 Fanshaw Ave.  
Ottawa, Ont.  
(613) 733-7108

## TECHNICAL EDITOR

**Ed Hartlin VE3FXZ**  
P.O. Box 356, Kingston, Ont.  
K7L 4W2

## TECHNICAL DESIGN

**Don Prickett, VE5KP**  
41 McAskill Cres.,  
Saskatoon, Sask, S7J 3K1

## CRAIG COLUMN

**Hugh Lines VE3DWL**  
P.O. Box 192, S.S. 11 Belleville,  
Ont. K8N 4Z3

## CONTEST SCENE

**Dave Goodwin VE2ZP**  
4 Victoria Place  
Aylmer, Que. J9H 2J3

## DX EDITOR

**Douglas W. Griffith VE3KKB**  
33 Foxfield Drive,  
Nepean, Ont. K2J 1K6

## EMCOM

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

## YL NEWS AND VIEWS

**Cathy Hrischenko VE3GJH**  
56 Stockdale Crescent  
Richmond Hill, Ont.  
L4C 3S9

## VHF/UHF COLUMN

**John Dudley VE5JQ**  
3125 Mountbattan St.  
Saskatoon, Sask. S7M 3T3

## ADVERTISING

### REPRESENTATIVE

**Don Slater VE3BID**  
R.R. #1 Lombardy  
K0G 1L0  
(613) 283-3570

## PRODUCTION AND

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**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, photographs 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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Don Slater, VE3 BID  
R.R. 1,  
Lombardy, Ontario  
K0G 1L0  
(613) 283-3570

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1427 Cavendish Road,  
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K1H 6C1  
(613) 733-2205

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Calgary, Alta.  
T1Y 2L2  
(403) 280-0074

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K7M 1X1  
(613) 389-3301

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K1H 6C8  
(613) 733-7108

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11 Manitou Cres. East,  
Kingston, Ontario  
K7N 1B1  
(613) 389-2697

**Secretary**  
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4 Victoria Place,  
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J9H 2J3  
(819) 684-6173

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L4G 2A3  
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1. To act as a coordinating body of Amateur radio organizations in Canada;
2. To act as a liaison agency between its members and other Amateur organizations in Canada and other countries;
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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2 METERS, 45 WATTS.  
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TR-2500



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| MC-60A Desk Mike.....                       | 109.00  |
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| TS-530S HF Transceiver.....                 | 979.00  |
| TS-130SE HF Transceiver.....                | 899.00  |
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| VFO-230 Matching Digital VFO.....           | 419.00  |
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| TR-2500 2 mtr. handheld.....                | 399.00  |
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| Mosley S-402 2 el. 40 mtr. beam.....               | Regular 619.00  | Sale 419.00            |          |
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| Hy-Gain TH5DXX 5 el. tri-band beam.....            | To Clear        | 479.00                 |          |
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| Rotors CDE "Big Talk" medium duty all purpose..... |                 | 149.00                 |          |
| Cushcraft ATB-34 4 el. tri-band beam.....          | To Clear        | 469.00                 |          |
| Coax Specials: RG-213 75c ft.                      | RG-8U 59¢ ft.   | RG-8X 35¢ ft.          |          |
| RG-59 18c ft.                                      | RG-58U 18¢ ft.  | RG-11 55¢ ft.          |          |
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| MFJ keyers #496 keyboard.....                      | \$469.00        | #484 memory keyer..... | \$209.00 |
| MFJ/Bencher combo #422.....                        | \$149.00        | MFJ 401 keyer.....     | \$75.00  |
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The IC-740 allows maximum transmit flexibility with front panel adjustment of VOX gain and VOX delay along with ICOM's unique synthesized three speed tuning system and rock solid stability with electronic frequency lock. Maximum versatility with 2 VFO's built in as standard, plus 9 memories of frequency selection, one per band, including the new WARC bands.

With 10 independent receiver and 6 transmitter front panel adjustments, the IC-740 operator has full control of his station's operating requirements.

### Options include:

- FM Module
- Marker Module
- Electronic Keyer
- 2 - 9MHz IF Filters for CW
- 3 - 455MHz Filters for CW
- Internal AC Power Supply

### Accessories:

- SM5 Desk Microphone
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- Linear Amplifier
- Autobandswitching Mobile Antenna
- Headphones
- External Speaker
- Memory Backup Supply
- Automatic Antenna Tuner



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- NB - Noise blanker - suppresses pulse type noises on SSB/CW.

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- Stop on busy or empty channels.

## ICOM Performance.

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- Hi/Low power switch.
- LED indicators - RECV/SEND/PRIO/DUP.
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- Compact size - (170 mm) W x (64 mm) H x (218 mm) D.

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## TR-9130 \$719

The TR-9130 is a powerful, yet compact, 25 watt FM/USB/LSB/CW transceiver providing increased versatility of operation on the two meter band. It features six memories, memory scan, memory back-up capability, automatic band scan, all-mode squelch, CW semi break-in, and incorporates microprocessor technology.



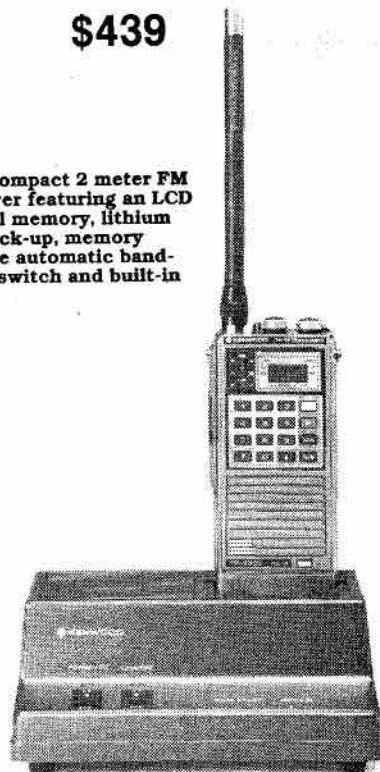
## TR-8400 \$679

Synthesized operation on the 440 MHz amateur band now is available with KENWOOD's TR-8400 70 cm FM mobile transceiver. This extremely compact, full-featured rig covers 440-450 MHz, in 25 kHz steps and includes five memories, memory scan, automatic band scan, UP/DOWN manual scan, and two VFOs.

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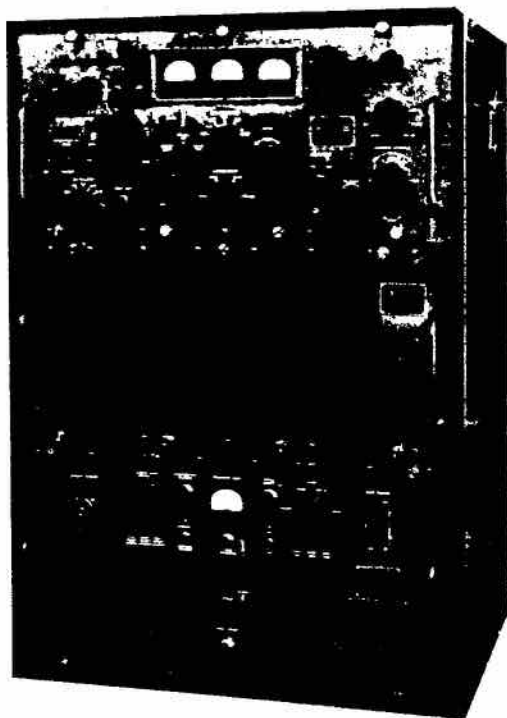
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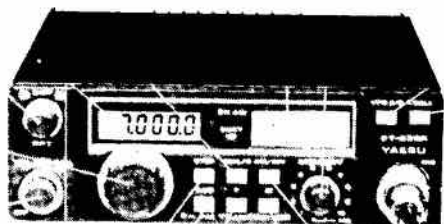
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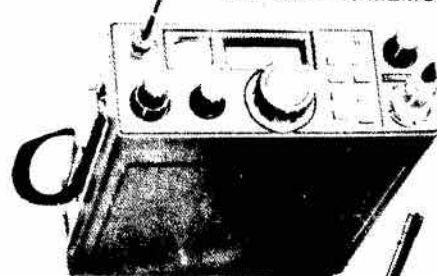
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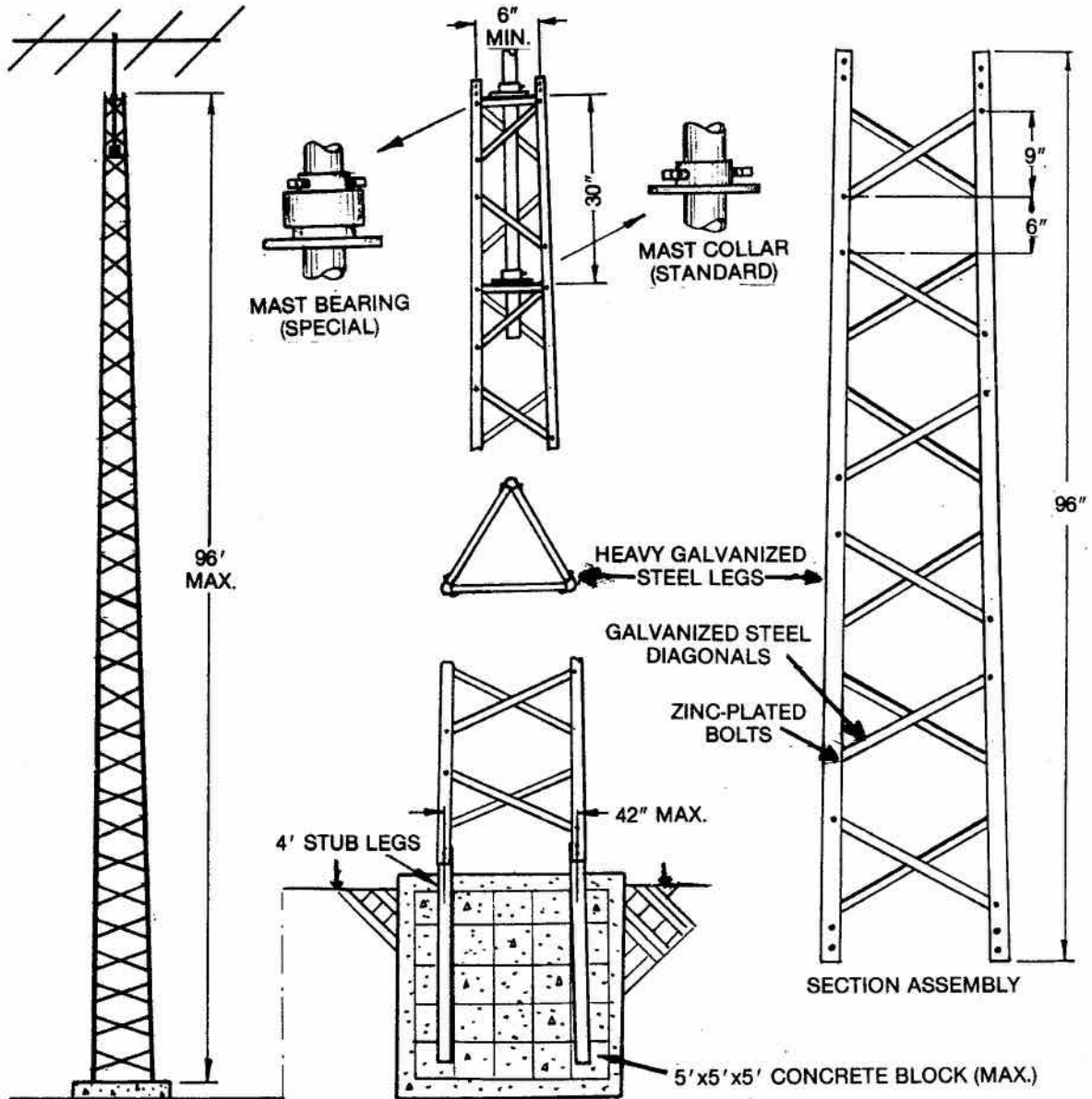
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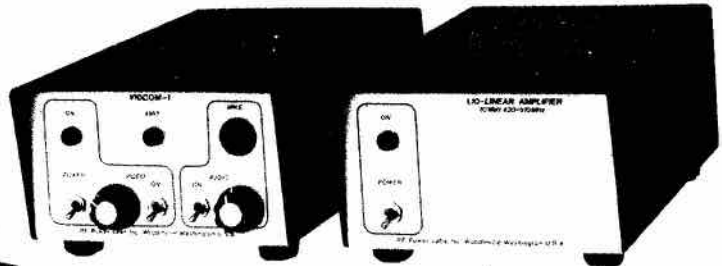
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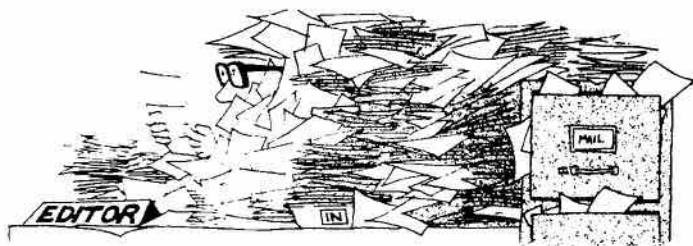
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# LETTERS



## READERS REPLY

In the April issue of TCA we asked you to tell us the date on which you received TCA. 90% of the replies indicated a delivery date only TWO WEEKS after mailing (29 April). The delay in mailing was caused when we discovered several problems with our method of labelling TCA. We had also just changed printers (again!) and we were getting used to "their ways" as opposed to the last printer. I can assure you of better service this Fall.

To the hundreds who did reply, thank you!

Editor

Dear Editor:

I received the April copy of TCA May 8. However, I received the May copy of QST May 7, so there must be something wrong in China, ha.

For CARF members interested in DX I would like to see a DX list published 3 times a year and the Honor role twice a year. This would be of interest to all CARF DXers. If this was done, plus a speedy delivery of CARE, I would cancel my QST membership.

Gordon Gosse  
VOICU

P.O. Box 105  
Gander, Nfld. Canada  
A1V 1W5

We are working on it.

(Editor)

Dear Editor:

In response to page 13 April issue, I received my issue today, May 10th. Comments on this? The delivery is terrible and unfortunately this is going to cause us to lose members from this area next year. QST delivery is on time and takes only 3 days from mailing date from the U.S.A. Some

events announced in CARF have come and gone before we even get our issue.

Something is definitely wrong up there and I sure hop you can solve it fast.

Yours sincerely

Alex Gibbons  
VE1 CAZ  
RR 1 Lower Cove Rd.  
Joggins, N.S.  
B0L 1A0

Dear Editor:

I have been receiving my copy of TCA anywhere from 6 to 8 weeks after the first of the month. My April copy hit my doorstep on May 6th, 1983 which is about 1 week better than usual.

To me the best improvement you could make would to get my copy to me, early in the month when the information contained in it is current, rather than out of date and useless. Keep up the good work.

Yours truly,

Ollie Simmons  
VE7QV

Dear Editor:

Received April TCA on May 5. The quality of TCA is markedly better in the last six months or so. I've had my complaints re forgotten issues a few times in the past but things appear solid now. Glad you now have a proofreader/layout person. My XYL (VE6 CQA) has done considerable proofreading and the magazine used to drive her around the bend. I'm also glad to see some editing on the "life story" type of articles. At any rate keep up the improvements — we're both pulling for CARF and TCA.

73,

Will  
VE6 CCO

Dear Editor:

Re page 13 April TCA, delivery this month — 5 May!

Re point 2 — Magazine in present form quite good (except for typos and occasional grammatical errors). As a contest op (for fun only) would like to see coverage of contest such as U.S. State Q.S.O. parties if such information available, of course, and space permitting! Now that I no longer subscribe to QST, believing that CARF adequately serves my interests as a Canadian Amateur, I never know when QSO parties are going to be on.

Keep up the good work.

73

Len Heal  
VE3 BQL

## LAUDING BILL, LUMPING EXAMS

Dear Editor:

Bill Deacon's stories on "Experiences as a Ship's Operator" are excellent. Bill, I do hope you continue to write those very readable stories.

I echo the sentiments of an earlier letter on how difficult the advanced exam is becoming. When a person considers that a good number of Amateurs no longer build their own transceivers etc., one may ask why we have the indepth knowledge requirements. That is not to say "Let's drop the standards we presently have", but, refocus them. Operating techniques could be "stiffened" up along with station set-up and antennas. Interference is another "hot" area. Basic principals and theory need to be taught and learned, but in these days of crowding bands I feel "gentlemanly" conduct may help the *Hobby* to survive.

Dave Lincoln  
VE6VU

# LETTERS

## SOUTH AFRICAN CONTACTS

3076 Lowe Court  
Kelowna, B.C.

Dear Editor:

In the March issue of TCA I read a most reprehensible letter exhorting Canadian Amateurs to shun contact with our opposite numbers in South Africa. Your footnote comment Mr. Editor was to the point, however I would like to add a few additional comments.

On New Year's Day 1980 my CQ call was answered by a Ham in the Republic of South Africa, and we conversed for over an hour ending with an agreement to meet again the following week. Soon we had established a "Sked" which we have maintained whenever the propagation conditions permit. In 1981, during a business trip to Canada, my South African friend was able to spend a weekend with me, providing a memorable highlight to many hours of pleasant and informative ragchewing.

During our QSO's we have never discussed politics or political issues; a practice used I believe by most Canadian Hams, and a sound one indeed. My friend in South Africa has provided much enrichment to my Amateur life, and I am proud to have recorded his presence in my log.

In the World Amateur Community, Canadians enjoy a position of respect based on the use of common sense and good radio manners. Indulging in the kind of bigotry suggested by VE3 KSP can only bring discredit to us and I, for one, have no intention of engaging in such a practice.

Murray A. Brown  
VE7 E1W  
(formerly VE3 KXA)  
3076 Lowe Court  
Kelowna, B.C.

Dear Editor:

Read with interest on page 15 of May, 1983 TCA "Beware of the Covenant" the same day as reading the enclosed clipping from the *Sudbury Star*.

Perhaps not the same thing, but if antennas on minds of our elected local members — in this case, satellite dishes — perhaps next, Amateur towers, etc.

73,

Bert Morgan  
VE 3XK  
115 Colby St.  
Sudbury, Ont. Canada  
P3E 5A8

P.S. — Any info on possible "Ham" interference to a possible "fenced in" array of dishes around your QTH?

## Satellite dish threat sparks concern at region

By Marcel Lamarche  
Star Staff Writer

Regional government should be prepared to deal with the matter of satellite dish installation before problems arise, Coun. Frances Caldarelli told council last night.

With federal deregulation allowing individual homeowners to install satellite dishes without need of a licence and costs expected to drop within reach of the average family, Caldarelli wanted to know if the region "is able to govern the placement of these dishes with present bylaws."

She was concerned that some may choose to install their dishes on their front lawns. If the region waits to legislate, she said, these will then become legal-non-conforming uses under planning legislation, and regional government will be unable to remedy the situation.

Regional solicitor Ron Swiddle noted that if a dish is installed on a roof which is not designed to bear the additional weight, existing regional bylaws can look after the situation.

As to zoning regulations, planner Klemens Dembek said, "we are only permitting accessory

uses" in residential areas, and if a satellite dish can be interpreted as a means of enhancing one's enjoyment of his property, "then this is permitted."

## To Review Situation

But chief administrative officer Herb Akehurst assured Caldarelli that the administration will review the situation "before there are problems."

Coun. Ron Symington, meanwhile, cautioned that care be taken not to put in place legislation which would allow some area residents to install a satellite dish while others could not.

Because of the location of the satellites from which the desired television signals are being received, Symington said, "only a small angle" is available for proper reception, and it could be that by forcing dish installations in back yards, that the signal would be blocked off by the house.

*The Sudbury Star*  
May 26, 1983

## I DISAGREE

Dear Editor:

In regards to submission by Walter Stubbe, VE7 EGR, "B.C. Advises Amateur help on Exams" in the May issue of TCA, I would like to point out that although my call appears at the beginning of this submission, I in no way participated in the make-up of this submission, other than listening to some of the comments on 75 metres.

My feeling has always been that examinations should remain as at present in the hands of the DOC. I therefore disagree with several of the suggestions as presented.

I do not believe that Mr. Stubbe's submission should be considered as representing the views of all B.C. Amateurs, but rather the opinion of an individual or group.

Yours truly,

Norman M. Simon  
VE7 EG0  
Site 6A Comp 20  
RR #5  
Vernon, B.C.  
V1T 6L8

### LICENSE PLATES

Dear Editor:

I am writing to you in the hope that you might be able to assist me with a rather unusual hobby which I have pursued for about 20 years. I am a collector of automobile license plates.

I am trying to put together a complete set of auto ham radio plates of each Province and so far I have gotten 6 of the possible 12 plates available.

I am hoping that you might have an old obsolete or unneeded Saskatchewan auto ham radio plate that I could have or know of someone who does. I would be willing to pay for such a plate if you would let me know.

With many many thanks for your help and best wishes.

Sincerely yours,  
Roy G. Klotz, Jr., M.D., F.A.C.P.  
Pathologist  
Box 111  
Dresher, PA. 19025  
U.S.A.

### EXAMS - BALLOTS MISS TARGET

Dear Editor:

Received April TCA on May 13. If there were any ballots for the CARF elections mailed out let it be known I never received one and wonder why?? If we belong to "Mid West" then it's O.K.! I very strongly object to "hi-level tech" used in latest exams. There is no need for it; we need more bakers, butchers and candlestick makers, not more technical experts; look at the mess we're in now. Bring 'em in easy and if the interest is there they'll keep going; the not so interested will drop out anyway!! We experiment as a HOBBY and DO NOT design as professionals and if DOC does not understand this yet the time has come to correct this. Give a bureaucrat a molehill and he'll make a mountain any time!! DOC should help, not hinder!!!!

T. Crowas  
*You are in the "Mid West" region.*

(Editor)

Dear Editor:

The Lambton County Radio Club has received from the Department of Communications the club call VE3 VPP and will use that call from now on for contesting and for work on emergency networks.

The club custodian of the licence is Gord Parsons of Petrolia (VE3 GNP). The suffix of the call is the same as the initials used for the Victoria Playhouse Petrolia, which has been designated a national monument by Parks Canada. The playhouse is well known among Canadian theatrical groups for its excellent acoustics and has in the past been used by the CBC for its Farm Show production.

Yours truly,

Side Rose  
VE3 JFP  
Petrolia, Ontario

### HESLER AND BURRILL CONCUR!

Dear Editor:

Although I have never actually been known to agree, too often, if ever, with my good friend Doug Burrill, VE3 CDC, after reading his article, in your June issue, "An End to the Hamfest Torture Chamber," all I can say is that either Doug is coming to his senses . . . or I am! Or, perhaps, both of us are.

I therefore am troubled to have to say, that I simply cannot help but agree *with every single word* of his article!

In point of fact Cary, I believe that both you and I may have been "silent" contributors to Doug's pen, when he wrote this article. For I well recall our association, with Doug, on this subject, as we sat at a rear (near the exit door) table at a hamfest just short of a year ago!

Now, perhaps, the two of us should seriously think of joining Doug in Marseilles?

73,

Ron. J. Hesler,  
VE1SH  
P.O. Box 418,  
Sackville, EOA 3C0

*I believe we did just that twice last year. At both occasions, we all had a good time due mainly to our sense of humour. I look forward to the next one Ron.*

(Editor)

Dear Editor:

I am ashamed to be a member of CARF. To think that my membership fee is being used to produce "garbage" such as the editorial by Fred Towner VE6XX in the April issue.

Although there are two national organizations in Canada to represent us Amateurs, many of us support both organizations. This is our way of ensuring the growth of Canadian Amateur Radio.

Out west CARF is definitely the underdog and I for one have defended its existence and many of its policies in the hope that some day we might have enough cooperation to eventually have one national organization that truly represents us and works for the benefit of Canadian Radio Amateurs.

To allow such an editorial covering three full pages of sniping at the CRRL has done only one thing. It has reduced the credibility of Mr. Towner and also of CARF for publishing such an editorial in the first place.

I wanted to sent my dues for the new year. I'm afraid my protest will be to withdraw my support of CARF until its policies change. As a member of one of the largest radio clubs in Canada, I am sure that I can convince many of my friends to do the same.

Sincerely,

J.A. Lou Beaubien  
VE7 CGE  
4813 Fairlawn Drive  
Burnaby, B.C.  
V5C 3R7

TCA WELCOMES LETTERS  
TO THE EDITOR.  
PLEASE SEND ALL  
CORRESPONDENCE  
TO EDITOR TCA.  
P.O. BOX 2610 STATION D  
OTTAWA, ONTARIO K1P 5W7



## Editor's comment:

The following letter was received by every household in Ottawa recently. My reply follows it.

Rideau Division  
1424 Caledon Street  
Ottawa, Ontario, K1A 0C1

Dear Customer:

Eighteen months ago when Canada Post Corporation was created, we established three key goals: better service, improvement of employee relations, and financial self sufficiency.

While we have been able to improve some aspects of our service we know our performance record in Ottawa has not been the best in the past few years. As a result, you have not yet experienced the service improvements we have been able to achieve for our customers in many other cities across Canada.

We are concerned about this, and we are working in continuing consultation with our unions to bring postal service up to the level you deserve. Some of the actions we are taking include:

- The formation of a special service improvement team to streamline mail processing and eliminate bottle necks in the Alta Vista plant.
- Attacking the problem of service improvement by type of mail. For example, a measurable speed-up has been achieved in the delivery of large envelopes, magazines and newspapers.
- Focussing attention on standard first class mail: (in fact, we won't be satisfied until all of the 1¼ million pieces of mail we process each day in Ottawa, meet our delivery standards\*).
- Removing asbestos insulation and renovating the Ottawa Postal Terminal, in consultation with our unions, to improve the working environment of our employees.

The challenge facing all of us here at Canada Post over the next

year is to make the needed plant and processing adjustments while continuing to improve service to our customers. I am confident that our action program will not only provide better working conditions for our employees but will also bring your postal service closer to national standards in the months ahead.

As we strive to improve both the speed and reliability of service in the Ottawa area over the next few months, we ask for your patience and your understanding during this period of transition. We certainly welcome any suggestions you may have to help us attain this goal.

I know that you share our interest in improving our service, so I intend to keep you informed as we progress.

M. Beauchamp  
General Manager

\* Our standards are high. For local mail, we aim for next day delivery. For inter-city mail, we strive to deliver within 2 to 3 days depending on the destination.

Dear Mr. Beauchamp.

What is happening at our post office cannot be excused. We, as taxpayers, have been paying for a service that is substandard by comparison to commercial carriers. This should not be so. With each rise in postal rates, the service gets worse. Although you say you strive for the best possible service, I submit that what you have achieved rates as one of the worst examples of progress in modern civilization. During the last postal strike, the Prime Minister stated that commercial users of the Post Office should not be relying on that service to carry our business. They should

find "Other means". What "Other means"?

In this day of combines and monopoly investigations, it has been held, legally, that only the Post Office can handle the mails in Canada. We who must use the system are tied to it with neither hope for improvement, nor guarantees for delivery.

Since becoming a Crown Corporation, I have only heard of your intentions to clean up the Post Office; I have seen no actual improvement. I have heard and read the "Mea Culpas" but continue to be frustrated by inefficiency, indifference, and at times, open contempt on the part of some postal authorities. Why?

TCA is mailed out by second class postage. It is presumed that it gets treated like first class. Wrong. I have been told by some officials (who wish to remain nameless for obvious reasons) that there is a strong likelihood that second class magazines will never reach destination. Even if sorted properly, these magazines stand a good chance of being delayed in the mail for up to six weeks it mailed from Ottawa. Ottawa, it seems, has the worst record of all the postal stations in Canada. This is where TCA gets mailed from. That is too bad.

Stop wasting our money making excuses for your blunders. Use that money to correct the situation. Perhaps firing everyone and rehiring only those who want to work is one way. I am sure you can think of others.

Sincerely,  
Cary Honeywell,  
Editor  
TCA



The Signallers Club will host a Reunion in Kingston, Ontario on 2, 3 and 4 September 1983 to celebrate the 80th anniversary of the founding of the Royal Canadian Corps of Signals.

The 1983 Reunion committee members are:

|                        |  |          |
|------------------------|--|----------|
| J.E. (Jack) Burman     | 15 Hermer Cres., Kingston, Ont. K7M 2W1    | 546-9568 |
| R.B. (Bob) Gifford     | 277 Glengarry Rd., Kingston, Ont. K7M 3J8  | 542-8425 |
| M.V. (Bill) Hall       | 84 Sherwood Dr., Kingston, Ont. K7M 2E3    | 544-5043 |
| R.J. (Dick) Libby      | 127 Harvard Pl., Amherstview, Ont. K7N 1J5 | 389-4989 |
| G.O. (George) McMillan | P.O. Box 42, Odessa, Ont. K0H 2H0          | 286-3852 |
| F.J. (Fred) McQuillan  | R.R. #1 Inverary, Ont. K0H 1X0             | 353-2244 |
| H.A. (Harold) Shannon  | Box 339, R.R. #2, Kingston, Ont. K7L 5H6   | 546-8306 |
| E.C. (Elvin) Veale     | 39 Henry Cres., Amherstview, Ont. K7N 1G3  | 389-1580 |

(Call Sign VE3NZ)

The 1983 Reunion Committee is working hard to ensure a memorable weekend for all attendees. Special events are planned for the ladies and gentlemen, together with mixed social parties for all. Backbone functions will be Stag & Doe parties on Friday the 2nd, a Buffet Dance on Saturday, a Memorial Service on Sunday and for those who wish, a relaxed theme for Monday the 5th which is Labour Day.

We cordially invite, with spouses, past and present members of:

- the Royal Canadian Corps of Signals, Regular and Reserves;
- the Communications and Electronics Branch of the Canadian Armed Forces, Regular and Reserves;
- the Royal Canadian Army Pay Corps;
- other Military units who were attached to Signals;
- the Civil Service employed in a Signals milieu; and
- the widows and widowers of the above.

The main purpose of this letter is "EARLY WARNING" so you can now start planning for the big weekend. A multi-media advertising campaign will be launched later for optimum publicity. In the meantime, please help us spread the news by word-of-mouth.

If you plan to attend, please complete and return the attachment so we can form a reasonable basis for planning accommodation, space, entertainment and catering.

Yours truly,

(F.J. McQuillan)  
President, The Signallers Club

Please return to: SIGNALS REUNION, P.O. Box 1983, Kingston, Ont., K7L 5J8

Name .....

Address .....

My spouse will accompany me                      Yes       No

|   |                              |                             |                       |
|---|------------------------------|-----------------------------|-----------------------|
| I/We will attend these events<br>in the Kingston area on<br>2, 3 and 4 September 1983 | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Friday Stag Party     |
|   | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Friday Doe Party      |
|   | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Saturday Buffet/Dance |
|   | Yes <input type="checkbox"/> | No <input type="checkbox"/> | Sunday Memorial       |

I/We will stay with friends:                      Yes       No

OR

Please book, in my name, Motel/Hotel accommodation for . . . . . person(s) for the nights of

- (Friday)
- (Saturday)
- (Sunday)
- (Monday).

# JE SUIS HIER JE CONNAIS DEMAIN

Bruno R. Molino VE2 FLB

*REGINAL, AUBREY FESSENDEN*  
(Né le 6 octobre 1866 East-Bolton, Québec, est mort le 22 juillet 1932 aux Bermudes.)

Après avoir fréquenté le collège Trinity à Port Hope en Ontario, Fessenden rentra au Québec pour s'inscrire à l'université de Bishop's à Lennoxville où il obtint sa licence de professeur. Refusé comme professeur à l'université McGill, il accepta un poste aux Bermudes comme directeur à l'institut Whitney. Pendant son professorat chez Whitney, il développa un intérêt scientifique qui l'incita à démissionner de son poste pour se rendre dans la ville de New York.

## **Je ne connais rien en électricité, mais je suis prêt à apprendre**

Dès son jeune âge, Fessenden fit preuve de fermeté, de perspicacité, de persistance et d'enthousiasme pour tout ce qui est nouveau. Grâce à ses talents il parvint à réaliser de grandes choses. A New York il s'entretint avec Edison pour éventuellement faire partie de sa compagnie. Edison lui demanda ce qu'il connaissait en électricité. Fessenden lui répondit: "Je ne connais rien en électricité, mais je suis prêt à apprendre." Edison rétorqua en le quittant: "J'ai suffisamment d'employés qui ne connaissent rien en électricité."

Sans argent et sans emploi, Fessenden ne se découragea pas. Il rodait autour d'un site de construction où la compagnie Edison installait des fils électriques. Un jour, la chance lui sourit. Un des hommes du chantier quitta le travail. Fessenden était présent. Il prit les outils et continua le travail. Grâce à son intelligence et à son esprit alerte, il fut vite promu dans le laboratoire de recherches comme chef chimiste.

Des divergences d'opinions avec ses confrères et Edison l'obligèrent à démissionner. En 1890 il se joignit à la compagnie Westinghouse électrique. En 1892 il réintégra la carrière académique comme professeur de génie électrique. Il enseignait à l'université Purdue, Lafayette, Indiana et à l'université Western de Pensylvanie (maintenant l'université de Pittsburg). Tout en enseignant, il continuait à travailler et à faire des recherches dans un domaine très en vogue à son époque: "Les communications sans fils."

## **Son grand rêve était toujours de pouvoir utiliser la voix en communications.**

En 1900 Fessenden quitta l'université pour effectuer des recherches en communications sans fils pour le bureau météorologique des États-Unis. Peu après, il fonda la compagnie Nationale électrique de Signalisations. Son grand rêve était toujours de pouvoir utiliser la voix en communications. L'idée ne le quittait pas, il redoubla d'efforts, de travail et de vigueur. Lors d'un séjour au Canada, il s'amusa à envoyer des cailloux dans le lac Chemung près de Peterborough en Ontario. En voyant les vagues se dessiner en forme de cercle, une idée lui vint, et il tint ce raisonnement: "Les ondes d'émission-radio sont continues, comme le mouvement des vagues en forme de cercle dans l'eau. Pour pouvoir émettre des voix, des sons, il faudrait donc interrompre ces ondes qui voyagent à la vitesse de la lumière, c'est à dire à 3000.000.000 mètres/seconde". Pour pouvoir effectuer ses recherches il avait besoin de fonds. Il discuta de l'idée avec la direction de la compagnie "United Fruit" car cette compagnie possédait plusieurs bateaux

qui navigaient sur l'Atlantique en faisant le transport entre le sud Amérique et les États-Unis. La compagnie "United Fruit" fournit les fonds nécessaires pour ces recherches. Sous sa direction, les ingénieurs de la compagnie Général électrique mirent au point un alternateur à haute fréquence de 70.000 HZs, et avec l'invention récente de Sir Ambrose Fleming, d'un tube à vide comme amplificateur, les essais pouvaient commencer. (L'invention de Fleming fut reprise et améliorée par Lée DE Forest qui inventa la triode en 1907.)

## **Le 24 décembre 1906, 21.00 heures les opérateurs T.S.F., surpris, écoutent des voix et de la musique provenant de leur récepteur. Joyeux Noël les Amis.**

Fessenden était très confiant que la voix et les sons pouvaient être émis. En 1906 il entreprit des essais. Ayant installé deux stations émettrices — réceptrices à 17 Km (11 Milles) de distance entre-elles, dans l'état du Massachusetts, il effectua plusieurs essais. L'un d'eux fut très promoteur, non seulement les deux stations ont pu se contacter, mais un associé de Fessenden à pu écouter la transmission d'Ecosse. Fessenden, très confiant, installa une station de radio-diffusion à Brant Rock, Mass. Le 24 décembre 1906 à 21.00 heure les opérateurs à bord des bateaux de la compagnie "United Fruit" captèrent l'émission de Fessenden. La voix annonçait que la symphonie Largo de Handel allait être jouée par un grammophone Edison, suivie par le cantique; "Sainte NUIT," joué par Fessenden lui-même au violon, accompagné par Caroling, son assistant. On terminait par un souhait de "Joyeux Noël les Amis."

**Ecoutez, j'entend les voix des anges, qui chantent.**

Ormond Raby enregistra les réactions d'un marin qui était à bord d'un des navires de la "United Fruit" mouillant dans les Caraïbes; "Ecoutez, j'entends les voix des anges au microphone qui chantent et jouent de la musique."

Quelques jours plus tard Edison disait: "Le récepteur Fessenden est 2.000 fois mieux que le vieux coherer de Marconi."

La même année il établissait une transmission transatlantique en télégraphie sans fils entre Brant-Rock et l'Écosse.

Il améliora la radio en la dotant d'une hétérodine, la radio-fréquence reçue était convertie en une fréquence intermédiaire permettant un meilleur contrôle et une meilleure amplification.

En plus de la découverte de la radio, Fessenden contribua à plus de 500 brevets parmi ses découvertes on retrouve: Le compas-radio, le Sonar (appareil à mesurer la profondeur des fonds marins), un dispositif de signalisation pour les sous-marins, un dispositif turbo-électrique pour les navires et un détecteur d'iceberg.

Après la première diffusion-

radio de Fessenden David Sarnoff, fonda la R.C.A. (Radio Corporation of America) et la N.B.C. (National Broadcasting Company) qui en 1916 envisagea la possibilité de munir chaque maison d'un récepteur radio.

Le 2 novembre 1920, la station de Pittsburg la "K.D.K.A." entra en fonction. C'était la première station de radio-diffusion de toute l'histoire des États-Unis. La première émission couvrait le reportage des élections présidentielles américaines au terme desquelles Harding-Cox fut réélu. A partir de ce moment, les postes de radio-diffusion commerciaux se multiplièrent très rapidement.

En 1921 on comptait 8 stations opérant aux U.S.A. En 1922, une année plus tard, on comptait 564 stations de radio-diffusion licenciée.

En 1932 Fessenden, le savant Canadien, s'éteignait aux Bermudes. Les journaux de New York le "New York Herald Tribune" fit son éloge en ces termes: "Il arrive quelques fois, même en science, qu'un homme puisse avoir raison et être contre les idées du monde. Le scientifique et professeur Fessenden était cet homme."

Dans son épitaphe on peut lire

encore aujourd'hui en hiéroglyphes égyptiens: "Je suis hier, et je connais demain."

Stephen Strauss, journaliste du "Globe and Mail" écrivait dans un article qu'il consacrait à Fessenden le 18 janvier 1982: "On se souvient peu de Fessenden comme inventeur Canadien mais chaque fois qu'on allume la radio on est à l'écoute de ce savant."

C.A.R.F. est très heureuse de commémorer le 76ème anniversaire de Fessenden dans le cadre de l'année des communications. La Fédération Nationale des Radio-Amateurs Canadiens, par la voix de son Président "Don Slater" VE3 BID affirme sa valeur, en le reconnaissant comme un grand Québécois, un grand Canadien, et comme le père de la radio moderne.

Fessenden, n'est pas, le seul savant Canadien méconnu, on ne se souvient pas de lui comme d'un héros, mais tous les héros n'affichent pas leurs médailles.

Les sources de références utilisées pour cet article proviennent de: The Globe and Mail, January 18, 1982; Oakville Radio-Amateur, radio club magazine; Encyclopedia Britannica; Italien Encyclopedia "Zingarelli".

**OPERATION INFORMATION**

**RECIPROCAL OPERATING AGREEMENTS**

Canada has concluded agreements or arrangements with the following countries to permit licensed Amateur radio operators to operate radio stations while temporarily in the other country: Australia, Austria, Barbados, Belgium, Bermuda, Botswana (Republic of), Brazil (Federative Republic of), Chile, Colombia, (Republic of), Costa Rica, Denmark, Dominica, Dominican Republic, Ecuador, Finland, France, Germany (Federal Republic of), Greece, Guatemala (Republic of), Haiti (Republic of), Honduras (Republic of), India (Republic of), Indonesia (Republic of), Iceland, Ireland, Israel (State of), Italy, Jamaica, Luxembourg, Malta (Republic of), Netherlands (Kingdom of the), New Zealand, Nicaragua, Norway, Panama (Republic of), Papua, Peru, Philippines (Republic of the), Poland (People's Republic of), Portugal, S. Lucie, Senegal (Republic of the), Sweden, Switzerland (Confederation of), United Kingdom, United States of America, Uruguay (Oriental Republic of), Venezuela (Republic of), Yugoslavia.

Negotiations for the establishment of similar agreements or arrangements with the Republic of Bolivia, Cuba, Japan and Italy have been initiated.

**BANNED COUNTRIES LIST**

The following countries have notified the International Telecommunications Union that they forbid radiocommunications with Amateur stations under their jurisdiction: Democratic Kampuchea, Iraq (Republic of), Libya (Socialist People's Libyan Arab Jamahiriya), Somali Democratic Republic, Turkey, Viet Nam (Socialist Republic of), Yemen (People's Democratic Republic of), Zaire (Republic of).

**THIRD PARTY TRAFFIC AGREEMENTS**

Canada has concluded agreements with the following countries to permit Amateur radio operators to exchange messages or other communications with or to third parties: Australia, Bolivia (Republic of), Chile, Columbia (Republic of), Costa Rica, Commonwealth of Dominica, Dominican Republic, El Salvador (Republic of), Guatemala (Republic of), Guyana, Haiti, Honduras (Republic of), Israel (State of), Jamaica, Mexico, Nicaragua, Paraguay (Republic of), Peru, Trinidad and Tobago, United States of America, Uruguay (Oriental Republic of), Venezuela (Republic of).

Negotiations for the establishment of similar agreements or arrangements with Ecuador and the Federal Republic of Nigeria have been initiated.

Amateurs who wish to operate in Commonwealth countries other than those listed above should apply to the embassy in Canada or directly to the appropriate regulatory agency.



# VHF/UHF News

John Dudley VE5JQ

## Dayton Hamvention

The 1983 Dayton Hamvention featured several activities of interest to the VHF/UHF enthusiast. The First Annual International VHF/UHF Conference was held in conjunction with the Hamvention. This featured a fine series of lectures and demonstrations by well known speakers. The first day of the meeting featured a veritable who's who of EME enthusiasts. The EME forum featured thorough discussions of this activity on each of the VHF/UHF bands. Following this, a very balanced and understandable discussion of optimizing receiving systems was given by AAL. VHF/UHF contesting was the theme of another discussion group with individual presentations by all the leading contesters in the United States. This was certainly a most impressive presentation showing the huge amount of work and planning that goes into mounting a multi-operator/multi-transmitter VHF contest operation.

Other discussions of the day of interest were an introduction to the Maidenhead Locator/Grid Square System and discussions of equipment for the new 900 MHz and also gear for 1296 MHz and 10 GHz.

Friday evening, at a nearby hotel, there was an informal get together which was a huge success. Food and drinks were provided and it was a great chance to meet one's fellow enthusiasts. In addition to the social component of the evening, there was an interesting discussion by W1JR on receiving systems and also a chance for people to have the noise figure of their favourite pre-amp measured by the latest in sophisticated test gear.

Saturday saw a return to the program at the Hara Arena. This included a beautiful visual presentation of six meter DX peditions by W6JKV. Mike Stall, K6MYC, owner of KLM Electronics, gave a very thorough and understandable account of antenna design. WA4MVI finished the formal program off with an excellent review of VHF/UHF propagation.

The weather was very wet at the Hamvention which unfortunately led to the cancellation of the antenna gain measuring contest. The weather, however, did not deter the faithful in tromping through the huge flea market looking for their favourite item. Indeed, there were very few items that one could imagine in the realm of amateur radio and electronics which were not either on display at the commercial exhibit or available at the flea market.

We hope to see the Dayton Hamvention continue to have an association with its own operation and this International VHF/UHF Conference which I am certain will become a central meeting point for such enthusiasts.

## Winnipeg News

During a recent visit to Winnipeg, I had a chance to visit with some of the local VHF operators. Barry, VE4MA, was most hospitable in showing me around his 432 moon bounce station and bringing me up to date on his activities. Barry now has over 30 States worked on 432 MHz. This is through a combination of EME tropospheric work. Barry is also active on 6 M, 2 M and 23 CM. He has built a great deal of his gear himself and is a very knowledgeable

amateur both in the realm of building and design of equipment and the study of VHF/UHF propagation.

Bert, VE4AP, gave your scribe an interesting tour of his own shack and antenna farm. Bert is well on the way to becoming active on 432 moon bounce himself, having a four yagi array and also a 12 foot dish he can use. He hopes to add 1296 MHz amplifier soon but he can also be active on that band in a big way.

One of the newcomers to VHF in Winnipeg was A1, VE4AAA. He has four long boom yagis for 2 meters and is presently gathering other bits and pieces to complete his moon bounce station. He will shortly be moving from urban Winnipeg to a rural location and will have lots of room for his antenna farm.

There were several other Winnipeg operators I was unable to visit during my short visit but it appears that VHF interest is on the rise in that city. We look forward to further developments in Winnipeg.

---

## DID YOU WORK A CH3?

The town of Essex, Ont. is celebrating its 100th Anniversary this year. The DOC has allowed us to use the special prefix CH3 for the period July 16-31, 1983 to commemorate this event.

For all stations who QSO a CH3 station during that time, there is a colourful certificate available. Please QSL with a SASE (business size) to Mr. Ralph Adams, VE3 GHZ.



# Lack of interest kills amateur exam participation

DOC has informed CARF that it has dropped the idea of Amateur participation in the examination process. Although there were a few excellent replies to the Department's request for input on the question, the general lack of interest and response has killed any further official consideration of the matter. The proposed meeting for June 10th, to discuss the matter with CARF and others has therefore been cancelled.

Even though the idea is dead, at least for now, the brief submitted May 27th by CARF to the Acting Director-General of the Telecommunication Regulatory Service is worth reproducing here.

"Dear Mr. Johnson,

The Department of Communications by letter of February 1, 1983 asked the Canadian Amateur Radio Federation, Inc. to poll Canadian Amateurs concerning their opinions on matters relating to Amateurs becoming involved in Amateur Examination processes. You asked thirteen specific questions to which you desired detailed comment.

"Thirty-two written replies have been received from 13 clubs/groups and 19 individuals whose comments and recommendations have been condensed into the following consensus:

- a) *Method to use to select volunteer Amateurs examiners.*

Examiners should be initially selected and recommended by clubs, and to obviate the need for DOC to deal directly with a large number of individual clubs, the recommended names should be processed through the

national Amateur organization.

- b) *Minimum criteria for examiners, i.e., qualifications, experience, skills.*

Examiners should be holders of at least an Advanced Amateur Certificate and have at least five years recent operating experience on the high frequency Amateur bands.

- c) *How to assure impartiality of examiners and avoid charges of conflict of interest and favouritism.*

The main point in the comments was that an instructor should not examine his/her own students. Other points included proposals that two/three examiners be present at all examinations (although this may not always be practical), and that examiners should not have conflict of interest such as being involved with the sale of Amateur equipment. It was strongly indicated that the examiner's integrity, his respect for his own reputation and appreciation of DOC's trust in members of the Amateur fraternity together with his pride in his own certificate qualifications would provide ample safeguards.

- d) *Quarterly scheduling of exams or an altered frequency/schedules.*

While the present quarterly schedules would prove sufficient for most larger centres, the proposal would assist greatly in areas where travel by candidates is required by providing flexibility (weekends, evenings, etc.).

- e) *How to ensure availability of examiners and suitable facilities for candidates in remote or isolated areas.*

Generally mutual arrangements between examiners and candidates would ensure availability of examiners at desired times. In larger urban areas, the corresponding larger numbers of licensed Amateurs should adequately take care of the situation.

- f) *Maintenance of integrity of examination papers.*

To ensure the integrity of individual examination papers it is recommended that they be enclosed in sealed envelopes to be opened by or in the presence of the candidate(s).

- g) *How to ensure uniformity on national basis in awarding marks.*

It is the belief of the majority of respondents that uniformity of assessing papers and awarding marks could be accomplished by the use of multiple choice questions. If essay type questions are to be used then it would either be necessary for DOC to continue marking papers or for the Department to provide examiners with appropriate guidelines.

- h) *Examination paper production and distribution networks.*

It is the consensus of the respondents that initially, individual examination papers should continue to be prepared and distributed by the Department. In the future a pool or bank of several hundred questions could be provided to examiners from which they could develop individual papers by random selection. Distribution could be from DOC Regional or District offices to the examiners by mail (registered if desired)

or pick-up by the examiner if convenient. Papers should be available on request as needed.

- i) *Coordination and contact points between DOC inspection staff and Amateur examiners.*

Coordination and contact would be between the appropriate (nearest) DOC office and examined by mail, telephone or visit. Some respondents proposed "supervisory examiners" or "coordinators" to act as centralizing points thus reducing the number of individuals dealing directly with the Department.

- j) *Provision of service in official language of candidate.*

No problem is seen in providing examination services in either official language as required. The problem (if any) is self-effacing in the various parts of the country.

- k) *Desirability of establishing a pilot project in one province or in a limited area.*

Replies to the question of the desirability for a pilot project were divided; 12 for Yes, and 10 each for No and No Comment. There were however, several comments that a pilot project would only result in prolonging the introduction of the proposal.

- l) *How to ensure the departmental objective of reduced costs with equivalent or better service will be achieved and maintained.*

Of the twenty-one respondents addressing this question only one had any doubts of savings to the DOC in manpower (time and travel) and other expenses (rental of examination rooms and cost of equipment for code tests, etc.). It was also believed that service to candidates would be improved through flexibil-

ity of examination schedules and location (they could be held at times more acceptable to candidates such as evenings and/or weekends, or at the conclusion of courses and at places not requiring extensive travelling or time off work by candidates.

- m) *Other relevant matters which are important to the process.* Under this item a number of suggestions and comments were made, such as —

- Amateurs are responsible individuals who are proud of their hobby and could make the proposal work.

- Examination questions should be addressed for persons looking for a hobby — not a vocation.

- A large pool of known examination questions to be established to assist instructors in development of adequate training programs.

- A return to full examinations (code sending and oral questions on diagrams as required by regulations.

- Additional responsibility on the part of Amateurs will strengthen the Amateur community.

- Implementation of the proposal should be carefully phased in — not a sudden total change — with a minimum of red tape.

- Provide an appeal system; but in order to reduce possible misuse, all resulting re-examinations to be conducted by DOC inspectors at DOC convenience.

"As stated above, there were replies from 12 clubs/groups and 19 individuals for a total of thirty-one. Comments were received from the Yukon to the Maritimes. Two clubs and one group indicated that they believed the DOC would be remiss in its responsibilities if they did not continue to

completely administer and conduct examinations. No indication was given as to the size or membership of clubs (except for one claiming 27 members) and groups, there were merely vague claims of "unanimous" or "majority" agreement.

"Unfortunately, some respondents did not address their comments directly to the DOC questions, but were more concerned with the content of examinations and the recent problems with code tests.

"In view of the small response to the questionnaire and the opposition expressed by several clubs/groups, it can only be concluded that the Amateurs of Canada as a whole are not, at this time, prepared to accept the responsibility involved in your proposal for them to assist in the conducting of examinations. While there is no exact count of the number of Amateurs included in the clubs/groups, it must be concluded that they substantially out-number the individuals who submitted comments. Thus, CARF can only conclude that Canadian Amateurs are satisfied with the present administration and method of Amateur Certificate examinations as conducted by the DOC and do not wish any major change to the procedures now in effect.

"CARF is pleased to note the trust that the Department very obviously places in the integrity and pride of Canadian Amateurs and is prepared to assist with the furtherance of proposals relating to the deregulation and self-administration of the Amateur Service."

Yours truly,

A.P. Stark, VE3ZS  
CARF/DOC Liaison

## On memory — Human and otherwise (A Net-Minder Program for the TRS-80)

B.J. Madsen, VE5 ADA  
228 Sixth Street N.E.  
Weyburn, Saskatchewan  
S4H 1B2

Some people are blessed with a remarkable ability to associate names with individuals. In politics this is probably essential to survival. In amateur radio it never fails to be impressive. For example, you are into your twentieth hour of contest operation. You call a YB0 who responds using your first name and asks how things are going. Suddenly you are awake again. How did he do it?

I suspect some of the UAs of having some form of sophisticated filing system whenever they pull that stunt on me. Surely, VE5s aren't as rare as a BV1 or a VR6? One operator that I know of, a VE7 (ex VE5) keeps an extensive detailed filing system on every contact so that he can respond to any call with some personal remark . . . "Hi, Fran. Haven't worked you since 1974. How did the hernia operation go that you were scheduled for?" Impressive, to say the least.

Many of our number are involved with NETS of one form or another, and one thing that check-ins seem to share is the expectation that the net control station will associate the call with the name IMMEDIATELY, even though he last checked in several months ago. Some Amateurs seem able to do exactly that, and I greatly envy them that gift. Most of us can't, and resort to various devious means, like a list (hopefully in some logical order) that can be referred to — probably while saying "aaaaah" — to jog the memory.

CARF's illustrious Western director, Norm (VE5AE), finds himself in this position on a regular basis, and while his memory for relating names to calls is im-

pressive, it is somewhat short of encyclopedic. We have discussed this shortcoming on occasion, particularly the desirability of being able to, without delay, respond with the name and QTH of any and all check-ins to the SARL 75 metre net. Even though VE5 is pretty low in active Amateurs, doing this by referring to a paper list is not really satisfactory, so our discussions tended toward computerization as a possible solution.

Searching a list by computer is certainly nothing new. Anyone who has started to write BASIC programs will be familiar with the technique of using a subscripted string variable to store a large number of pieces of data, and then searching this list in a loop. This simple technique works very well and I have seen various programs using this method designed to aid the net control station. They all share the same drawback — they are too slow. To search a list of 2-300 potential check-in against a specific call might take as much as six or eight seconds. This would require much too much "um-aaah"ing on the part of the net control. What was needed was an average response time of less than one second.

That kind of a challenge had to be met and a program which seems to fill this need was written, and has been used successfully with the SARL net for the last while by Norm. This program will supply the name and QTH of a check-in from a list of about 400 potential check-ins with an average response time of about 0.5 seconds and a maximum response time of just over 1 second. This is fast enough to earn Norm the reputation of having an infallible memory.

### What it Does:

The operator sets up the program by typing into DATA statements at the beginning of the program the SUFFIX, NAME and QTH of each potential check-in. On a 16 K RAM machine, it will handle about 400 Amateurs' data. If more memory is available, obviously more data can be handled.

To use the program the operator simply types the two or three letter suffix of the check-in. In about one-half second the screen displays the name and QTH to go with that call, or if the call is not on file, a message to that effect so the operator can request the information to update his DATA for future reference.

At any time, the operator may initiate a search of those who have checked in, to determine if a specific check-in is QRU, who he is, and at what point he checked in.

At the end of the net (or any other time) a summary routine may be called up to list all check-ins, with name and QTH, in the order in which they checked in. This creates a numbered screen by screen display, and counts the check-ins for net report purposes. This routine provides the option of a print-out if a printer is available.

The program also contains a routine which will display all data on file for checking purposes, again providing the option of a print-out copy.

The size of the program obviously depends on the amount of DATA stored in it. The bare program, without DATA, requires 5.7 K RAM. It will run on a TRS-80 Model I or Model III, tape or disk system, with at least 16 K RAM.



Anyone wishing a copy of the program, customized for his own call area, may obtain one by sending me:

1. A description of the system (Model I or III)
2. A computer quality cassette tape (or a diskette for a Model

III)

3. \$5.00 so I can tell the XYL that the investment is paying off.

## **CARF** NEWS SERVICE

### **CARF QUERIES DOC ON INTRUDER WATCH**

With the increase of intruders into the Amateur Bands, CARF has been investigating the possibility of an effective "Intruder Watch" and recently wrote to DOC on the subject. Here is the letter, dated May 27th:

"I have been directed by the CARF Board of Directors to inform you of the concern being expressed by Canadian Amateurs of the increasing number and activities of non-Amateur stations operating in the Amateur frequency bands.

"It is fully understood that not all Amateur bands are exclusively assigned to the Amateur Service and that in some cases the Amateur Service has only shared

or secondary status. However, there are many instances where stations, some high power commercials, others illegal unlicensed, which regularly use frequencies within the Amateur bands.

"Canadian Amateurs are prepared to establish an "Intruder Watch" organization with a view to collecting data on these "intruders" which could be used by the DOC, through the ITU, to have these illegal operations in the Amateur bands terminated.

"Before developing such a watching or monitoring service, it is necessary for Amateurs to know what data is required for the DOC to take appropriate action and how it should be presented to the Department. It is

recognized that Amateurs, on the whole, do not possess or have access to sophisticated direction finding equipment or signal analyzers. Many, however, are capable of copying and recording received signals as well as determining a broad estimate of the direction from which the signals appear to originate.

"CARF would be pleased to receive advice as to what data the Department desires and how it should be presented, so that plans can be developed for a useful and effective adjunct to the DOC Monitoring Service in an endeavour to clean up the frequency spectrum, at least in the Amateur bands."

Yours truly,

**A.P. Stark, VE3ZS**  
CARF/DOC Liaison

### **WOODPECKER NUMBER THREE**

By Doug Burrill

A new 'woodpecker' (over-the-horizon radar) is being added to the well-known Russian one and the U.S. east coast equipment to add to the intruders infesting the Amateur bands. The U.S. east coast one, ironically situated near a New England town called Moscow, is to be joined by a new one on the U.S. west coast, either in Oregon, California, Idaho or Washington state.

This time the U.S. Air Force released a "Draft Environmental Impact Statement about the system, describing the socio-economic, biological and physical environmental effects to be expected.

It is not known whether the resultant physical effects of high blood pressure on Amateurs wrestling with the QRM produced by the system has been taken into consideration.

**ELDER ENGINEERING INC.**  
P.O. BOX 10, KING CITY, ONTARIO L0G 1K0

### **JOB VACANCY**

Small, well established consulting engineering firm needs someone special. Candidates must have: considerable theoretical design and practical experience concerning ham or other directional transmitting antennas; plus a bachelor's degree in engineering or physics; plus some computer programming ability.

We specialize in the design, procurement and adjustment of broadcast transmission systems. These include high powered MF, FM and TV facilities; also microwave and broadcast auxiliary systems. DOC's procedural rules and regulations require close attention to detail to ensure compliance. The job offers unusually interesting, challenging and rewarding career prospects to the right person.

The offices are pleasant, well equipped and located in a rural residential area, north of Toronto. Some on the job training will be provided. Starting salary is open.

Reply by letter only initially. Resumé must include education, antenna and other relevant experience, age, work goals, references, etc. Replies will be acknowledged and will be kept confidential on request.

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# KDK FM-2030

## SIX IN ONE CONTROL

### SIMPLE SCAN CONTROL

FUNCTION ring selects type of scanning as follows:

- DIAL ... Band scanning. Limits, memories 5 & 10.
- M-CH ... Memory scanning. Channel Nos. displayed.
- M-FR ... Memory scanning. Frequencies displayed.

Just set SCAN switch to BUSY to find a busy channel and OPEN to find a vacant channel. When located, flick switch to center (-) position and start transmitting.

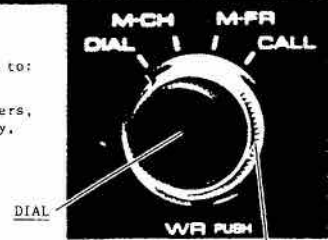
### HI/LO POWER BUTTON

HI - 25 watts, LO - 5 watts



**\$ 379<sup>95</sup>**

WITH TM-2 UP/DOWN SCAN TOUCH-TONE MIKE



DIAL

FUNCTION ring



### COMBINATION VOLUME CONTROL, POWER AND MEMORY MODE SWITCH

Black knob controls volume. Push ON, push OFF power switch leaves volume setting unchanged. No need to re-set volume level each time transceiver is switched on. Silver ring sets memory modes as follows:

- A + B ... Select and scan 10 memories, 1 - 10.
- A ... Select and scan 5 memories, 1 - 5.
- B ... Select and scan 5 memories, 6 - 10.
- A x B ... Duplex using memories. Receive on memories 1 - 5 and transmit on memories 6 - 10. Scan 5 memories, 1 - 5.

### REVERSE BUTTON

Use to monitor transmit frequency (Repeater input) during duplex operations. Functional for duplex using memories (A x B mode) and offset switch. Also functions during RIT use.

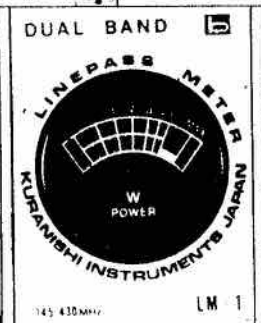
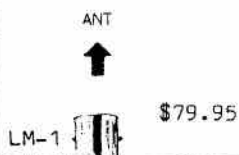
KDK, KURANISHI, DAIWA AVAILABLE FROM SELECTED DEALERS ACROSS CANADA: CONTACT YOUR FAVOURITE DEALER TO SEE IF HE IS CARRYING OUR NEW LINES. IF YOU ARE UNABLE TO LOCATE A DEALER CARRYING THESE LINES YOU MAY ORDER DIRECT. MORE DEALERS COMING SOON.

CANADIAN DEALERS TO DATE:

DC ELECTRONICS (514)427-2563  
BOX 308 STE MARTINE, QUEBEC

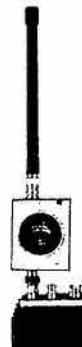
## KURANISHI

### DUAL BAND LINEPASS METER & OPTIONAL "S" METER



- FREQ : 145-430MHz
- POWER : 0.5-5.0W
- Z<sub>0</sub> : 50ohms
- VSWR : 1.15以内
- ACCURACY : MS ± 10%
- ATTENUATOR :
- OUTPUT :
- CONNECTOR : BNC
- SIZE : 55 × 96 × 48.5mm
- WEIGHT : 120g

LM-1



THROUGH POWER

THIS IS NOT A TOY LIKE SOME LOOK-ALIKES. PROFESSIONAL QUALITY AND MATERIALS THROUGHOUT.....

Did you ever wish you had an 'S' Meter on your HandHeld ?? Now it's possible. Add the SK-1 option to the LM-1 above and presto you have an S/R/F Meter. A small wire connects to the MC-3357 IC found in most HT's. The wire can be led into the HT through the earphone hole. Makes your HT ideal for transmitter hunts. The finishing touch for today's HT's, LM-1 with SK-1 installed \$119.95.

We will install the lead-in wire for you. Send us your HT along with \$15.00 to cover the installation when you purchase the LM-1 & SK-1. The lead-in wire has a

## LINEAR AMPLIFIER

**BE HEARD!  
GIVE YOUR HAND-HELD  
THE BOOST IT NEEDS!**

The New Daiwa LA-2035 two meter linear amplifier.

A compact amp at a compact price  
Only \$99.95 Suggested Retail.

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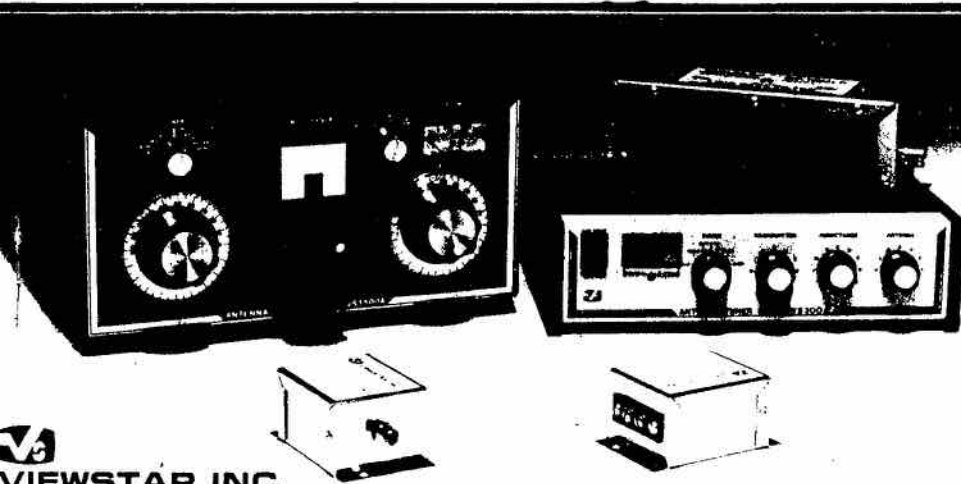
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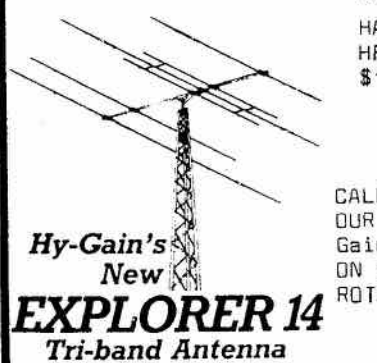
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## *Municipal tower by-laws invalid* — Justice department

Doug Burrill  
VE3 CDC

As a result of discussions and correspondence with CARF, the Justice Department official who acts as legal counsel for DOC has written to President Don Slater, VE3 BID, quoting a 1932 Privy Council decision which "without equivocation" asserts federal "legislative authority over radio communications".

The letter states that "a province or municipality has no jurisdiction to enact laws or pass by-laws respectively which deal directly with radiocommunications".

"Of obvious concern to the members of CARF is the question of controverted jurisdiction as between federal, provincial and municipal levels of government over the use and operation of radiocommunication towers in Canada. This issue is embodied frequently, as you know, in the form of disputes between a town or municipal council on the one hand and a federally-licensed Amateur radio operator on the other. Specifically at issue is the question of the validity at law of municipal zoning by-laws and other enactments which directly or incidentally either restrict or prohibit the ongoing use and operation by licensed Amateurs of radiocommunication apparatus and facilities including towers and, increasingly, parabolic earth-station receiving dishes used in satellite communications."

Referring to the Privy Council's decision in the 'Radio Reference Case', the letter continues:

"This clear statement of jurisdiction is as applicable today as it was 51 years ago and yet, with perhaps increasing regularity, municipalities persist in attempting to exercise authority lawfully delegated to them by the provinces through the enactment of

by-laws related to a certain extent to the regulation of radio-communication facilities and apparatus."

"The explanation for this activity appears to be twofold in nature; first, from the broad language and scope of certain by-laws, it is evident that many of the local councils simply lack an understanding of the legal exclusivity which the federal government enjoys in this field. Secondly, based upon the language, purpose and spirit of certain other by-laws, it is equally clear that some municipalities, while aware of the jurisdictional difficulties, nevertheless are intent upon resolving zoning and amenities problems and, to do so, have adopted an approach which incidentally affects other areas, such as radiocommunications. . . ."

"To restate the legal issue of jurisdiction, the federal government's exclusive legislative authority over radiocommunications has been exercised through the *Radio Act* and regulations thereunder. Pursuant to paragraph 7(1)(e) of the Act, the Minister of Communications is empowered to regulate antennas as an integral part of the radio apparatus required for the operation of a radio station. The Minister of Transport, under paragraph 6(1)(j) of the *Aeronautics Act*, is also authorized to regulate structures, including antenna support structures, located in the vicinity of airports which pose a hazard to air navigation safety. Conversely, a province or municipality has no jurisdiction to enact laws or pass by-laws respectively which deal directly with radiocommunications. However, a properly framed by-law dealing with local zoning and relating only indirectly to radio-

communications may co-exist with federal legislation provided the by-law neither prohibits nor unduly restricts the conduct of radio services or the operation of federally-licensed radio stations and apparatus"

In the matter of those restrictive 'covenants' or 'servitudes' found in agreements to purchase or lease property which prohibit towers or antennas, the letter states that:

". . . a restrictive covenant is a prior restriction on the enjoyment of real property which is said to 'run with the land', that is, from vendor to purchaser. It is an obligation which forms part of the private transaction of real property and to the extent that a purchaser has notice of the covenant, it is binding upon him. Obviously, the federal government's powers regarding radiocommunication have no impact upon what is essentially the exercise of private land rights. To the extent that constitutional jurisdiction has any bearing upon this issue, it is clearly the provinces and not Parliament that are empowered to legislate."

### **Read the Fine Print**

The letter also gives an interesting legal background on covenants and some words of advice to Amateurs who are about to purchase or lease property on which they plan to set up a station. BEFORE you commit yourself to an Agreement of Sale and Purchase or lease, study it carefully for snares and snags which could ruin your plans.

"At law", the letter winds up, "the issue becomes quite simply whether the purchaser accedes to the covenant or decides to spend his money elsewhere." ". . . CARF might", it concludes succinctly, "profitably attempt to



educate its members to the legal pitfalls inherent in purchasing a property without thoroughly reading the 'fine print'."

("Educate" our members? Well, we hope that we did just that with Bill Wilson's article in the May issue, which explored the murky

world of covenants. It was Bill's queries and discussions with DOC legal people which resulted in their letter treating with covenants as well as towers. If, however, you wish to be even further "educated", the full text of this letter may be obtained from

CARF Inc., Box 356, Kingston, Ont., K7L 4W2 by sending a STAMPED return envelope. Ask for the DOC Legal Services letter.)

— VE3 CDC

In the April issue of TCA we had a story by TOM, VE3 LNT on the York North ARC's trip to the 1982 Dayton Hamfest. Now for this year's trip.

### THE DAYTON TRIP

Last year, I reported on an aborted trip to Dayton. One with almost tragic consequences. This year, I am happy to report that the whole trip went better than expected.

As was the case last year, the trip was sponsored by the York (formerly York North) Amateur Radio Club and organized by John Iliffe VE3 CES. The chartered coach was again operated by Transtario. However, this time, a modern comfortable bus (with brand new tires) was supplied.

I joined the trip in progress at Yorkdale Shopping Centre, the pickup point for Toronto and vicinity passengers. We departed at 21:00 and arrived in Windsor at about midnight. I missed about half of the trip because I was sleeping. Slept a bit more after leaving Detroit and had an uneventful trip to a road-side rest just north of Dayton, where we had a breakfast of orange drinks and honeybuns. After breakfast and a short drive we arrived at the Hara centre at 6:00 just as the flea market was getting started.

Unfortunately, the weather did not cooperate. A light drizzle which turned into a pretty heavy downpour put a bit of a damper on the out-door activities. (Those boat-anchors would come in handy since we would soon need an ark!) However, since the buildings did not open until 8:00, and the vendors in the parking lot had interesting stuff to look

at, I decided that I wouldn't melt, and wandered about in the rain.

By the time the buildings opened . . . so I got wet! Also got a few good deals. Seems that the worse the weather, the better the prices.

Meanwhile, to prove their hospitality, the Dayton police towed some of the cars out of the rain. Wasn't that thoughtful? (another good reason for taking a bus).

We spent the rest of the day walking around looking at all the stuff. What amazed me was the size of the place. I was warned that it was big, but did not realize how big.

Anyhow, as all good things end, our visit to Dayton ended. About 17:35 we boarded the bus and headed for home. My feet were a little the worse for wear as were a few others I imagine.

A few miles north of Dayton we stopped for dinner at a smorgasbord restaurant. Entertainment was provided by a Nickleodeon piano with a drum, cymbals and accordion built in. (And you thought you had something new with computer music did you?)

Back in the bus I managed a bit of shut-eye before we arrived back in Canada.

I thought the customs stop would be a bit of a problem. It wasn't. We were there for about 15 to 20 minutes and some of us had to pay a little (9%) tax. Another stop in Windsor for a bit of a snack, then we left for Toronto at about 00:00.

Again I slept a while and before long we arrived at Toronto. I left the bus at about 3:00 Sunday morning with my arms full of bargains.

Would I take the bus again? Yes. It's a very good way to go to Dayton if you have not got the time to drive down. Let someone else do the driving.

I am looking forward to going again, although York Amateur Radio Club and John Iliffe are not planning to organize the trip next year. Perhaps Peel should consider doing something?

Thanks to the York Amateur Radio Club and John VE3 CES for organizing a great Dayton trip.

73

de Paul, VE3 IAC  
Peel ARC News

### NEED AN ENGINEER?

Young Bachelor of Science (electr. engineering) looking for job from January 1984. Trainee permit obtainable, write to HB9 BKQ, Passwangstrasse 26, 4153 Reinach Switzerland.



# How to span a province on two-metres

Rejean Letourneau VE2MPV

*Two-metre repeater linking in Quebec and how the Outaouais Radio Club participates in the province wide system using the club repeater, VE2CSO.*

The VHF repeated, VE2CSO, located at Camp Fortune in the Gatineau Park not only serves the National Capital area but has been equipped with a special control system and UHF linking equipment since June of last year. The equipment allows Amateur operators in the Ottawa-Hull area to be linked with different repeaters throughout the province of Québec through VE2RTQ, the linking network control.

Each repeater belonging to the VE2RTQ network has been allotted a special code which permits them to access the UHF link. The

code is composed of 'DTMF' (Dual Tone Multifrequency) tones which are sent on the UHF carrier via the VHF repeater, utilizing a predetermined procedure. Once the code is sent and successfully received by a distant VHF repeater, all Amateur operators in the coverage area of the local and the distant linked repeaters can communicate with each other although they are not accessible to each other using normal VHF transmission.

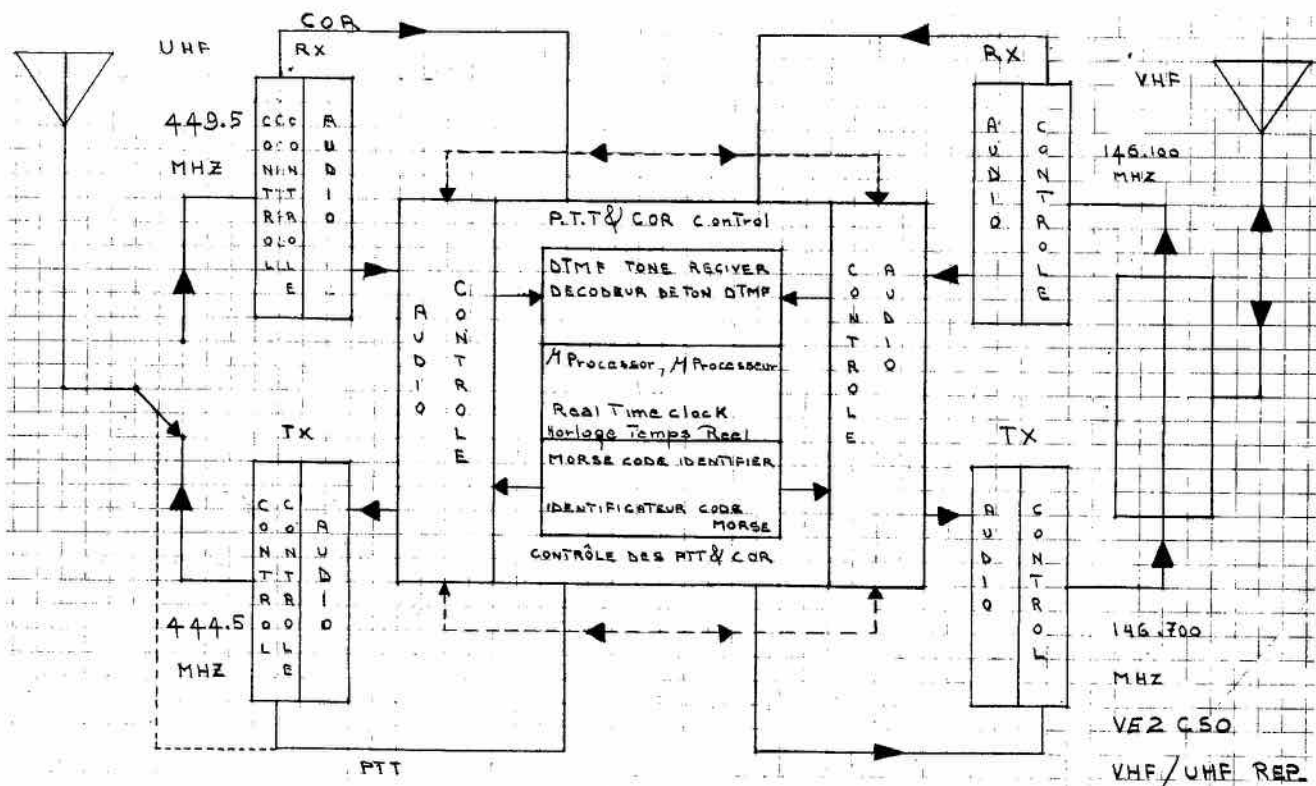
In order to facilitate the opening and closing of several repeaters in case of emergency, universal codes can be used which accelerate the transmission of information throughout the entire province of Quebec and part of its adjacent provinces.

The main part of VE2CSO's UHF/VHF linking repeater is a

home-brewed microcomputer based on a M6802 microprocessor. The microprocessor and its hardware operate both UHF/VHF transceivers, morse code generator, DTMF tone decoder and a real time clock. The control program occupies about two kilobytes of permanent memory. The executive program is a series of machine language modules interrupted by the DTMF tone decoder and the morse code identifier when service is requested by one of these peripherals.

A real time clock assembled on the master card is responsible for the system timing and control.

This gives a general idea of what VE2RTQ linking via VE2CSO is all about. The construction and maintenance of latter repeater and its linking equipment is one of the activities of VE2CRO, the "Club Radio Outaouais".



# RSEAU VHF (Fréquences métriques) du Québec

Par VE3 MPV  
Rejean Letourneau

Depuis la 20 juin 1982, le répéteur VHF, VE2 CSO, situé à "Camp-Fortune" dans le parc de la Gatineau, possède un système de contrôle spécial ainsi qu'un équipement UHF (Fréquences décimétriques) comprenant un émetteur-récepteur et un amplificateur de puissance UHF.

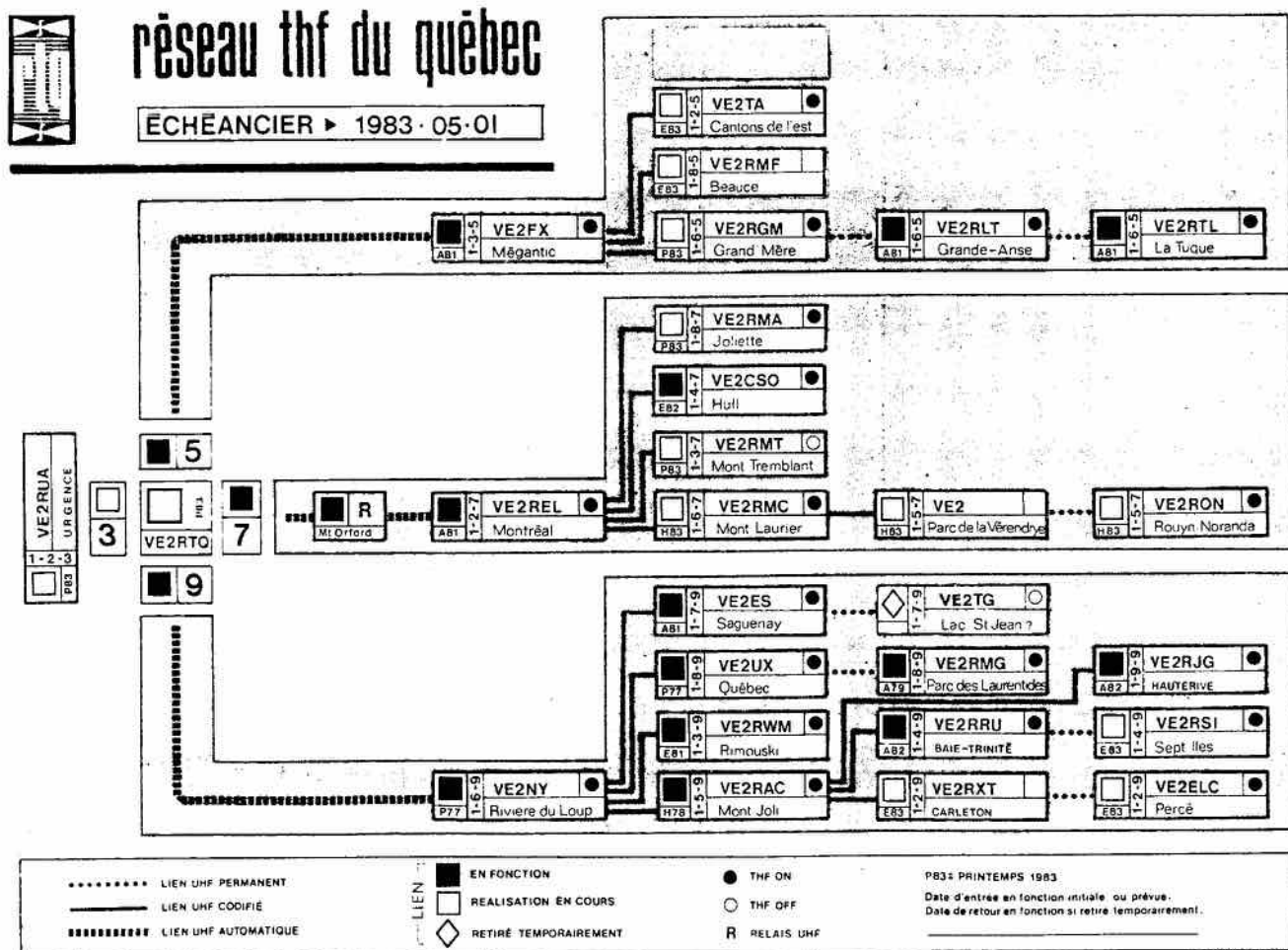
Pourquoi toute cette installation? me demanderez-vous, . . . et bien c'est avec cet équipement que les radio-amateurs de la région de Hull-Ottawa peuvent via UHF, converser avec leurs confrères qui, eux, opèrent avec différents répéteurs situées d'un bout à l'autre de la province de Québec. Sans oublier que tous ces répéteurs VHF/UHF font partie du grand réseau VE2 RTQ.

Afin d'accéder à cette fameuse liaison UHF, chaque répéteur VHF appartenant au réseau VE2 RTQ possède un code spécial. Quand ce code est transmis suivant une procédure commune à tout le réseau, il permet au radio-amateur qui a transmis le code sur UHF via le répéteur VHF, sur lequel il opère, d'être relié à une autre répéteur du réseau VE2 RTQ. Nous obtenons ainsi une liaison UHF entre deux répéteurs VHF décervant deux groupes de radio-amateurs qui ne pouvaient, auparavant, se contacter par radio VHF.

De la même façon, si un code universel est envoyé sur UHF via VHF, une branche du réseau VE2 RT1 composée de plusieurs

répéteurs VHF peut être mise en opération. C'est ainsi que les communications peuvent être établies entre les différents répéteurs VHF répartis sur le territoire de la province de Québec.

Le cerveau du répéteur VHF/UHF VE2 CSO est un micro-ordinateur de fabrication maison basé sur un microprocesseur M 6802. Ce microprocesseur gère les opérations du générateur de messages en code morse, émetteur-récepteur VHF, émetteur-récepteur UHF et du décodeur "DTMF" (Double Tonalité Multifréquence). Le programme de gestion est un ensemble de modules écrits en langage machine et il occupe environ 2K bytes de mémoire permanente.



Le traitement d'interruption du programme principal venant de l'identificateur en code morse et du décodeur "DTMF" est pris en charge par différentes rou-

tines de service exécutées par logiciel.

Ceci vous donne un bref aperçu des activités du club VE2 CRO en ce qui concerne les opéra-

tions sur VHF et UHF, ainsi que les outils employés pour faciliter les communications entre eux et leurs amis radio-amateurs répartis un peu partout dans la province de Québec.

## Building a tower

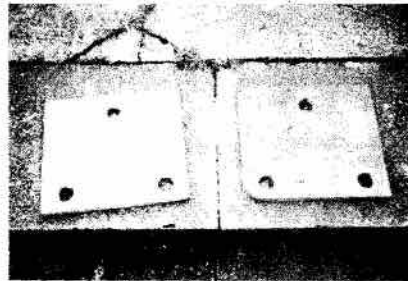
By E.J. Colmer  
VE7 CCJ  
1236 Chapman St.,  
Victoria, B.C.  
V8V 2T8

How many "Hams" dream of having a nice crank-up tilt-over tower, thus eliminating the problems of climbing steep roofs and flimsy ladders. Well, Don Brumwell VE7KA solved this problem by the do-it-yourself method. Fortunately, Don has his own welding outfit plus the know-how. However, for those who may be interested, here is an on-the-spot, step by step review of Don's tower.

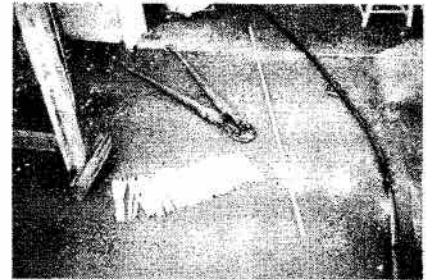
Materials required: six pieces of 24 foot, one and three-eighth galvanized steel fence rail; one-quarter by three-quarter galvanized bar stock; five-sixteenths mild steel plate for base; three-quarter bar stock for hinges; two ordinary boat winches; one-quarter inch galvanized aircraft cable; top block is a galvanized boat steering block; snatch block pulley half-way up mounted on two pieces of angle iron for raising and lowering; wooden forms to hold pipes in place for welding, (later knocked out on completion); special welding rod for galvanized material ARCTEC 220.

The distance between holes in the wooden forms is an arbitrary measurement depending on the mechanics decision. The inside is built first and the outside built around it with a clearance of one-eighth inch. A progressive welding technique is used to prevent mast binding while being welded. The rotor may be mounted on the top. Don't forget a good bolt cutter!!!

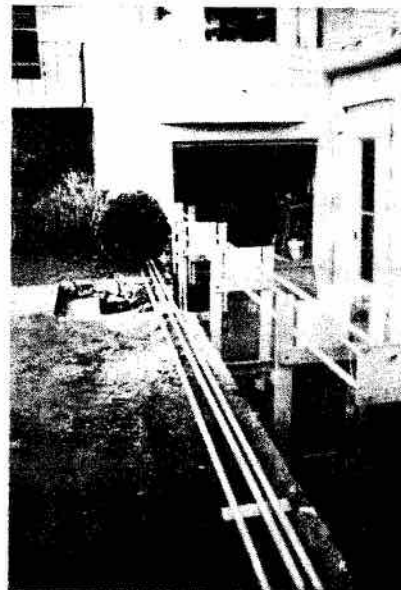
Cost: Material under \$500 — Labour 60 hours.



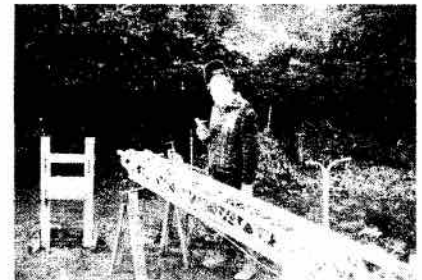
1. Wooden template and metal base plate.



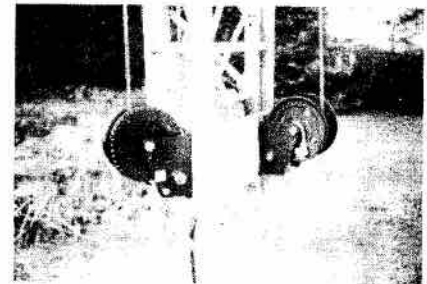
2. Bar stock and bolt cutter for struts.



3. Fence rails in templates.

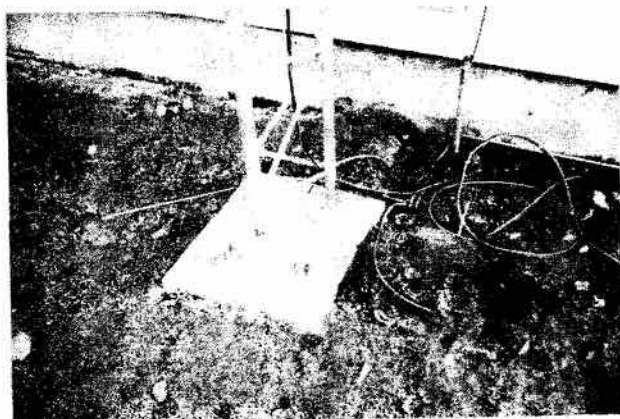


4. Don welding in struts.

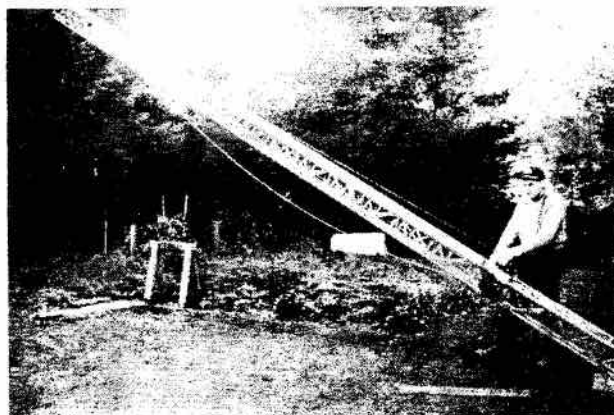


5. Two winches for lowering and tilt over.





6. Base plate attached to cement pad.



7. Raising tower.



8. Tower raised.



9. Tower raised and extended to full height.



10. Tower complete with antenna.

---

*The first annual*

## **Golden Anniversary Flea Market**

sponsored by the Hamilton ARC will be held on Saturday Oct. 8/83 (8:30 a.m. - 2:00 p.m.), in Hamilton, Ontario, at the CNIB, 1686 Main St. W. For info contact Glen Simpson VE3 DSP, 61 Briarwood Cres., Hamilton, Ontario L9C 4C3.

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# YL News and Views

Cathy Hrischenko VE3GJH  
56 Stockdale Crescent  
Richmond Hill, Ontario  
L4C 3S9

## The Ontario Trilliums:

NEW TOT EXECUTIVE  
AS OF JUNE 1, 1983.

**President — Audrey Cuthbert,** VE3ILT. Her OM is Dave, VE3HVR and they have 2 girls. Audrey was licensed in September of 1976. She is an active CNIB operator and has been NCS on different nets. She also belongs to CLARA and the Scarborough ARC.

**Vice Pres. — Eva Colbeck,** VE3EVA. Eva has been licensed since 1948 and has been active in TOTs for many years. She is also a member of the Scarborough club and CLARA. Eva does some beautiful oil paintings when she has the time.

**Secretary — Leonora Wilson,** VE3IGW was licensed in 1976. Like the others, she too belongs to CLARA and SARC. She is presently studying for her advanced. Another hobby of hers is boating. She is secretary for the Don Valley Power Squadron and holds a Jr. Nav. herself. Her OM is Bob, VE3IGB.

**Treasurer — Beverly Blakey,** VE3LZU. Bev, who was licensed in 1980, has 2 brothers who are also Amateurs; Cliff, VE7ETL and Wilf, VE3IYU. She is from Collingwood, Ontario, and lives in Toronto. She commutes to Collingwood on the weekends though. Her other interests are music and art.

**Membership — Judy Vance,** VE3LXC was licensed in 1979. She belongs to her hometown Ban-

croft ARC and VE3RPT in Toronto. She only operates 2 metres.

**Editor — Thelma Woodhouse,** VE3CLT, has been licensed since 1966. Thelma is known for her years as editor of TOT Topics (past, present, ???). Thelma is an active worker in the QSL bureau and belongs to SARC and CLARA.

Good luck and hope you have a successful year.

### Ladies Day at CNR

August 26 will be Ladies Day at the CNR in Toronto and at the Amateur Radio booth we will be marking the event by controlling the CLARA net. Mary, VE3COH will be at the mic of VE3CNE as NCS.

### Another Number

The meaning of 55.

Christel, DF1LV says it means "Alles Gute", — "Good Luck".

Don't forget AC-DC, Oct. 22-23. It is a very worthwhile Canadian contest. Both OM's and YL's are welcome.

I'll leave you with this: Parents are shock absorbers!

7/33/88 as the case may be.

### YL News

In May 1965 a small group who had met on the air every Saturday as the Ontario Cw YL Net, sormed the Ontario Trilliums — Canada's first ladies amateur radio club — with the station call VE3TOT. We began as a provincial organization but now have representation from several other provinces and the U.S.A.

One of the earliest projects was to assist others in the teaching of code to aspiring hams at the CNIB and financial assistance was also given to help the whitecaners form their group known originally as the NIBS ARC.

Association Membership in the Trilliums is offered to blind and permanently disabled YLs who are licensed amateurs. Many of our most active members come from this group and can be heard on the air frequently. Friendship with the Whitecaners, the hams at Sunnybrook Hospital, The Queen Elizabeth Hospital, and the Villa Hospital is one of our most rewarding efforts and we look forward to the get-togethers we are able to have with these hams.

Each year we have social events where the CMs are always invited and they must enjoy themselves as they always come back for more.

As a Centennial project in 1967, The Trilliums formed the Canadian Ladies Amateur Radio Association — CLARA — which is now a large nationwide group and we are proud to be affiliated with them. Together we can be found at many radio conventions and meetings, assisting and meeting other YLs.

The Club Bulletin — TOT TOPICS — comes out four times a year with news and information and is taped for our blind members. Additional taping and brailing is done for them on request.

Aug. 8, 1975. The Ontario Trilliums ARC assumed the responsibility of the VE3QSL Bureau. Box 157 Downsview, Ont. M3M 3A3.

Trillium Weekend Contest is open to all phone and CW operators and is held annually in November. With a trophy for the Trillium with highest score and certificates for runner up and 2 non members with highest score.

For certificate hunters, we offer an attractive Trillium Certificate for confirmation of six TOT members plus a fee of \$1.00. Members contact 12 members.



My previous articles have been mainly about my experiences on the larger ships. This time I will recount for you some details of life aboard deep-sea or salvage tugboats. The two on which I served were the *Lorne*, owned by Pacific Coyle Navigation Co. at Vancouver, and the *Anyox*, whose owners I have forgotten.

In both cases, these boats were used for towing Davis rafts from the Queen Charlotte Islands off the NW coast of B.C. to Ocean Falls and Vancouver. Davis rafts could be called wood icebergs, I suppose. They were formed in the shape of a large Churchill-like cigar composed of logs 40 feet long each, and ranging from about 2 to 5 feet in diameter (the logs, not the rafts). The logs were dumped into a cradle made of large 1½-inch wire cables; and as the raft grew in size, it submerged deeper in the water. When the raft was as large as the experts thought it should be, the wire cables were wrapped around the top to keep the whole raft compact. It tapered at both ends, making it look like a massive cigar. The idea was to make the raft a little more seaworthy than the more customary flat boom. The latter is a single layer

## Life on the ocean wave

Bill Deacon, VE3 BDO  
Ottawa, Ont.

of logs floating within a sort of log "fence". The problem with the flat boom is that it will not stand any waves, as the logs just bounce out of the boom and drift off to be swiped by log poachers.

Davis rafts couldn't stand a very substantial sea; and we faced quite a challenge trying to get across Hecate Straits that separates the Queen Charlottes from the B.C. mainland in the brief periods of relatively calm seas. This was why they carried a radio operator on board. The operator not only copied the formal weather reports, but also kept an ear open for ships in the general area so as to get actual reports on sea conditions, etc. It was worth the added expense of carrying a radio op, since the high grade spruce, known in those days as "airplane spruce", was worth \$2 per board foot FOB logging camp. Log poachers cruised the towing areas looking for loose logs, since they fetched a very fancy price from the mills in Vancouver.

In August of 1933 while on the beach (i.e. out of work), the Canadian Marconi Co. phoned to advise me that a tow-boat job was available for roughly 3 months at Pacific Coyle Navigation Co. I would work for PCN — not CMC — so I would not accumulate any seniority on the job; but the salary would be the same as at CMC. I accepted, and chased right down to Coal Harbour at Vancouver to sign on with the *SS Lorne* at the PCN office.

Upon joining the *Lorne*, I found that the Captain was not aboard, and the 1st Mate was very busy with the small crew getting the boat in shape for the trip. It had been tied up for a long period, and gear was scattered all over the deck.

I proceeded to the radio room which was somewhat small. The transmitter was the Canadian Marconi 100W4, putting out 100W CW and 50W AM phone or MCW. The receiver was the one I referred to in my first article back in the December issue of TCA. That's the one that developed an open audio transformer, if you recall. Anyway, the operator's accommodation obviously was not part of the radio room, so I looked for the First Mate to see if he knew where the operator's cabin was.

It was discovered back aft, below the deck, and was at that time acting as a storeroom for lanterns, pike poles, rope, shackles and you name it. The Mate told me I would have to clean it out, although he grudgingly allowed that he would have one of the deck-hands help me. What do you do when there's a depression and jobs are tight? You bet — I set to work cleaning all the junk and gear out of the very dirty cabin, following which I got a pail of water, soap and a scrubbing brush and proceeded to remove the accumulated grime off the bulkheads and deck. Since the boat was not sailing until the next day, I had all of that first day (oh, joy!!) to scrub down the "cabin" or rat hole so as to make it habitable. The Mate didn't seem to have a very high regard for radio operators, so it was not easy to secure much cooperation from him in getting help with my task. I did get some help from one of the deckhands for a short period, however.

The next day being sailing day, the Captain appeared aboard, so I introduced myself. He was a nice guy — a Norwegian — and I got along with him very well. However, he expected everyone to pitch in on any chore at any



time. I was required to provide a spell at the wheel, and when we were hitching up a tow I was expected to handle big steel cables along with the deckhands. One really annoying feature was that the Captain would not allow the steam-operated steering gear to be used except when he was manouvering the ship in a tight situation. This was because his cabin was right under the steering gear, and its use kept him awake. Direct steering was OK when towing, as the speed was only about 2 knots; but when we were sailing without a tow at about 8 or 9 knots, it got really tough to move the wheel.

We had a total crew of 10 on board, so the cook was able to provide us with pretty decent meals without having to rush with them. Also, for the group of 5 officers, he was very accommodating in meeting any special dietary requests. For example, I liked a lot of gravy on my roasts or chops, and Larry the cook always gave me that extra slosh of gravy on the plate, muttering in a friendly way that "you like your soup with your meat, Sparks".

It was quite an experience to be on a boat that did not have a flushing toilet. The toilet was situated in the after section of the deck housing at a point where there is low freeboard (i.e. the deck is close to the water); and contained an orthodox toilet bowl minus a cistern. Prior to entering its stately confines, one picked up a bucket with a rope attached thereto and put it overboard to bring up a full pail full of seawater. This, of course, was placed beside you prior to sitting down. Upon completion of your task, you dumped the bucket of water into the bowl and VOILA! the flush was performed in a very simple and effective fashion.

I must go back to my article in the April issue of TCA and recall that the toilet on the Chief Capilano was the only English type with the cistern above your head. You flushed by pulling a chain beside you. Due to the heavy weather on that voyage, if you let the cistern become full, it spilled over on you in heavy rolling of the ship, so you had to listen to the cistern filling; and, when it seemed to be pretty high, you immediately flushed before you could get showered. At the same time, the seas were pounding against the drain pipe from the toilet, forcing air and water back up to the "throne". It was one heck of an experience to come under a water attack both from top and bottom. The latter was solved by getting the ship's carpenter to turn a wooden plug on his lathe. This was placed in the bowl and acted as a buffer against the attacks from the bottom. There were none of these problems on the Lorne.

We proceeded to the J.R. Morgan Logging Co. camp in an inlet whose name I have forgotten. However, it is on the east coast of Moresby Island and a substantial distance south of Sandspit. The Davis raft was all ready to go; and we had simply to attach our tow line and head off with it. Of course, one doesn't "simply" attach a tow line. There is a lot of maneuvering of the boat and the attachment of shackles and bridles so that the force of the tow is spread across the forward part of the raft. This takes some little time and messing about. By the time we set off with the tow, we were all pretty pooped.

Now came all the activity on the part of the radio operator and the skipper to get weather reports and decide if it were safe to attempt a crossing of Hecate

Straights with this valuable load of logs. The details don't come clearly to me now, except to remember that the weather was felt to be not suitable for a crossing right then. We anchored in a cove close to coast line, so that we would be in a good position to make a dash (at the mighty speed of 2 knots) for it when the weather broke.

This was when I first learned to play chess. The second engineer, who wasn't substantially older than I, talked me into entering the fray with him. I know darned all about the game; but by the time that voyage was over I had learned a fair bit about it. We spent several days there just doing whatever we felt inclined to — mostly eating — while we waited for the break.

Eventually the time came to make our escape, so away we rushed at the 2-knot flat out rate across the Hecate Straits. To the best of my recollections, we got to the "mainland" around Caamano Sound, then worked a tortuous route around various islands to keep sheltered from any seas.

Every evening the skipper got on the radiotelephone to work the rest of the Pacific Coyle fleet. They all exchanged position reports together with a report on any events or problems of interest to the Head Office. The Marine Superintendent had a good antenna system and receiver in Vancouver; and he listened to these broadcasts every evening. You will readily recognize that the purpose of the exchanges between the two boats was not so much to keep the other captains abreast of events as it was to let the Superintendent know how his fleet was doing.

I had quite a scare one evening

while taking my watch at the wheel. We were in a narrow inlet, and the skipper had been at the wheel, using his searchlight to check out the distance to the shore. I didn't like that procedure, since one's eyes adjusted for the lighted area and didn't see the rest very well. As soon as he left the wheel house, I stuck my head out the wheel house window and got my eyes used to the dark. While concentrating very heavily on the uneven contours of the shoreline, the whole sky lit up with a brilliant green, prolonged flash — apparently a meteorite. I darned near rocketed out of the window in surprise. Naturally, my eyes were wide open when the flash occurred, so I got the full treatment from that event. It took a while for my pulse to slow down so that I could again enjoy the peace and quiet of plying a remote stretch of coastal water in that nearly uninhabited part of the B.C. coast. For the greater part of the time, all one hears in a late evening in those remote areas is the slow repetitive "thunking" of the reciprocating engine, the odd clink of a coffee mug, and the odd indistinguishable phrase uttered by someone below on the deck. It is indeed the perfect peace.

Crossing Millbank Sound and, later, Queen Charlotte Sound were not such relaxing experiences. The weather was borderline; and we did cross them without holding up. However, a pretty nervous Captain paced the deck and haunted the radio room with me as he assessed his chances of completing the crossings without losing some logs. We made it OK, and we dropped the tow finally near False Creek in Vancouver some 3 or 4 weeks after our initial departure from that beautiful city.

As soon as we had dropped the tow, we went to our company dock to load stores; and, in a matter of a few brief hours we were off to the Morgan camp again for another raft. We had a good crossing of Hecate Straits,

and we put out trolling lines to see if any stray salmon were wandering about under that wide expanse of water. Sure enough, we caught a beautiful big sock-eye salmon weighing about 25 or 30 lbs. Our meals for some time thereafter consisted of baked salmon, salmon steaks, salmon fillets, fish cakes; and, finally, fish chowder. Anyway, with no refrigeration in those days, that fresh fish was a nice change from meat.

We were tied up in a cove just north of Millbank Sound awaiting an easy of the wind and seas for its crossing. One day the Mate and the 2nd Engineer decided to try their luck at deer hunting; and they were kind (and also stupid) enough to take me along with them. I say that because with my inexperience, I am sure that any deer that may have been around were soon scared off with may awkward crashing through the bush. Anyway, we returned to the boat empty handed. Later that evening, I saw a little dug-out canoe approaching us, paddled by a bewhiskered but not old man. He was literally a hermit; and, having seen us with guns and no victims thereof, had decided that perhaps we would be willing to swap some of our meat for a big white goose he had brought along. The cook examined the bird with his practiced eye and decided that it would be a good trade, so the swap was made. I can't say that I was all that enthralled with the goose. However, it was a change of diet.

Eventually the skipper decided that conditions would permit us to make a dash across Millbank Sound, so off we went. It was the only time I saw him make a poor call. Suddenly, the wind picked up and was soon blowing a gale. We were sailing alongside of a small island that had a long narrow split protruding out into the channel; and that island was to leeward of us. The wind was slowly blowing us and the tow toward the island, and it now was getting dark. The tug had passed the spit as the wind blew us well

toward the island, so that the tow line started to slide over the spit. That was it!!

We found ourselves in a small cove, and as the boat maneuvered about, the glow of phosphorous stirred up by the propeller lit up rock within inches of our keel. We could do nothing but put out the anchor and wait for daybreak. Meantime, the skipper was beside himself with guilt at the thought of the raft breaking up on the shore on the other side of the spit.

At daybreak, we found the tide out; and we were surrounded by a myriad of ugly big rocks. How in the world we had maneuvered around there on the previous evening without having our hull ripped open is beyond comprehension. To our great relief, we saw the raft on the shore but still intact. To boil that story down to its essence, we got the raft OK, and went on to Powell River with it as if nothing had ever happened.

Two other incidents come to mind in my towing experience, both of them on the SS Anyox. This boat got the towing contract from J. R. Morgan some time after the Lorne jobs. The Anyox had been idle for quite some time, so that the company was not in too good financial shape (who was in the dirty Thirties??). The boilers had needed attention, mainly by getting some boiler tubes shipped over from Poland. However, finances held this project up; and when the contract became available, it was the equivalent of "Damn the torpedoes", etc., etc.

An old friend of mine who was and still is a very active ham was courting my sister at this time, and he had designed and installed the radio equipment on the Anyox. Hence, he also became its operator when it was in service. At this time, he had another shore job going, and, besides, he was campaigning my sister, so he invited me to take his place on the boat. This time, it was under better conditions — good accommodations, just some re-

lief steering, and running a winch when we were working on lines and tackle during hook-up and release of the tow.

We hadn't been underway more than perhaps 3 hours when I heard a mighty hiss, and saw the engine and boiler room crew scrambling out onto the deck. Steam was all over the place. One of the boilers had blown a tube.

The boys had been so startled they just dashed away from the hot steam, and no one thought to shut off the fires and the steam. The Chief Engineer quickly tied a heaving line around his waist so that he could be recovered if necessary, and he made his way through the steam, heat and racket to shut off the steam and turn off the fires. In the meantime, we had anchored, since we were going to lose power very shortly. Then came the miserable and tedious job of extracting the blown tube from that hot boiler and inserting one of the few spares that we had on board. It

wasn't very long before we had steam up again and continued underway. This happened again a couple of hours later; but thank goodness that was the last of that panic. On the second occasion, the boys knew what to do, so it wasn't the same schemozzle.

The other thing I remember about that ship is that my friend couldn't resist making the transmitter capable of operating on 40 metres. Operation from a ship wasn't permitted then, so I surprised some of my friends in Vancouver when I appeared on 40 with a weak signal (being shielded in narrow inlets or straights by high mountains on either side) using my own call (VE5KQ). There was nothing very exotic to work at that time, since we were nearly always in poor locations for HF transmission.

Well, that's about it. This isn't in the same ball park as the Orient adventures and so on; but it seemed like a good idea to try to portray to you the differences

in life on little tow boats as compared with that experienced on the bigger trans-Pacific jobs. Meantime, I will scrape down to the bottom of this frail old mind in an attempt to find some more recollections of happenings 50-odd years ago in the wireless world.

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## IMPORTANT NOTICE

Plan to attend the  
**CARF National Symposium**  
Saturday, October 15, 1983

at the Hotel Nova Scotian, in Halifax, Nova Scotia. This is your opportunity for direct input to DOC at the National level, and it comes only once a year. If you cannot attend, plan to have your club or organization present a brief to the symposium by submitting it by mail. Topics have not yet been chosen, so the door is open to you.

Send your papers to "CARF National Symposium, c/o Leigh Hawkes, P.O. Box 864, Armdale, Nova Scotia, B3L 4K5."

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# OSCAR 1983

## The Phase IIIB Transponders

Werner Haas, DJ5KQ

Seven days after launch, both transponders on the Phase IIIB satellite will start routine operation, signalling a new era in Amateur Radio communications. After a decade of development and improvement, the world's most advanced amateur communications satellite will undertake its most important mission: unifying the world's hams through the medium of radio in the spirit of world-wide hams cooperation that created the spacecraft (s/c) itself.

The new and exciting chapter in ham radio's history will begin just five days after an apogee kick motor hurls the s/c into a highly elliptical orbit, making the two on-board transponders accessible for up to 15 hours a day.

The launch failure of the Ariane 2 booster on May 23, 1980 and the resultant loss of the Phase IIIA satellite gave designers a chance to reconsider the configuration of the planned Phase IIIB unit. Two major changes resulted: a second transponder was added to allow operation in the L band (24-cm uplink/70-cm downlink)<sup>1</sup> as well as U band (70-cm uplink/2-m downlink)<sup>2</sup> and the solid-propellant kick motor was replaced by a liquid-propellant unit from the West German manufacturer Messerschmitt-Boelkow-Blohm (MBB). Changes have also been made to the two transponders to keep them current with the state of the art. Both units are now built on printed circuit boards. This facilitated construction of spare modules for the current s/c as well as boards for upcoming Phase III missions.

The functional block diagram (Fig. 1) shows both transponders, along with the control, switching, and on-board computer systems. The right-hand side of the

diagram shows the communications system with its high-gain and omnidirectional antennas, as well as the associated computer-controlled switching unit.

### The U-transponder: UHF up and VHF down

The U transponder (Fig. 2) is a linear converter with a 150-kHz bandwidth extending from 435.025 to 435.175 MHz on the uplink side and 145.825 to 145.975 MHz on the downlink. Also, two beacons operate through this transponder: a general or G-beacon at 145.810 MHz with information of general interest to s/c users as well as an engineering of E-beacon at 145.987 MHz with phase-shift keyed (PSK) 400-bit/s data about the satellite's internal systems. The maximum power output of the two-meter downlink is 50-watts PEP, or an average of 10 to 12 watts.

For a 20 dB s/n ratio on the two-meter downlink, the satellite

user must generate 21.5 dBW effective isotropic radiated power (EIRP) for the uhf uplink. This corresponds to a transmitter power of 10 watts into a 12-dBi antenna. For reception, an antenna with an excess of 10-dBi gain is recommended. This assumes a receiver noise figure of 5 dB and a bandwidth of 2.4 kHz. With an adequate receiver, the engineering beacon on two meters will be heard with a s/n ratio of at least 17 dB.

The input section of the U transponder (Fig. 3) consists of a 4-pole filter that offers more than 60-dB attenuation of the harmonically related two-meter downlink transmitter. Attenuation at 436 MHz is a modest 0.9 dB over a 50-MHz bandwidth.

Careful selection of the bipolar input transistor, a BFR 91A, has kept the converter's noise figure to 2.6 dB. Although a better figure could have been obtained with a metal-oxide semiconduc-

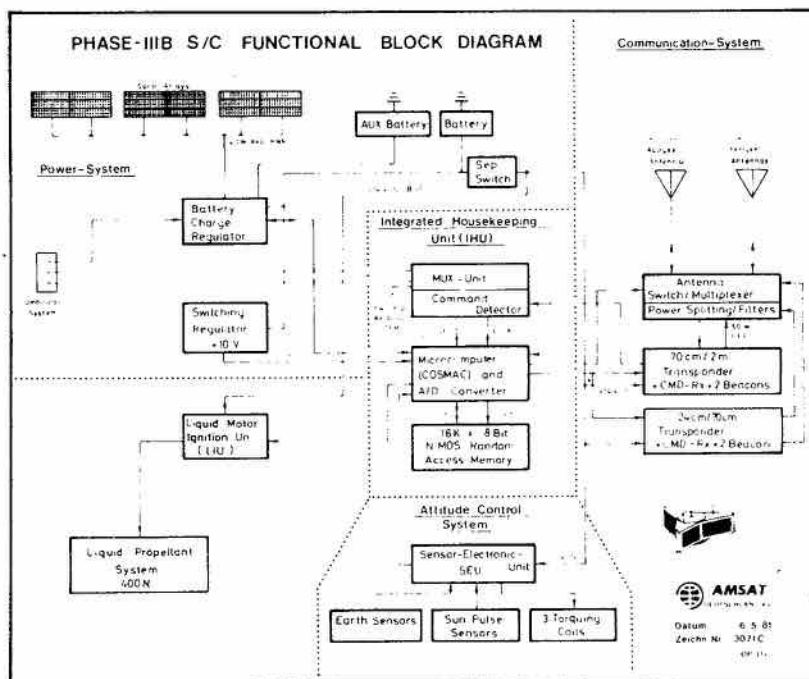


Fig. 1 — Phase IIIB functional block diagram.

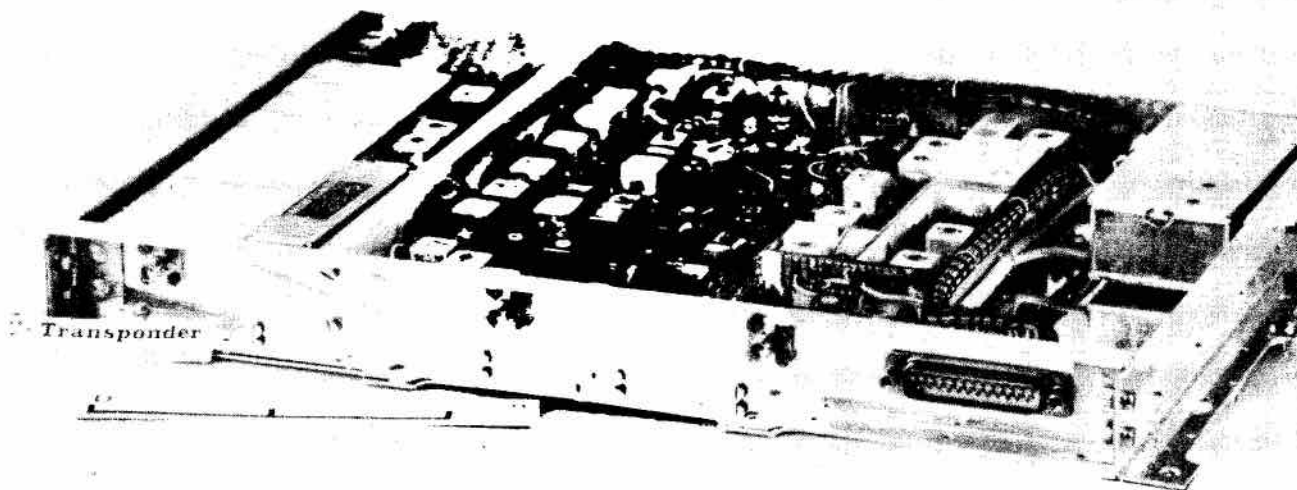


Fig. 2 — The U-transponder 435/145.9 MHz built by Werner Haas, DJ5KQ.

tor (MOS) transistor, those devices would be damaged by the intense radiation in the Phase IIIB orbit.

A two-stage converter mixes the 435-MHz input signal to 53 MHz and then to 10.7 MHz. At the latter intermediate frequency, the signal is passed through a radar-blanker that limits all pulses that exceed the peak level of the passband by 6 dB. A 10.7 MHz crystal filter, with a 150-kHz bandwidth, allows up to 50 simultaneous conversations (QSOs), assuming 3 kHz per station. However, due to the narrowband nature of many amateur transmissions, including cw and radio teletypewriter (RTTY), many more QSOs can be accommodated within the 150-kHz passband.

For image-frequency suppression, the signal is mixed to 28 MHz. At this frequency, the two beacon signals are introduced into the signal chain. The G-beacon transmits cw, RTTY with a 170-Hz shift, or PSK data at 400 bits/s. While transmissions from the G-beacon will be of considerable interest to the general amateur community, the E-beacon's PSK data will be of prin-

cipal interest to command stations. Demodulation and display of E-beacon data on a video monitor is described by Dr. Karl Meinzer, DJ4ZC, in the West

German publication *cq-DL*.

After linear amplification, the 28-MHz signal is supplied to an envelope demodulator. The amplitude component of the signal

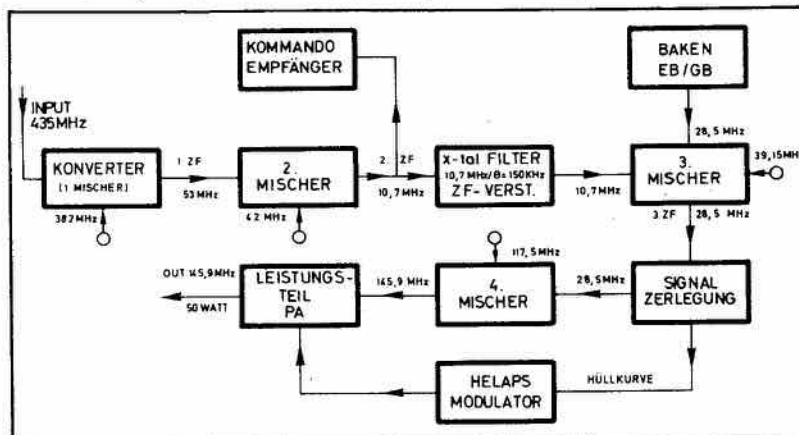


Fig. 3 — Simplified block diagram of the U-transponder.

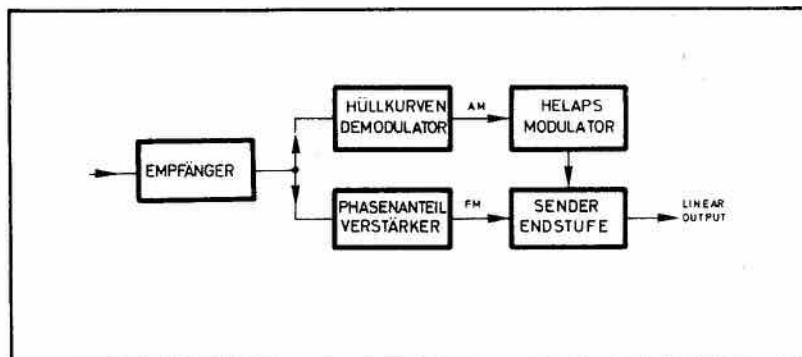


Fig. 4 — Envelope elimination and restoration (EER) diagram.

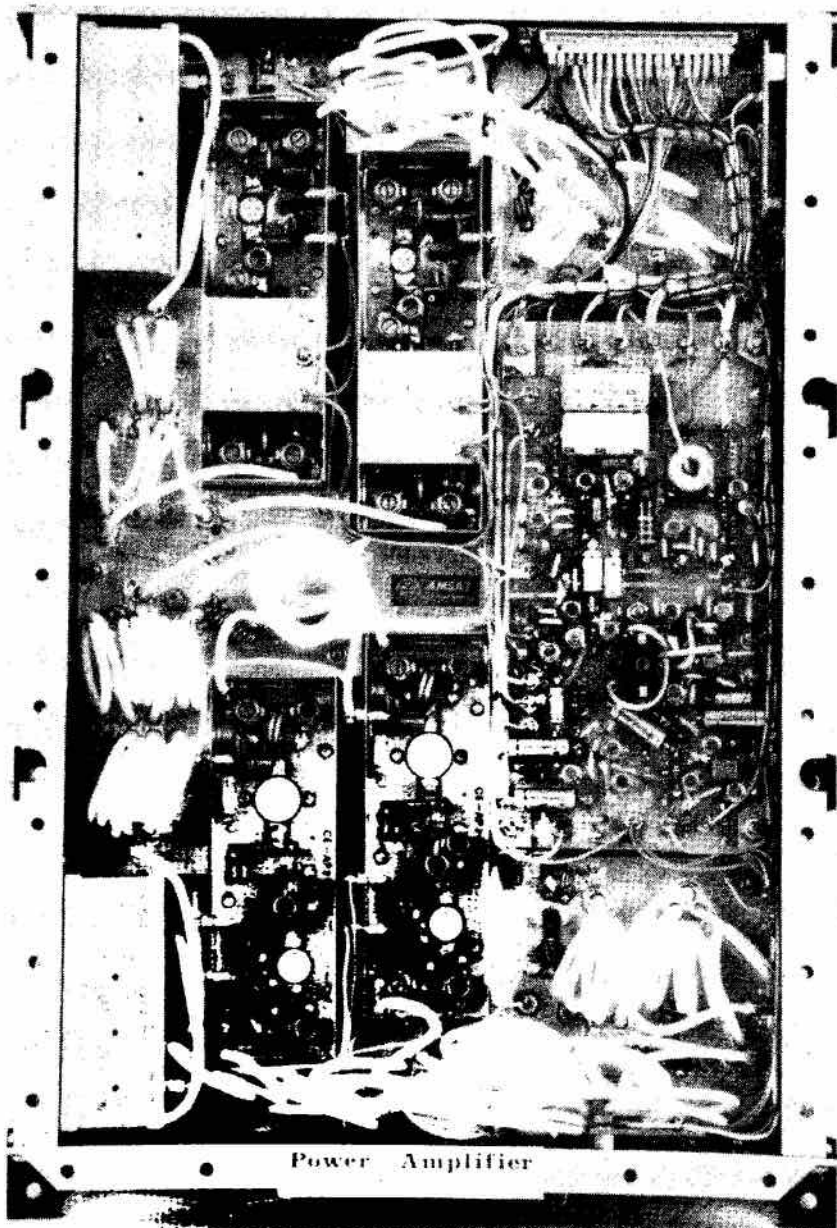


Fig. 5 — HELAPS Power Amplifier for U and L transponders built by DK4VW. Includes four transmitter power amplifiers by DL4FA.

is sent to the HELAPS (High-Efficiency Linear Amplification by Parametric Synthesis) modulator while the phase component arrives at a push-pull transmitter mixer through a multistage limiter.

When mixed with the output of a 17-MHz oscillator, the 28.5 MHz passband signal is converted to a 1-mW signal at 145 MHz. Not yet potent enough for transmission, the signal is boosted, by a two-stage amplifier, to 500 mW, the

power level needed to drive the final amplifier. The amplitude signal and the phase component are combined, within the final amplifier, into a linear signal output (Fig. 4).

The final-amplifier module (Fig. 5) includes a number of sub-assemblies for use by both the U and L transponders. The power amplifier for the U transponder uses two paralleled 25-watt PEP transistors. Amplifier efficiency, at 40 percent, is some three times

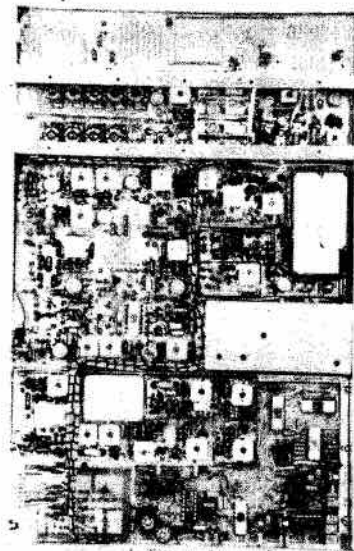


Fig. 6 — L-transponder 1296/435 built by DJ5KQ. Includes the front end with 800 kHz filter by DK5GB.

better than could be expected from a common linear amplifier. Parametric synthesis, the job of the HELAPS modulator, accounts for this significantly greater power output.

Crowded into the amplifier module, in addition to the two sets of solid-state finals, are the phasing lines (used to match those transistors), harmonic filters, and dc-to-dc converters. The receiver's automatic gain into the module, provides a 30-dB control range per transponder.

Completing the U-transponder package are right-hand circularly polarized antennas. Each has 8 dB of gain.

The communications system includes a separate command receiver (CMD) for the on-board computer. A portion of the 10.7-MHz signal is tapped from the U transponder ahead of its crystal filter. This signal is mixed to 9 MHz and is demodulated by a 3-kHz bandwidth ssb receiver. After some processing, the CMD signal is passed to the on-board computer. Search logic (afc) facilitates contact with the s/c by



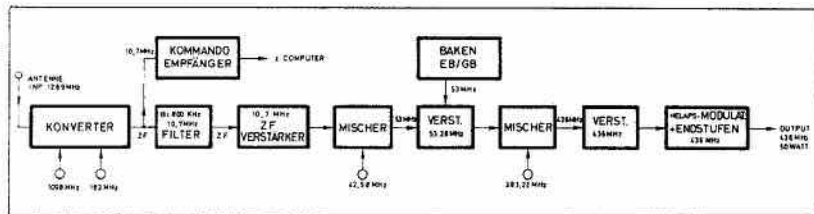


Fig. 7 — Simplified block diagram of the L-transponder.

ground-based command stations.

**The L Transponder: Ushering in OSCAR microwaves**

The 800-kHz bandwidth of the L transponder, from 1269.05 to 1269.85 MHz offers the satellite enthusiast as much operating space as the 15- and 20-meter hf bands combined. Downlink reception extends from 436.15 to 436.95 MHz in a band shared with a G-beacon at 436.05 MHz and an E-beacon at 436.02 MHz.

Although the transponder's maximum power output is 50 watts PEP, the average is approximately 10 to 12 watts.

Despite the distances that will often separate the ground-based

station and the satellite, uplink power requirements are relatively modest. At 24 cm, the user's station should be capable of generating an EIRP of 28.8 dBW. This corresponds to 3 watts from the transmitter into a 12-dBi antenna. Alternatively, 50 watts delivered to a 12-dBi antenna will produce the same results.

For reception of the uhf downlink, an antenna with greater than 13.5-dBi gain must be used. This assumes a receiver noise figure of 3dB and a 2.4 kHz bandwidth. With such a receiver, a monitoring station will enjoy a 17-dB signal from the engineering beacon.

The input to the L transponder consists of a double-conversion

strip-line circuit with a GaAs FET, the MGF 1402, used as the first rf amplifier. Despite the four-pole input filter used at the front-end, the noise figure here is just 3 dB.

Because industry was not able to supply a crystal filter with the required 800-kHz bandwidth and proper shape factor, a special 9-pole coil filter was developed for the 10.7 MHz i-f stage. Design considerations demanded that the ripple from this filter be small in order to achieve flat response across the entire passband through the i-f amplifier stage.

The wideband linear i-f amplifier boosts passband signals by 40 dB. The following mixer stage converts the 10.7-MHz i-f signal up to 53 MHz. It is in this mixer that the two 436-MHz beacon signals are injected. Yet another mixer, this one with an injection frequency of 38 MHz, converts the linear 53-MHz signal to 436 MHz. Finally, a two-stage amplifier boosts the signal to 0.5 watts of driver power output. Signal disassembly, for the HELAPS modulation technique, takes place within the 50-watt PEP power amplifier.

The L-band command receiver makes use of the transponder's i-f stage, tapping some of the signal just prior to the 10.7-MHz filter. Following conversion, in a separate mixer, to 9 MHz and shaping through a crystal filter, the 24-cm command signal is processed by a dedicated 3-kHz bandwidth ssb receiver. The output is then directed to the on-board computer.

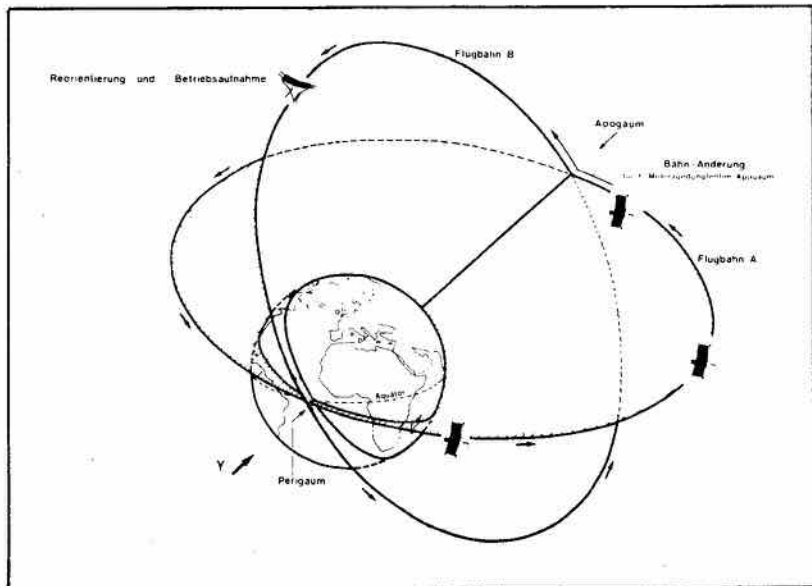


Fig. 8 — Phase III B reorientation and operation.

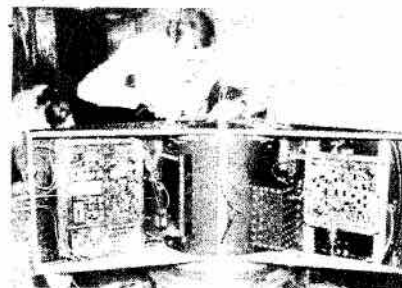


Fig. 9 — Phase 111B shown in the open state. The L-transponder is shown at the left of the photograph.

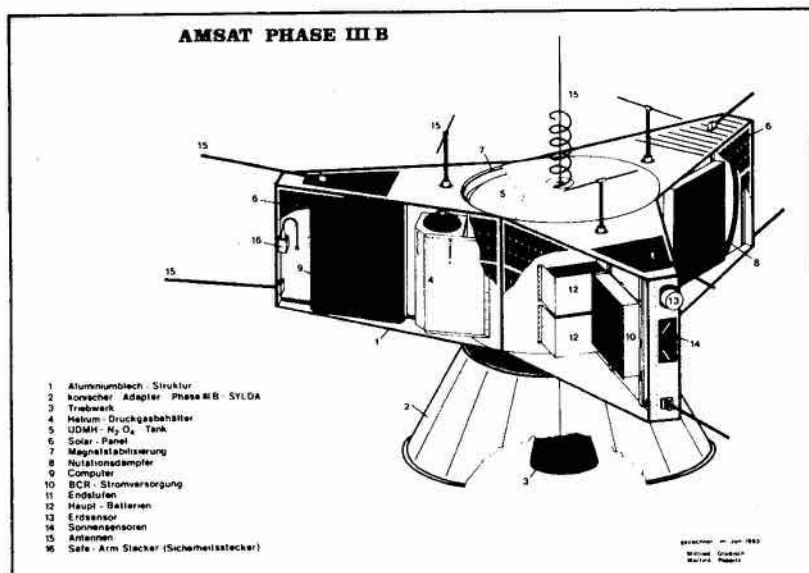
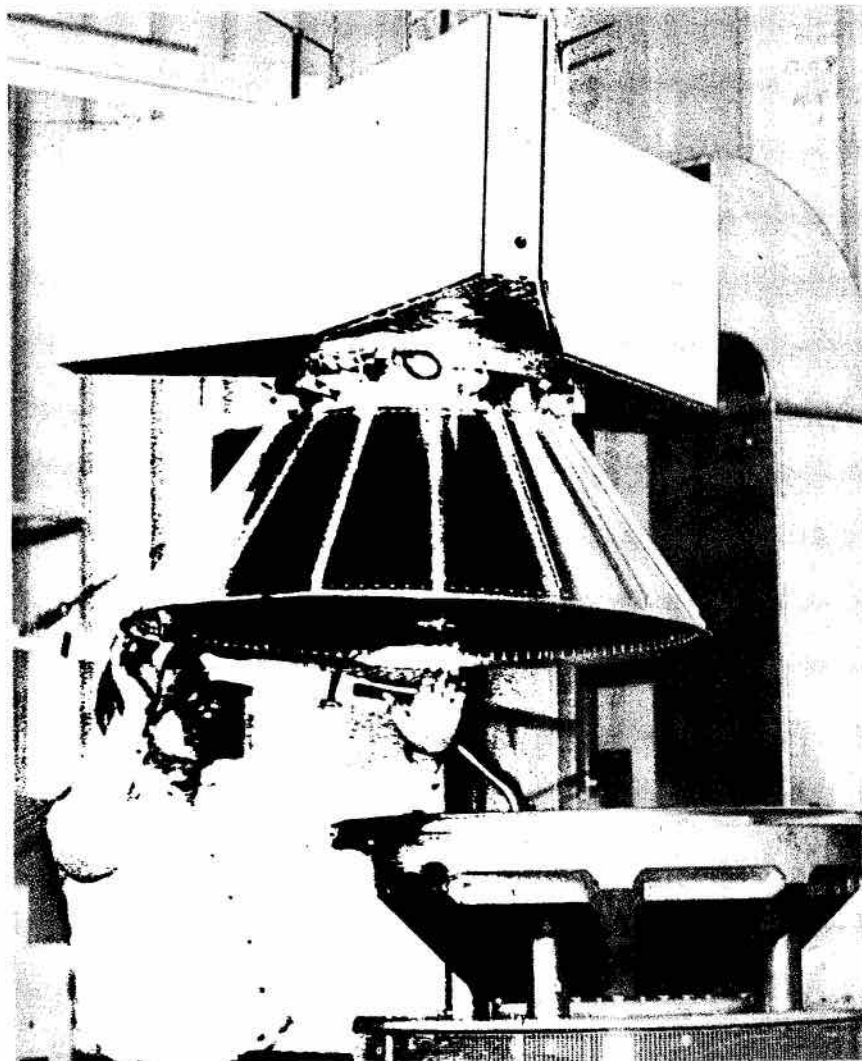


Fig. 10 — Schematic view of the Phase III B satellite.



Konrad Mueller of AMSAT-2 prepares to mate Phase III B and attach fitting to shake table test rig in West Germany, October, 1982. The solar panels have protective covers in place.

**Translation for Figure 3.**

- konverter*: converter
- mischer*: mixer
- kommando*: command
- empfänger*: receiver
- ZF*: i-f
- ZF-verts.*: i-f amplifier
- baken*: beacons
- zerlegung*: decomposition, analysis
- hüllkurve*: envelope curve
- leistungsteil*: high efficiency stage

**Translation for Figure 4.**

- phasenteil*: phase component
- verstärker*: amplifier
- sender*: transmitter
- endstuf*: final stage

**Translation for Figure 7.**

- z. computer*: to computer

**Translation for Figure 8.**

- perigaum*: perigee
- apogaum*: apogee
- reorientierung*: reorientation
- vor*: before
- motorzündung*: motor ignition
- nach*: after
- bahn-änderung*: orbit alteration
- tage*: days
- betriebsaufnahme*: activity beginning (start of business)

**Translation for Figure 10 with remarks**

*(Editors note. The helix on the spacecraft should in fact show a right-hand helix; the drawing shows left)*

- aluminiumblech struktur*: aluminum plate structure
- konischer adapter*: conical adapter
- triebwerk*: motor
- druckgasbehälter*: pressurized gas reservoir
- magnetstabilisierung*: magnetic stabilizers
- nutationsdämpfer*: nutation dampner
- BCR stromversorgung*: battery charge regulator
- endstufen*: final stages
- haupt batterien*: primary batteries
- erdsensor*: earth sensor
- sonnensensoren*: sun sensors
- safe - arm stecker*: safe/arm plug

Translation: R. Gape

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# Oscar Satellites, Amateur Radio in Space

J.M. Henry VE2VQ  
Amsat-Canada, Vanier, Ontario

## Abstract

*This paper discusses the history of amateur radio in space and the launch opportunities provided by American and Russian authorities. System details of 19 amateur radio satellites are provided, with emphasis on Canadian participation.*

## 1.0 History of Amateur Radio Satellites

Twenty-two years ago, in December 1961, just four years after the launch of "Sputnik 1", PROJECT OSCAR, comprising a small group of volunteers, constructed the first of a series of "OSCAR" satellites (for Orbiting Satellite Carrying Amateur Radio) dedicated to the amateur radio service.

OSCAR 1 was carried as a secondary package aboard Discoverer 36. When released, it entered a slightly elliptical (430 Km by 245 Km) polar orbit. Noting the achievement, then American Vice-President Lyndon B. Johnson, termed OSCAR 1: "a symbol of freedom and participation on the part of individuals throughout the world". NASA called it "our international ambassador of good will."

OSCAR 1 had a limited battery life; nevertheless, more than 5000 individual observations were logged by some 450 stations in 44 states and 28 countries during its eighteen day life. The beacon sent a continuous series of "Hi . . . Hi's" in Morse code. By timing a series of ten consecutive "Hi's", the observer could determine internal baseplate temperature. After the first few orbits the satellite temperature stabilized at just over 50 degrees C until the end of life, when the batteries failed.

It was housed in an aluminum box with a quarter-wave monopole antenna centered on the largest flat surface. The ten pound package contained three 18 volt mercury batteries, a temperature sensitive keyer, a crystal oscillator

and a multiplexer rated for 140 mW at 144.980MHz.

It provided an opportunity for amateurs to learn tracking skills, measure doppler effects and the use of telemetdata.

OSCAR 2 was launched six months later on 2 June 1962, attached to a U.S. Air Force vehicle. Although very similar to OSCAR 1, modifications kept internal temperature within a more suitable range (10 to 20 degrees C) until the final few orbits, when atmospheric drag caused a sudden heat buildup. Modulation measurements of signal amplitude clearly indicated the satellite was rolling once every 66 seconds. The last known orbit was number 295.

Based on the success of these first two simple telemetry satellites, PROJECT OSCAR next build a satellite which would operate as a VHF repeater in orbit. Communications would then be possible at VHF frequencies across a greater range than is possible at the earth's surface.

OSCAR 3 was launched 9 march 1965, into a higher and more stable orbit, averaging 920 kms. It became the world's first open access satellite. The transponder had an input frequency of  $144.10 \pm 0.025$  MHz and provided a 1 watt p.e.p. output at  $145.90 \pm 0.025$  (50 KHz bandwidth), plus two beacons. Many hundreds of transmitting earth stations could be heard working the satellite. This was a new experience for them and only a few actually completed a full two-way contact. Successful attempts included several transatlantic and Hawaii-U.S. mainland contacts. With practice, more amateurs learned to communicate via this short-lived satellite. Their ability to predict, locate, track and measure satellite parameters was improving. OSCAR 3's beacon reported battery voltage and two separate temperature points.

One solar cell-powered beacon, which had been designed to last several years, failed during launch.

The narrow band-width transponder lasted only 16 days owing to battery limitations, but the second beacon continued to operate another 4 months.

OSCAR 4 was launched 21 December 1965, aboard a Titan III, and was intended to drift slowly in a near-synchronous orbit. Instead, failure of the third stage left the satellite in a highly elliptical transfer orbit; 33355 km by 169 km. The low perigee would reduce useful life to several months. On this satellite, the transponder operated on two separate amateur bands to allow full duplex operation. The 3 watt transmitter had a bandwidth of only 10 kHz. The first American-Russian (Estonia) contact was just one of the many long range two-way contacts achieved with this satellite. OSCAR 4 was the first amateur radio satellite designed to be controlled by a terrestrial command station.

Meanwhile, a new group of engineers and enthusiasts in the Washington, D.C. area had formed a group called AMSAT; the Amateur Radio Satellite Corporation. With NASA granting another launch opportunity, the next satellite was built around a structure submitted by the Australians.

OSCAR 5 was launched by NASA 23 January 1970, on an operational weather satellite (ITOS 1) and inserted into a stable 1450 km polar orbit. This satellite did not contain a transponder, but did incorporate many innovations. Beacons transmitting at 144.05 MHz and 29.450 MHz were of great interest during periods of high solar activity. The 10 meter beacon could be received on all modern communications and amateur radio receivers.

OSCAR 5 contained two large magnets, which caused the satellite to align itself with the North/South poles. The effect was a gyroscopic stabilization at two revolutions per orbit, thus dampening initial roll and spin moments.

As this was only the second Aus-



tralian effort in space, the success captured headlines in the Australian media for several days.

OSCAR 6 was launched 15 October 1972 and was an instant success. Within the first few orbits, successful contacts between points as distant as 6000 km were made. Input to the transponder was at 145.950 MHz and output at 29.500 MHz, with 100 kHz BW. It was soon loaded with experiments using CW, SSB, slowscan TV, FM and many other modes of transmission.

The satellite could be tracked for a maximum of 25 minutes. Although OSCAR 6 demonstrated both thermal and power limitation problems, the ability to command and control the satellite extended its useful life to over 4 years.

OSCAR 6 contained a 24-channel telemetry system. Individually numbered frames (groups) were transmitted in Morse code; thus anyone who could read numbers in this code could copy the telemetry. By referring to conversion algorithms, the listener could follow the day-to-day life of a satellite.

With the success of OSCARs 5 and 6, many international offers were made to Amsat Washington to assist in the building of succeeding satellites. The next satellite would contain systems from four nations, as follows:

1. Australian-redundant command decoders and telemetry encoder.
2. Canada — 435.1 MHz, 100 mw Beacon
3. Germany — 432/145.9 MHz transponder, morse code telemetry encoder, logic control
4. U.S.A. — 145/29.5 MHz transponder, morse code telemetry encoder, logic control, switching regulator, solar panels, batteries, support structure and code store.

The amateur radio satellite had become sophisticated. It now required professional expertise in design, assembly and testing.

OSCAR 7, launched 15 November 1974, was the first amateur radio satellite to contain two transponders. Then, with two active satellites in similar orbits, it was possible to experiment with a satellite-to-satellite hop; i.e., 432 to 145.9 MHz via OSCAR 7, then 145.9 to 29.5 MHz via OSCAR 6.

OSCAR 7 was the first satellite to provide telemetry in FSK, to contain an internal clock set to change transponder modes and an "S" band (2304 MHz) beacon. Showing signs of degradation, the satellite nevertheless remained useful until approximately June 1981.

The Canadian 435.1 MHz beacon was heard again late in 1982. Internal shorting of the NiCd batteries during maximum eclipse periods appears to have been the reason for OSCAR 7's demise.

OSCAR 8 was developed as a replacement for OSCAR 6 and is still operating. It was launched by NASA 5 March 1978. It contains, besides a 145.9 to 29.4 MHz transponder, a new 145.9 to 435.1 MHz transponder developed by members of Amsat-Japan.

Rumours had long circulated that the Russians planned to launch an amateur radio satellite which would be designated: "RS" ("Radio-Sport). Cosmos 1045 was launched 26 October 1978 from Plesetsk, together with satellites RS1 and RS2.

The very high sensitivity of these two satellites, compared to previous OSCARS, resulted in many radio operators using uplink levels that would automatically cause transponder shutdown. A Soviet command station then had to reactivate the satellite. Radiation damage and battery problems caused the early loss of RS2. RS1 lasted about four months. The RS1

beacon has been identified from time to time over the past four years.

WOSAT OSCAR 9 was launched 4 October 1981. This experimental Amateur radio satellite contained a series of intriguing new experiments developed by the University of Surrey, in England and by AMSAT. These included magnetometers; a CCD cloud scanning experiment; a digitalker data readout; radiation detectors; 2.4 and 10.47 GHz beacons; coherent 7, 14, 21 and 29 MHz ionospheric beacons . . . , just to name a few. The saga of UOSAT OSCAR 9 was to prove even more exciting than expected.

First, they had problems commanding the spacecraft owing to a software error that had failed to surface during all the assembly and pre-launch tests. In April 1982, again owing to an apparent software error, both the 145.825 and 435.025 MHz beacons were commanded 'on'. Both command receivers were now desensitized by the beacons and the satellite was locked out from receiving any further commands. The search was on for a high EIRP station to overcome the desensing problem and order the beacons to shut down. Even Amateur stations capable of communications via moon-bounce proved inadequate. Attempts to command UOSAT using the SRI 46 m antenna at Stamford, California proved unsuccessful at 435 MHz. Finally, armed with updated orbital projections to help aim this large antenna, a command from SRI effected a shutdown in September 1982.

A quick check of the satellite revealed the satellite had weathered the lockout with no adverse effects. This error caused an important loss of six months preparation and project time.

A sudden announcement by the Russians of a launch of six Amateur

radio satellites on 17 December 1981 was received with some disbelief. Radar tracks and radio signals soon confirmed that RS3 through RS8 had been placed in orbit in a single launch. The first three, RS3, RS4 and RS5, contain beacons for identification and telemetry, and a robot. This station receives, repeats the call heard and sends a preset message. The second three, RS6, RS7 and RS8, are normal transponder satellites with telemetry beacons. All six satellites are active as of March 1983.

Russian Cosmonauts released two additional low orbit "ISKRA;" satellites from their SOYUZ space station in 1982, (see Table 1). Neither satellite lasted more than a few weeks.

System details of the 19 Amateur radio satellites as of March 1983 are presented in Table 1.

### 2.0 AMSAT

AMSAT is both a project and membership-oriented organization. With funds generated by membership dues, industry contributions and launches supplied by NASA and ESA, AMSAT has increased the complexity, scope and longevity of its satellites. Education and access to 300,000 licenced Americans are two reasons for NASA's support. AMSAT has affiliations in more than twenty overseas countries. Seven countries have contributed subsystems for OSCARS to date.

### 3.0 AMSAT-CANADA

Until 1978, AMSAT-Canada was presided by A.E. Welling, VE3HD of Scarborough, Ontario. In 1978 there seemed to be a possibility of incorporating an experimental transponder with a large Hughes test platform which was to be launched into geostationary orbit. A project proposal was made, but the Hughes Syncom IV project, as it was called, was later dropped. The "Radio Amateur Satellite Association, Canada", later to be known as AMSAT-Canada, was federally incorporated in 1979. The proposal originally prepared for Hughes has now become the basis for the design of a number of spacecraft communication subsystems.

The transponder, as proposed by AMSAT-CANADA, would be mounted on the host satellite and share its power bus and antenna platform. It consists of twenty four subsystems, to achieve a fully redundant input and output configuration. The following describes four units which would be built into nine of these subsystems.

#### 3.1 Power Conditioner

This unit conditions the raw 30-volt satellite power; provides input voltage limiting; provides conversion to two separate system voltages, and interfaces with the onboard microprocessor for telemetry and control. The first unit met all design goals. It provided 85% conversion of the 30

volt, 1 amp input. Art Childerhose, VE3 CGD, designed the Power Conditioner.

#### 3.2 Control and Power Switching

Under CPU control, this unit activates all transponder subsystems. The power load to each subsystem is switched and monitored individually, thus failed units are locked out and their standby switched in as need arises. This unit can also disconnect and limit the effects of a total system collapse. Ray Bonnycastle, VE3 FUA, designed the Control and Power Switching Unit.

#### 3.3 Linear IF Modules

These redundant IF amplifiers provide 98dB gain and are the heart of the communications systems design. Requirements include high dynamic range and low noise and out-of-band immunity. These were achieved by using a dual 30MHz 4-pole monolithic crystal with an integrated circuit amplifier. A 10dB post amplifier had to be added to the four engineering models so they would match breadboard performance. W. Rolfe, VE3 BJO, designed and tested the Linear IF Module.

#### 3.4 Central Processing and Command Unit

The CPC is a fully redundant stand-alone microprocessor which controls all onboard functions. Each CPC receives com-

TABLE 1 — SUMMARY OF AMATEUR RADIO SATELLITES

| SATELLITE INFORMATION | OSCAR 1    | OSCAR 2    | OSCAR 3         | OSCAR 4         | OSCAR 5    | OSCAR 6         | OSCAR 7         | OSCAR 8         | RS1-2           | OSCAR 9(1)      | RS3 to 8 (Ref. RS6) | ISKRA 2         | ISKRA 3         |
|-----------------------|------------|------------|-----------------|-----------------|------------|-----------------|-----------------|-----------------|-----------------|-----------------|---------------------|-----------------|-----------------|
| Launch Date           | 61-12-12   | 62-06-02   | 65-03-09        | 65-12-21        | 70-01-23   | 72-10-15        | 74-11-15        | 78-03-05        | 78-10-26        | 81-10-04        | 81-12-17            | 82-05-17        | 82-11-18        |
| Useful Life           | 18 days    | 18 days    | 16 days         | 04 months       | 46 days    | 04 yrs 8 ms     | 6.6 years       | Active          | 04 months       | Active          | Active              | 53 days         | 36 days         |
| Apogee (km)           | 431        | 384        | 936             | 33355           | 1472       | 1468            | 1456            | 933             | 1724            | 536             | 1690                | 345             | 350             |
| Perigee (km)          | 245        | 208        | 904             | 168             | 1430       | 1452            | 1440            | 922             | 1688            | 533             | 1593                | 342             |                 |
| Period (mins)         | 91.1       | 90.5       | 103.5           | 587             | 115        | 115             | 115             | 103.4           | 120.4           | 95.48           | 118.8               | 91.34           | 91.61           |
| Inclination (°)       | 81.2       | 74.3       | 70.1            | 26.8            | 101.9      | 101.6           | 101.7           | 99.4            | 82.5            | 97.46           | 82.96               | 51.6            | 51.6            |
| Size (cm)             | 36x35x15   | 30x35x15   | 45x25x18        |                 | 44x25x15   | 44x25x15        | 351Hx3x33       | 38x38x33        | 39x42           | 42x42x74        |                     | 50x40           | 50x40           |
| Weight (kg)           | 4.5        | 4.5        | 15              | 13.2            | 17.7       | 18              | 29              | 27              | 40              | 54              | 40                  | 28              | 28              |
| Power                 | Batt. only | Batt. only | Solar + Battery | Solar + Battery | Battery    | Solar - Battery | Solar + Battery | Solar + Battery | Solar + Battery | Solar + Battery | Solar + Battery     | Solar + Battery | Solar + Battery |
| Beacon Freq. (MHz)    | 144.98     | 145.85     | 431.9           | 144/29.45       | 435/29.45  | 435.1/145.9     | 435.1/29.4      | 29.401          | 435/145.9       | 29.45           | 29.578              | 29.583          |                 |
| Beacon Power          | 100 mW     | 100 mW     | 30 mW           |                 | 100/250 mW | 300/200 mW      | 5/29.5          |                 |                 | 650/350 mW      | 100 mW              | 1 W (2)         | 1 W             |
| Transponder U/L       | —          | —          | 144.1 MHz       | 144.1           | —          | 145.95          | 432/145.9       | —               | 145.892         | —               | 145.930             | 21.250          |                 |
| Bandwidth             | —          | —          | 50 kHz          | 10 kHz          | —          | 100 kHz         | 500/100 kHz     | 100/100 kHz     | 45 kHz          | —               | 40 kHz              | 40 kHz          |                 |
| Transponder Tx Power  | —          | —          | 145.9           | 431.9           | —          | 29.50           | —               | —               | 29.372          | —               | 29.430              | 29.600          |                 |
| Telemetry             | 1 ch-Temp  | 1 ch-Temp  | 3 chs.          | 3 W             | —          | 1.3 W           | 8 W/2 W         | 4 W/1 W         | 1 W             | —               | 1.5 W               |                 |                 |
|                       |            |            |                 |                 |            | 24 chs          | 24 chs + 60     | 6 chs           | 30 chs          | 60 chs          | 35                  | 35              |                 |

The above information is based on AMSAT and ARRI documents.

NOTES:

- 1) UOSAT/OSCAR 9 contains H.F. beacons at 7.050, 14.002, 21.002, 29.510 and microwave beacons at 2401 & 10.426-MHz.
- 2) ISKRA 2 transponder was not operational owing to systems problems. ISKRA 3 transponder was operational over Russia only.

mands and returns telemetry to the command station via separate telemetry links. From sixteen control ports, various subsystems are activated or turned off according to CPS (para 3.2) program control. Operational status is monitored by 16 binary and 24 digitized analog channels. This unit can operate independently of ground control to keep the spacecraft in an operational mode.

#### 4.0 Canadian Participation

Canadian Amateurs have participated in all Amateur radio satellite activities since the beginning. The communications coordinator for the OSCAR 1 launch, T. Lott, VE2 AGF, is a Canadian who was then employed in California. The Canadian coordinator for both OSCARs 1 and 2, G. Wightman, VE5XU, of Regina, is just as active in satellites now as he was 22 years ago.

With the launch of OSCARs 6 and 7, hundreds of Canadians have had the opportunity to experiment and communicate with radio amateurs in the Americas, Europe, Africa and Japan.

Educational programs are available to demonstrate space communication techniques and some principles of physics. The Xerox corporation monthly "Current Science" dated October 1978 published a special issue incorporating a record containing voices of operator working satellite experiments and an article with background information. Demonstrations by Canadian Amateurs have been made in numerous places, including one by AMSAT-Canada at the new Toronto City Hall Plaza.

Tests conducted by DOC/CRC using the AMSAT OSCAR 6 and 7 helped to establish the design of the current series of planned SARSAT/COSPAR satellites. These satellites will retransmit the emergency location transmitted (ELT) signals from an aircraft in distress. The position of the ELT is determined by computer processing doppler information.

The high precision separation

rings for OSCAR 8 were made by B.C. deKat, VE3 CPB, of Lynden, Ontario. The OSCAR 7 435.1 MHz beacon was constructed and tested by L.S. Kayser, (ex VE3QB), R. Bonnycastle, VE3 FUA, and R. Archer, VE3CNM; all of Ottawa, and R. Pepper, VE2AO, of Montreal. OSCARs 6, 7 and 8 have been commanded and controlled by three Canadians; L.S. Kayser, R. Smith, VE1 SAT, and now D. Oman VE3 HRC, as part of the worldwide AMSAT operations network.

#### 5.0 Closing

AMSAT tested the next satellite due to be launched in June 1983 by ESA from Kourou, French Guiana. It was placed into an elliptical orbit much like those of the Russian Molynia orbits. This makes it available for communications in the northern hemisphere for six to ten hours per orbit. On certain orbits, Canadians will be able to communicate with Australian or even South African operators. This satellite is intended to last up to seven years. Information is available from the following addresses:

a) AMSAT, Box 27, Washington, D.C., 20044, U.S.A.

b) AMSAT-Canada, Box 7306, Vanier, Ontario, Canada, K1L 8E4.

#### 6.0 Acknowledgements

I wish to thank G. Roach, VE3 BNO, M. Gold, VE3 KHG, and Paul Fournier for their assistance in the preparation of this paper. Particular reference is made to the many and continuing articles detailing and supporting AMSAT activities in the ARRL monthly publication QST. The AMSAT journals, originally known as the "AMSAT Newsletter", (quarterly), and after 1979, as: "ORBIT" (bi-monthly), and ASR (Amsat Satellite Report), were an invaluable source of information for this paper.

#### About the Author

J.M. Henry is a P. Eng. (Quebec) with a B.A. Sc. (Electrical Engineering) from the University of Ottawa 1973. He is presently employed by Telesat Canada, Business Development Department. First introduced to Amateur Radio in 1957, and licensed in 1970, John holds an advanced certificate and licence VE2VQ. He is president of AMSAT-Canada and an elected director of the Board of AMSAT, Washington, D.C. John is also a past President of CARF.

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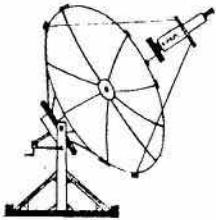
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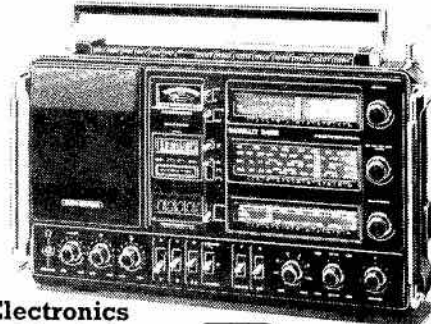
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P.O. Box 356, Kingston, Ontario, Canada K7L 4W2

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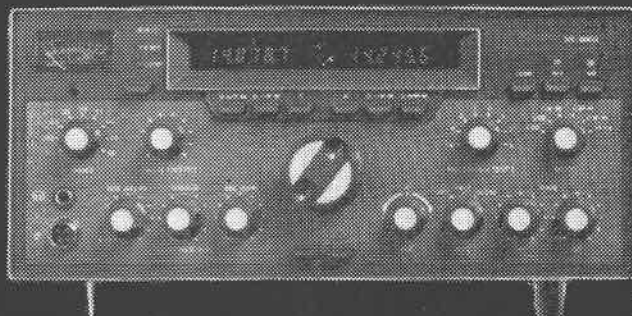
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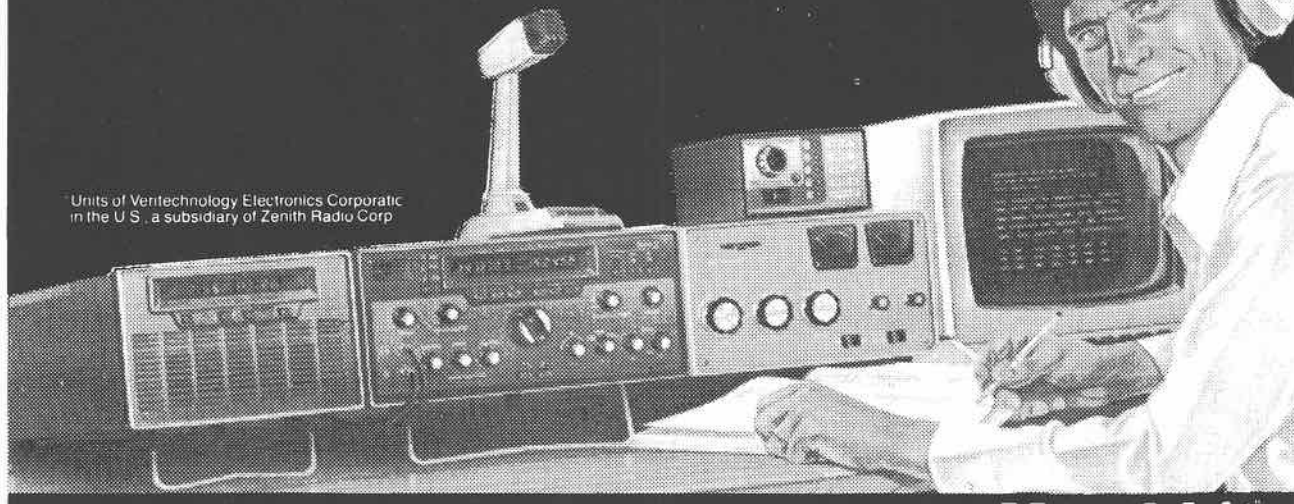


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AM-429

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