

# TCA



JANUARY 1985

The Canadian Amateur  
Radio Magazine  
La Revue des Radio  
Amateurs Canadiens

## THEY WORK THE CP RAILWAY LINE!

Story Page 31



Cover Photo— left to right: Ron Patterson VE2GMT, Keith Baker VE2XL, Michael Ross VE2DUB, Solange Charlebois VE2GUZ and Pascal Charlebois VE2HAD.

## THE POPE CAME TO OTTAWA

Story Page 18

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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.

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The Canadian Amateur Radio Federation, Inc. is incorporated and operates under a federal charter, with the following objectives:

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;
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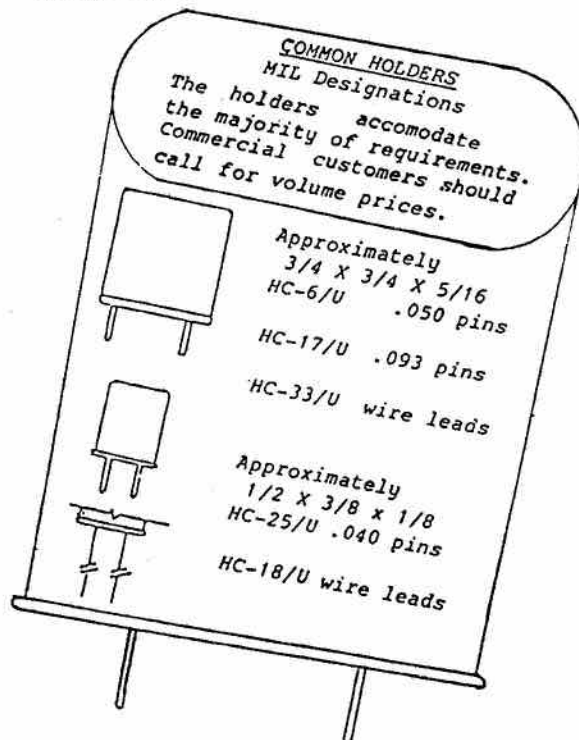
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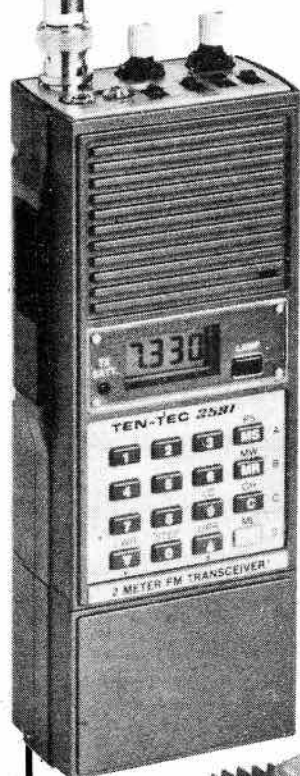




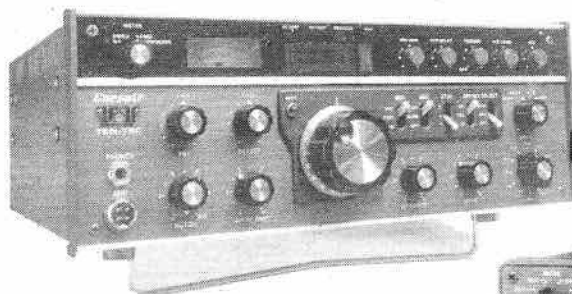


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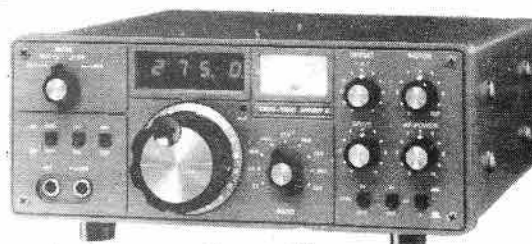
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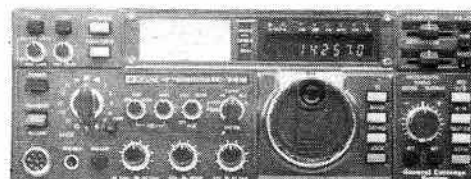
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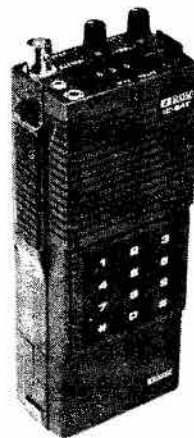
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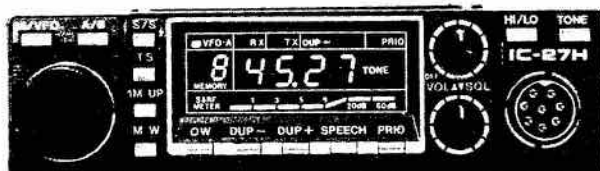
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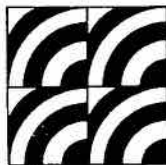
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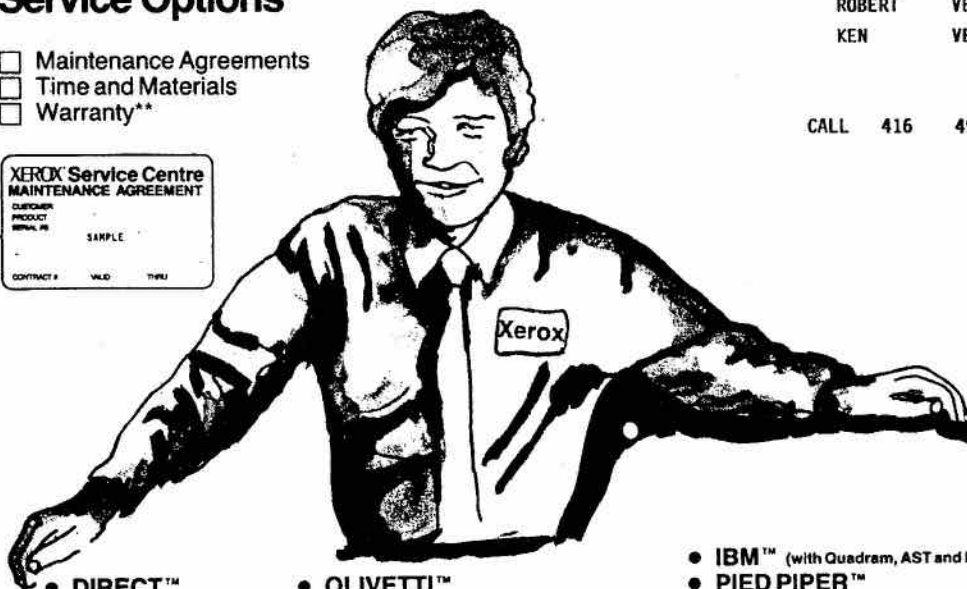
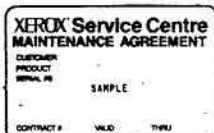
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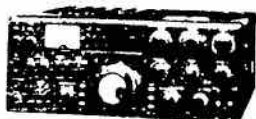
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All our leading products have at least two things in common: each one was designed by an accomplished Ham and has been widely accepted for many years by Amateurs, Commercial and Military communicators alike, both in the US and at least 50 countries around the world.

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The W2VS Traps (antenna coils) were developed by Fred Reynolds, W2VS, over 18 years ago. They are in wide use around the world by Hams and commercial operations. For example, they are used in the multi-band communication rigs of a number of pipe-line companies and others who must coordinate multiple site operations.

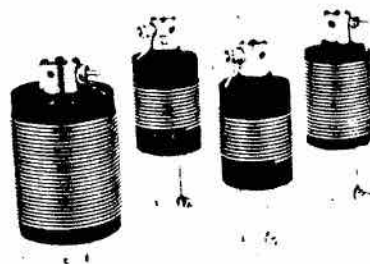
The *Inline Coaxial Relays* had their beginnings in 1961, when Sam Lackoff, W1NBB, designed and built some to eliminate multiple cables on his antenna farm in Manchester, New Hampshire (the original relays are still operating, incidentally). Egged on by requests from other amateurs, Sam went into production and, over the years, created a whole system of relays which can be used to remotely select from up to nine antennas and perform a lot of other useful chores to eliminate tower climbing. Although Amateurs make up the largest group of users, these relays are also extensively used in commercial, industrial, CATV, and marine radio systems.

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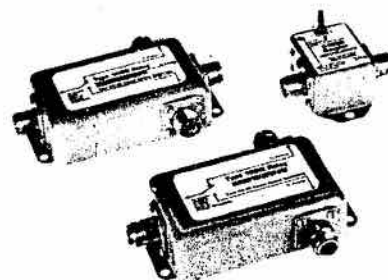
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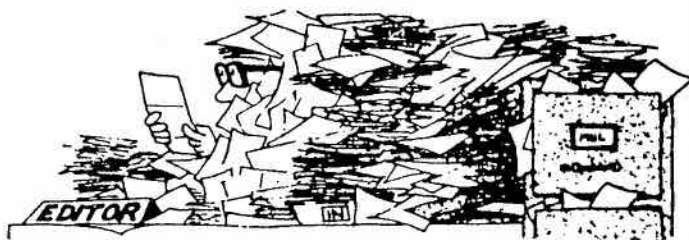
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# LETTERS



## YOUNGEST CANADIAN AMATEUR

I just received my October TCA. I usually read it from cover to cover. One little article in this issue caught my attention and prompted me to write to you.

The article is entitled "Youngest Canadian Amateur." You give me the impression that this young lad is the youngest Canadian to receive his Amateur licence. Yet in the October 1981 issue of QST there is an article about a young lady of 11 obtaining her Amateur licence.

I don't want to degrade this young 13-year-old from his achievement—I think it is great. But I would like to see that the editor of the magazine gets the facts right.

Keith Perry VE7BRO  
Keith—I didn't say Steve was the youngest Canadian ever to get his licence, merely that he is the youngest one in Canada today. The young lady is certainly older than he by this time!  
Editor.

Please send mail directly to: Frank Hughes VE3DQB, PO Box 855, Hawkesbury, Ont. K6A 3C9.

## A SOUVENIR

I was surprised the other day when I came across an old letter, while cleaning junk, in an old box in the basement. I had written it when a young boy at camp. My friend and I would exchange letters written in Morse code, so that no one else could read them.

Yves Remillard VE4DY



## Silent Keys

DOUG ROSTE VE7DDI

Sept. 12, 1984

Doug was an energetic radio Amateur for the past several years. He received his advanced Amateur radio ticket by the special consideration of the DOC as a handicapped person. He surprised everyone by the results of his exam with marks higher than they expected.

EDDIE EDWARDS VE7DAR

EX G3FYG

Oct. 10, 1984

Eddie was affectionately known as "dusty and rusty" and will be remembered for his true but lousy propagation reports to the DXers. The 1983 Nanaimo club Amateur of the Year winner, Eddie was much appreciated and respected as both an Amateur and a club member.

DAVE Mc TAGGART VE7RH

Oct. 30, 1984

This is to inform you of the passing of Dave Mc Taggart VE7RH on Oct. 30, 1984. Dave held his call since the late Thirties and remained active except during World War II. He served overseas as a Halifax bomber pilot completing 32 missions over Europe and was awarded the distinguished flying cross (D.F.C.). He is sorely missed by his family and his many friends among the VE7 Ham community. His daughter Sue is VE7FYL.

J.F. (Hop) Hopwood VE7AHB

## SUCCESS STORY NO. 1

Sorry to take so long to respond to your kind letter of assistance of Aug. 27, about studying for the digital ticket.

John had no idea, really, of what to study. We all agree on the dearth of appropriate study materials. All I did, with John's encouragement, tips, advice, was to obtain a number of computer digital communications texts, and study them. Just got the Digital Certificate in mail today!

Also wrote and passed Advanced test since (Morse only).

Thanks again for your interest and direction, Frank.

Herb Balfour VE3OHH  
Willowdale, Ont.

## RULE CHANGES

VE6VW's column in October TCA alludes to rule changes for future Canada Contests. I object to the changes in scoring for foreign stations.

Up to now, this has been a really Canadian contest, as the incentive was to work other Canadian stations. If you increase the point value for foreign contacts, you will change the character of this contest. If I now have to work several hundred foreign stations to achieve a competitive score, I will no longer compete in this contest.

I don't understand your statement: "This should make the Canada Contests more favourable in the future." Do you mean you are trying for more participants? If so





you may consider making it easier to send in the entries. In the last contest, of 27 VE stations I worked, only 4 sent in an entry.

Let's keep this contest Canadian.

Bruce Cornwallis VE7BAG.

### SUCCESS STORY NO. 2

I was fortunate enough to pass the entire Amateur exam on my first try (April 18th, 1984). I would like to take this opportunity to commend CARF on publishing a super study guide and I offer my profound thanks to the Fredericton Amateur Radio Club for organizing a fine three-month course. I was so impressed with the way I was accepted into the fraternity as a new Amateur. Just a matter of weeks after receiving my call I was invited by one of the 'pros' to sit down and work some phone contacts on 80/75 during Field Day. Amateur friends have been very supportive and helpful in seeing I was on the air as soon as possible with borrowed equipment. *I want to pledge, here in writing, that I will do the same in the years to come for other new Amateurs.* Let us all remember our Amateur beginnings and dedicate ourselves to helping new people. It is in a large part because of this spirit that I now proudly operate station VE1APG, and my operator's certificate is now more valuable to me than anything else I own. 73.

Brent Taylor VE1APG

Fredericton, N.B.

*I don't know which I admire more, Brent or the Fredericton club!—Editor.*

### MORE ON SPUD

The article by Spud Roscoe in the September issue was great, and I hope we have more. Although not specifically Amateur radio, many of us are interested in all facets of radio operation, and I don't know of another Canadian publication where this kind of thing could appear. Many Amateur radio journals carry articles relating to

radio history or radio regulation, just as commercial journals sometimes have articles relating to Amateur radio.

I wrote to Spud just after receiving the September TCA, asking some questions about maritime operation, and received a long and interesting reply. I intended to write to you saying the article was very interesting, but couldn't find your address at the time so didn't follow through.

The October issue is good. Keep it up OM.

Bob Eldridge VE7BS  
Pemberton, B.C.

### NEW REPEATERS IN NOVA SCOTIA

Here are details of two new repeaters in Southwest Nova Scotia:

VE1BBY, located at Granite Village, ex-RCMP site on the Queen's County-Shelburne County line. 147.360 TX, 147.96 RX. Provides Halifax to Yarmouth South Shore coverage. Call sign in memory of the late holder of Norm Bowers VE1BBY.

VE1NIN located at Nineveh, Lunenburg County. 147.090 TX, 147.690 RX. Provides inland coverage of Northern Lunenburg county, Queen's County and Annapolis County.

Howard Henderson VE1FV.

### KONIG HOESSEIN ONTVANGT RADIO- AMATEUR

You might like to print this picture of JY1 (King Hussein of Jordan) and PA3DSM in TCA.

A lot of Dutchmen live in Canada, many of them are radio Amateurs, many are members of the Royal Naval Amateur Radio Society. My membership number is 2024.

Henk Orie PA3DSM

## Corrections to Certificate Study Guide

Section 5.2.10 Performance monitoring.

Line 11. Delete "(P = IR)," replace by "(P = VI)."

Line 3 from foot. Delete "VSWR meter" and replace by "antenna matching unit."

Section 5.2.11 Frequency determination and the crystal calibrator.

Lines 3 to 7 from foot. Delete completely and replace by:

"Although many receivers now incorporate frequency converters, thus making the dial indicator almost redundant, the crystal calibrator serves not only as a backup but also as a cross check on the accuracy of the counter. In the event of a discrepancy, further frequency checks can be made against known frequency standards such as WWV or CHU."

### NOVEMBER ISSUE

Some of us received our November TCA's with the December issue. The computer fault causing all the trouble was finally traced to a defective disc drive. It is repaired and service should improve from now on.



# The Pope Came to



*The Pope with Archbishop Plourde.*

**A**ugust 20, 1984 was a monumental day for Amateur radio in the Ottawa area; the day that the papal visit organizers asked us to provide communications for the Pope's visit to Ottawa on Sept. 20, 1984.

For about 18 months, the Amateur radio fraternity in the Ottawa area knew that the Pope was coming to Ottawa. "Wouldn't it be good for us to be able to provide some sort of communications for the visit?" For 17 months, word of the Pope's visit to Ottawa was spread across the media for the general public to eat up. Seventeen months of announcements of how well the organizing committee was progressing with the preparations for the visit.

As the time for the visit quickly approached, and as announcements about completion of this activity and that activity in preparation for the visit were released in the media, it looked as if Amateur radio would not be able to do anything for the Pope's visit.

Now it was August 20 and a plaintive call came in from the papal visit organizers. After 17 months of preparations and after innumerable changes to plans for site communications by the

organizers, the Ontario Provincial Police, who were responsible for security at the site, told the organizers that the site administrative and safety communications was not acceptable to the police.

Interestingly enough, the organizers thought that 40 to 50 hand-held radios operating on three different frequencies by people who had never used radio equipment would easily be able to provide the necessary communications system.

# Ottawa

By Ken Kendall VE3IHX



Fortunately, the OPP thought not and advised that, at such a late date, the only people who had the necessary expertise to pull off the operation were the Amateur radio operators in the Ottawa area.

When representatives of Amateur radio met with the papal visit organizers, they were initially told that only a few operators would be required to provide certain "administrative communications." Within the space of several days, the "administrative communications" came to become something that resembled a multitude of additional communications responsibilities. At this point, it was decided to put the communications under the Ottawa-Carleton Emergency Measures Organization Amateur Radio Group for logistical reasons.

Soon, it was determined that 40-50 corrals would each require the services of an Amateur radio operator to provide administrative and safety communications back to a central command post. Word was that Amateur radio would be the



*It is good for us to be here! Dave Pyefinch VE3OSY, Tom Bristow VE3OFM and Mike Shacklock VE3LAR.*

link to safety and decision-making for about 250,000 spectators and up to 5000 volunteers and that their services would be required from 7 a.m. until 6 p.m. the day of the open-air mass. To further complicate the situation, the site of the mass would be closed to all vehicular movements from 5:30 the morning of the mass. All Amateur radio operators were required to be screened for security check at least a week prior to the mass, and all proposed frequencies to be used by Amateur radio had to be submitted to DOC for frequency compatibility at the site.

Two weeks before the mass was to take place, Amateur radio operators went to the site to check possible frequencies and to determine the best type of equipment to be used at the site.

Shock #1— even 52 was susceptible to intermod, and on a Sunday when the paging systems should have been pretty quiet. Fortunately, most of the problem could be alleviated by the old 'wet noodle' type of antenna, together with low power transmissions.

Calls went out on the Monday night net on VE2CRA and soon a roster of Amateur radio operators and spare equipment was compiled for the event. The names of the operators were given to the papal organizers along with their addresses and dates of birth.

Shock #2— even EMO could not get a bus to bring the Amateur radio operators onto the site. Amateur radio operators would have to get to the site the best way that they could.

*Continued on next page ►*



*Mailes Dier VE3BCO at station.*







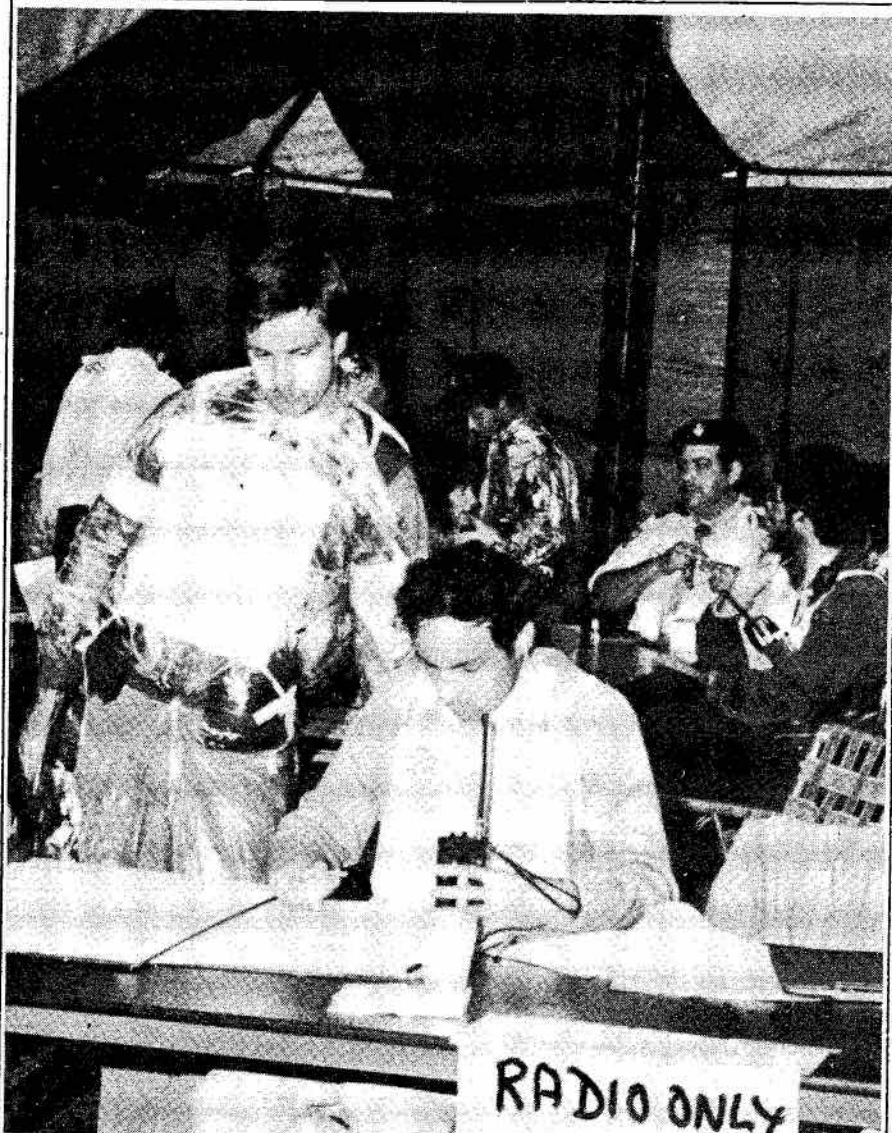
The day before the Pope's mass, the Amateur radio stations for the command post were installed in the 10'x52' trailer and all systems were tested.

Shock #3— certain locations on the site needed Amateur radio communications at 5:00 and the operators necessary for the function of the command post stations also had to be there at 5:00. During the evening, this was quickly taken care of in preparation for the big event.

September 20, D-Day. At 5:00 the command post went on the air and communications commenced. Initially, only one frequency was needed, but as the volume of traffic began to increase, it was decided to activate a second frequency to handle the load. The operators in the command post wore headphones to cut down on the noise of the command table which was located less than 10' from the operators.

At the command table, other members of the papal organizing committee had established additional communications systems using commercial radios— at one count, there were eight other frequencies in use in the trailer. To further clutter the airwaves in the immediate area, the Ontario Ambulance system had brought in its Mobile 10 command post with its impressive array of antennas— and we were on a hill overlooking them, smack in their takeoff angle. Thank God we had the foresight to install cavities on all our equipment!

Soon the safety and administration circuits were a solid chatter of information and requests for assistance in problems. At one point, one of the frequencies was in



Above: John Henry VE2VQ at Operator Assignment post, volunteer tent.



Left: George Morgan VE3JQW at Papal control No. 1 site, channel 146.52.



use continuously for three hours with the maximum quiet time only five seconds between transmissions.

Shock #4— we were asked by police officials in the command post to broadcast to all operators on the site the description of someone who had caused a disturbance in one of the corrals, with the additional rider that the OPP officers who were in each corral should listen to the broadcast. Surprise! The OPP officers in the corrals did not have personal communications equipment. The OPP only had enough equipment for their corporals and up, and Amateur radio operators were providing communications for the rest of their force on the site!

When the event was over, the police officers in the command post

commented on the 'professional' way in which the Amateur radio operators handled themselves under the pressure of the situation and one officer even went so far as to say that he doubted whether his own communications people could have handled the volumes of traffic as efficiently as the Amateur radio operators did.

To do the job took the dedicated work of 80+ Amateur radio operators, many of whom had to take a day off work to do the job. Other operators, who could not readily get off work for the event, stood by in the wings in the event that something serious happened at the site. Fortunately nothing did.

Would we do it again?

Definitely, but not with such short notice and not without confirming well in advance the FULL requirements of the Amateur radio services to be provided. And definitely, the next time, the operators in the command post will have lots of soothing honeyed drinks to help their throats through the long hard grind.

Much more could be said about this event, but this article must come to an end. Suffice to say that from the papal organizing committee, from the police who observed the operation of the Amateur radio circuits during the event and from the organizers of the Amateur radio operation— thanks for a job well done. △



*Merry hearts, cheerful countenances. VE3's NPG, NPX, CAT, KLK, CHT, FSN, BCO, JLG, GPR and (front) MPG, JFC, JAT, MPX.*

## Next Month: The Pope in VE6

# DOC DOINGS

## One-time \$25 fee for radio licences



**WEST ISLAND AMATEUR RADIO CLUB**



P.O. BOX 884, PTE CLAIRE/DORVAL P.Q.  
DORVAL, QUEBEC H9R 4Z6 CANADA

October 14, 1984

Canadian General Aviation News,  
P.O. Box 563 Station B  
Ottawa, Ontario K1P 5P7

Attn.: W.N. Feppeler, Managing Editor

Dear Sir,

The September 1984 issue of Canadian General Aviation News contained an article on the subject of a brief to the Department of Communications made by COPA, Canadian Owners and Pilots Association.

This brief called for the elimination of the requirement for yearly renewal of aircraft radio licenses as well as those for other classes of users including radio amateurs, marine, land mobile and General Radio Service (popularly referred to as CB). They requested that this be replaced by a one-time initial license fee of \$25.00.

The COPA proposal was discussed at the October 1984 meeting of the West Island Amateur Radio Club and a vote was taken on members' reaction to the proposal. Of the 35 members present, all were in agreement with COPA's stand as outlined in your article.

We are sending the text of your article to the two major organizations which represent Canadian radio amateurs, so that the COPA proposal can receive wider distribution and support among this group of spectrum users.

Yours very truly,

Don Jarvis, VE2DWG  
Secretary, West Island Amateur Radio Club

cc: The Canadian Radio Relay League  
The Canadian Amateur Radio Federation

Responding to a call from the Department of Communications for discussion papers relating to future radio licence fee structures, COPA submitted a brief last month calling for:

1. The elimination of a requirement to renew aircraft radio licences annually.
2. A one-time (initial) radio licence fee of \$25.
3. The licence fee for ground

aeronautical stations (UNICOM) to be the same as for aircraft.

4. 'Temporary' radio licence fees to be the same as for 'permanent' holders.

5. The same one-time \$25 fee to apply for all classes of radio operators such as marine, land-mobile, CB, HAMS, and so on.

In their brief, COPA attempted to justify their one-time \$25 fee proposal by pointing out that this is the amount Transport Canada

requires in order to register an aircraft. Just as DOT does not require that aircraft owners pay an annual registration or licence fee for the privilege of operating an aircraft in Canada, similarly, the DOC should not require that the operators of radio communication equipment be required to pay annual fees either.

Under COPA's proposal, a one-time \$25 fee would be valid until the aircraft was sold. Every time an aircraft changes hands, a new radio licence fee would be applicable just as in the case for re-registration of an aircraft. COPA feels that tying their proposal to existing DOT procedures would make their recommendations easier to accept, especially since it's obvious that DOT does so much more in return for their licence fee than the DOC.

COPA also pointed out that in the U.S., there is no radio licence fee payable whatsoever by aircraft operators for the privilege of using aircraft radios.

COPA noted that in the past, DOT officials pointed out that an annual radio licence fee was needed to pay for the administration cost of issuing annual licences. COPA's response was to stop issuing annual licences.

COPA feels that their proposal should be acceptable to all other radio users. Instead of paying an annual fee of \$40, aircraft owners would pay only an initial \$25 fee. Marine users (boats, ships, etc.) who now pay \$21 annually would pay \$25 just once. Radio Hams who now pay \$13.50 annually would pay \$25 but once. CB operators who pay \$13.50 for three years would pay \$25 just once.

Although it may appear that COPA's plan will reduce DOT's revenue intake, this is more than offset by eliminating the costly system of billing for annual fees. "It's a case where everyone wins in the long run," said a COPA spokesman.

—from Canadian General  
Aviation News





# Foreign Affairs/Affaires Etrangères

## DEPARTMENT OF COMMUNICATIONS RADIO ACT

Notice No. TRS-025-84

**Subject:** Amateur Service— Countries that forbid radiocommunications with amateur stations under their jurisdiction— Transmission of international communications on behalf of third parties by amateur stations— Reciprocal amateur operating privileges  
**References:** Article 32 of the International Telecommunication Union Radio Regulations and sections 50, 61 and 62 of the General Radio Regulations, Part II.

This notice replaces and cancels DGTR-018-83 dated 24 Sept. 1983.

1. The following countries have notified the International Telecommunications Union that they forbid radiocommunications with amateur stations under their jurisdiction:

Burma (Socialist Republic of the Union of)	Somali (Democratic Republic of)
Iraq (Republic of)	Turkey
Libya (Socialist People's Libyan Arab Jamahiriya)	Yemen (People's Democratic Republic of)
Pakistan (Islamic Republic of)	Zaire (Republic of)

2. Canada has concluded agreements or arrangements with the following countries to permit the transmission by Canadian amateurs of international communications on behalf of third parties.

Antigua and Barbuda*	Haiti (Republic of)
Australia	Honduras (Republic of)
Bolivia (Republic of)	Israel (State of)
Chile	Jamaica
Colombia (Republic of)	Mexico
Costa Rica	Nicaragua
Dominica	Paraguay (Republic of)
Dominican Republic	Peru
El Salvador (Republic of)	Trinidad and Tobago
Grenada**	United States of America
Guatemala (Republic of)	Uruguay (Oriental Republic of)
Guyana	Venezuela (Republic of)

\* Effective Nov. 15, 1983.

\*\* Effective May 18, 1984.

3. 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:

Antigua and Barbuda*	Bahamas (Commonwealth of The)**
Australia	Barbados
Austria	

## MINISTÈRE DES COMMUNICATIONS LOI SUR LA RADIO

Avis n° TRS-025-84

**Objet:** Service d'amateur—Pays qui interdisent les radiocommunications avec les stations d'amateur relevant de leur juridiction— Transmission de communications internationales au nom de tierces personnes par les stations d'amateur— Privilèges réciproques d'exploitation de stations d'amateur  
**Source:** Article 32 du Règlement des radiocommunications de l'Union internationale des télécommunications et les articles 50, 61 et 62 du Règlement général sur la radio, Partie II.

Le présent avis annule et remplace l'avis n° DGTR-018-83 du 24 septembre 1983.

1. Les pays ci-après ont notifié l'Union internationale des télécommunications qu'ils interdisent les radiocommunications avec les stations d'amateur relevant de leur juridiction:

Birmanie (La République socialiste de l'union de)	Somalie (République démocratique de)
Iraq (République d')	Turquie
Libye (Jamahiriya Arabe Libyenne Populaire Socialiste)	Yemen (République démocratique et populaire du)
Pakistan (République islamique du)	Zaïre (République du)

2. Le Canada a conclu avec les pays ci-après des accords ou des arrangements permettant la transmission par les amateurs canadiens des communications internationales en provenance ou à destination de tierces personnes:

Antigua et Barbude*	Guatemala (République du)
Australie	Guyane
Bolivie (République de)	Haïti (République d')
Chili	Honduras (République de)
Colombie (République de)	Israël (État d')
Costa Rica	Jamaïque
Dominique	Mexique
Dominicaine (République)	Nicaragua
El Salvador (République de)	Paraguay (République du)
États-Unis d'Amérique	Pérou
Grenade**	Trinité et Tobago
	Uruguay (République orientale de l')
	Venezuela (République de)

\* Effectif le 15 novembre 1983.

\*\* Effectif le 18 mai 1984.

3. Le Canada a conclu avec les pays ci-après des accords ou des arrangements autorisant les radioamateurs du

Continued on next page ►



Belgium	Jamaica
Bermuda	Luxembourg
Botswana (Republic of)	Malta (Republic of)
Brazil (Federative Republic of)	Netherlands
Chile	(Kingdom of the)
Colombia (Republic of)	New Zealand
Costa Rica	Nicaragua
Denmark	Norway
Dominica	Panama (Republic of)
Dominican Republic	Papua New Guinea
Ecuador	Peru
Finland	Philippines
France	(Republic of the)
Germany (Federal Republic of)	Poland (People's Republic of)
Greece	Portugal
Grenada**	Saint Lucia
Guatemala (Republic of)	Senegal (Republic of the)
Haiti (Republic of)	Sweden
Honduras (Republic of)	Switzerland
Iceland	(Confederation of)
India (Republic of)	United Kingdom of
Indonesia (Republic of)	Great Britain and
Ireland	Northern Ireland
Israel (State of)	United States of America
Italy	Uruguay (Oriental Republic of)
	Venezuela (Republic of)
	Yugoslavia

\* Effective November 15, 1983.

\*\* Effective May 18, 1984.

\*\*\* Effective June 25, 1984

Dated at Ottawa, this 26th day of October 1984

R. W. JONES

Director, Operations Branch  
Telecommunications Regulatory Service

Canada à exploiter des stations de radio-communications lorsqu'ils séjournent dans ces pays:	
Allemagne (République fédérale d')	Irlande
Antigua et Barbude*	Islande
Australie	Israël (État d')
Autriche	Italie
Bahamas (Commonwealth des)***	Jamaïque
Barbade	Luxembourg
Belgique	Malte (République de)
Bermudes	Nicaragua
Botswana (République de)	Norvège
Brésil (République de)	Nouvelle-Zélande
féderative du)	Panama (République de)
Chili	Papua-Nouvelle-Guinée
Colombie (République de)	Pays-Bas (Royaume des)
Costa Rica	Pérou
Danemark	Philippines
Dominicaine (République)	(République des)
Dominique	Pologne (République populaire de)
Équateur	Portugal
États-Unis d'Amérique	Royaume-Uni de
Finlande	Grande-Bretagne et
France	d'Irlande du Nord
Grèce	Sainte-Lucie
Grenade**	Sénégal (République du)
Guatemala	Suède
(République du)	Suisse (Confédération)
Haiti (République d')	Uruguay (République orientale de l')
Honduras (République de)	Venezuela
Inde (République de l')	(République de)
Indonésie (République d')	Yousgoslavie

\* Effectif le 15 novembre 1983.

\*\* Effectif le 18 mai 1984.

\*\*\* Effectif le 25 juin 1984.

Ottawa, le 26 octobre 1984

Le directeur, Direction de l'exploitation

Service de la réglementation des télécommunications

R.W. JONES

## News Briefs

### REPEATER VIOLATION

Peterborough ARC's repeater VE3PBO was used illegally by an Amateur who used it in violation of sections 57(a) and 59(1)(c) of the Regulations. DOC monitored the transmissions and warned the club. Club President Harold VE3KXB, wrote: "We appreciate the method in which this matter has been handled by the DOC, and we thank you for bringing this matter to our attention."

All repeater users should keep their transmissions to messages of a technical nature or of an unimportant personal character.

### COLUMN WRITER NEEDED!

TCA needs a UHF/VHF editor. The duty is to write a column of VHF/UHF news from a Canadian viewpoint.

### THE CARF TELEPHONE

Those of you who got busy signals or no replies from 613-544-6161 in November might like to know that a backhoe discovered a trunk cable in Kingston, and poor Mother Bell has been up to the hems of her skirts trying to set things right. Anyway, she's succeeded now, and you should have no further trouble.



# Social Events

## RSO/CRRL CONVENTION

Item 1: The Convention Committee has been meeting since June, 1984 to develop the 1985 event as one that will never be forgotten. The overriding concern of the Committee and the commitment made to all Amateurs is the best value for your dollar. To that end the Program Committee is scouring North America for the leading authorities on a wide variety of subjects of interest to Amateurs. We will announce specific names in future bulletins.

Item 2: The RSO Convention held in Ottawa this year saw the introduction of the RSO/CRRL '85 \$2.00 OFF coupon program. These coupons, good for \$2.00 off either an Amateur or a spouse registration will receive wide distribution in the next few months. Supplies will be at all major fleamarkets, sent to each club in Ontario, and reproduced in a number of Amateur bulletins and publications. Get one and use it to reduce your cost of attending the premier event of 1985.

Item 3: The Product Show at RSO/CRRL '85 will be a showcase of Amateur equipment running from Friday evening until Sunday afternoon. 26 vendors and manufacturers are expected to be in attendance. Another "DON'T MISS" event.

Item 4: A new bulletin will be issued by the RSO/CRRL '85 Committee each month. If this bulletin did not have the correct address on it, please advise us as soon as possible. It is our hope that you will reproduce this bulletin, or interesting portions of it, in your monthly publication and/or read it on your net.

The address for the committee is: RSO/CRRL '85, P.O. Box 73, Hyde Park, Ont. N0M 1Z0

## CALENDAR

**Feb. 2, 1985:** Niagara Peninsula ARC Big Event and Flea Market.

**May 11, 1985:** Ontario Trilliums 20th Anniversary Dinner, Howard Johnson's Hotel, Progress Court, Scarborough.

**May 19, 1985:** Southern Ontario Repeater Team Fleamarket, Medway High School, Arva.

**June 21, 22, 23, 1985:** RCN Reunion, details this page.

**June 27-30, 1985:** YLISSB Convention, Sugarloaf/U.S.A. Details this page.

**September 27-29, 1985:** RSO/CRRL Convention, London, Ontario. Details this page.

## YLISSB CONVENTION

The YL International Single Sideband Communications System's annual convention will be held at Sugarloaf/U.S.A., located near Kingsfield, Me., on June 27-28-29-30, 1985. Accommodations are available for reasonable rates; RV parking too. Besides our regular business meetings, DX forum etc., there are other activities planned: a Tour of the Rangeley Lake area and a Tour of Sugarloaf/U.S.A. with lunch at the top of the Mountain. For complete details and registration packet, please send a business-size SASE, 37 cents American to:

Phyllis Davis KA1JC, P.O. Box 805, Presque Isle, Me. 04769.

Submitted by Jeannine Cote VE1BWP  
co-chairman.

## RCN REUNION

Naval types should be interested in the Naval Communication Reunion 1985, June 21, 22, 23 in Halifax, at the Hotel Nova Scotian

and HMCS Scotian. Details from Nav Comm Reunion 85, P.O. Box 297, Dartmouth, N.S. B2Y 3Y3.

## DRAW WINNERS

The winners of the free draw at the CARF Booth, RSO convention, were:

CARF membership (1 year): Henry F. Greenway VE3OMU, CARF Reference File: Gordon McKay VE3JMT, Canada Call Book, second edition: Ed Gareau VE2GA.

Δ

## NEW ICs

The house magazine of Hewlett Packard recently carried some information on new integrated circuits and devices. Some of the more interesting ones included the DONT gate, whereby no output is obtained whatever the state of the inputs, the noise emitting diode (ned) which produces a loud noise once when connected across a 1kV supply, a J(UN)K flip-flop which does not change state when clocked regardless of its input states and an inoperational amplifier: this is allegedly "...the linear cousin of the DONT gate. It provides no output for any input at a slew rate of 0 volts per microsecond. A mil-spec version is available at 100 times the cost of the OEM version."

## HELPFUL HINT

Stationery stores carry 8½ by 11 inch index pages, with a tab on the side, punched 3-hole. Two sets of these can be marked VE0 to VE8 plus VO and inserted into the Canadian Callbook to speed reference to it. Eric VE3BB, who sent this in to the Kitchener-Waterloo ARC Kilowatt, says: "I can find a particular call a lot faster with this setup. I use an ordinary three-ring binder instead of the original binding."







# YL NEWS & VIEWS

By Cathy Hrischenko VE3GJH

**C**alling all Girl Guides, Guiders and YL's across Canada!

1985 will be the 75th Anniversary of the Canadian Girl Guides. The Girl Guides, with CLARA's help, are celebrating with an on-the-air jamboree. We are trying to form a network of YL's and Girl Guides and Guiders across Canada.

If you are a Girl Guide, Guider or YL, we would appreciate your participation in this celebration. We would like to arrange some skeds. Feel free to contact me, Cathy VE3GJH, or Susan VO1OI or your Girl Guide Headquarters or Guider.

The British Girl Guides are also planning their 75th Anniversary jamboree. Contact Lynne G4FNC and Jennifer G8WWO. We hope to pass official greetings.

The G.G. Thinking day is Feb. 22. The Jamboree will be the week of Feb. 17 to 23. During that time, each YL could have at least one sked or group over, don't you think? Please try to take part. Let me know how you make out.

## Visitors From ZL

After working a DX station and receiving their QSL, it's like icing on the cake when you get a chance to meet them. I've been very fortunate that way over the years. My latest visitors were Aola ZL1ALE and Dave ZL1AMN on a world-wide trip with a four-day stop over in the Toronto area.

George and I invited them to stay at our place and they accepted, saying they would be here the end of September. At that time we didn't know our daughter Dot VE3HUO was getting married the following week. Nor did I know that

I would be designing and making wedding gowns and the wedding cake decorations. What great friends Amateurs truly are!

Dave and Aola were great house guests. We visited while sewing, etc. Saturday night I had arranged a party of about 40 people. Dave brought along some slides of his DXpeditions and we all had a very interesting evening.

In 1977 Dave, his daughter Carol ZL1AJL, Marion ZL1BK and Eddie ZL1BKX went to the Kermadec Islands. In 1979 Dave and Aola and Ian ZL1BCG (x-VE3) went on a Tri-country DXpedition to 5W1, A35 and ZK2. Aola was the first YL to operate from ZK2. They provided new YL countries for several of us.

I was running far behind in the sewing, so Erica VE3CXE and Hans VE3CJZ took them to Niagara Falls and Viv VE3HGA and Glen



Dave ZL1AMN and Aola ZL1ALE

VE3HGB took them to the Science Centre.

The next morning they left for Washington D.C. I'd like to thank those that came to the party on such short notice and for those that helped as tourist guides. As I said, Hams are great friends!

That's it for now. Remember Everyone cannot be great, but Everyone can be devoted to something great. Δ



Back row: Erica VE3CXE, Hema, Ivy VE3IV, Irene VE3IRS, Thelma VE3CLT, Viv VE3HGA, Aola ZL1ALE. Front row: Cathy VE3GJH in middle with daughters Dot VE3HUO and Cathi VE3FBL.





# ICOM PROMOTION !!

Others may have "ICOM DAYS" but ATLANTIC HAM RADIO LTD. has "ICOM MONTHS". Since it is difficult for many of you to come to us for an "ICOM DAY" we are going to have ICOM SPECIALS from now until Jan 31st 1985.

**WIN !! WIN !! WIN !!** All purchases from Dec 1st until Jan 31st that include at least one ICOM item will be eligible for a grand drawing on Feb 1st 1985. The prize will be your choice of an IC-02AT handheld or the NEW PS-30 Station Power Supply. If one of those items was paid for on your bill the amount paid for the item will be refunded. The winner's name will be published in the March issue of TCA and I'm sure will also be passed along the grapevine.

# ATLANTIC HAM RADIO LTD.

HOURS: Mon-Fri 1p.m.-9p.m.

Saturday 1p.m.-5p.m.

Sunday 1p.m.-5p.m.

ATLANTIC TIME PLEASE !!

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CARD ORDERS \$50



P.O. Box 755  
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Canada E2L 4B3  
(506) 652-5753

**WIN !! WIN !! WIN !! ICOM IC-02AT HANDHELD OR ICOM PS-30 STATION POWER SUPPLY WIN !! WIN !! WIN !!**

## IC-751 BASE

- 160-10M
- 100KHz-30MHz Receiver
- CW/SSB/AM/RTTY/FM
- 32 Memories
- Microprocessor Controlled
- 12 VDC Operation
- Fluorescent Display



### HF Transceiver/General Coverage Receiver

ICOM is proud to announce the most advanced amateur transceiver in communications history. Based on ICOM's proven high technology and wide dynamic range HF receiver designs, the IC-751 is a competition grade receiver, or 100kHz to 30 MHz continuous tuning general coverage receiver, and a full featured all-mode, solid state horn band transmitter, that covers all the new WARC bands. And with the optional internal AC power supply, it becomes one compact, portable field day package.

300W Full Function Metering  
• Squelch • FM • Multicolor Fluorescent Display • Mic Options: Voice Frequency Readout, External PS-30 power supply, PS35 internal power supply, high stability reference crystal (less than  $\pm 10$ Hz after 1 hr.), desk mic, filter options:  
SSB: FL70  
CW: FL52A, FL53A  
FL32, FL63  
AM: FL33

**Some Specifications:**  
• Frequency Coverage: (Ham Bands) 1.8MHz - 29MHz, 3.5MHz - 4.1MHz, 6.95MHz - 7.5MHz, 9.95MHz - 10.5MHz, 12.95MHz - 14.5MHz, 17.95MHz - 18.5MHz, 20.95MHz - 21.5MHz, 24.45MHz - 25.1MHz, 27.95MHz - 30.0MHz  
• Coverage: (Receiving Only) 0.1MHz - 30.0MHz, Thirty 1MHz Segments  
• 100kHz digital PLL synthesizer, Independent transmit-receive frequency available  
• Frequency Readout: 6 digit 100Hz fluorescent readout with RTT readout

LIST \$1799  
SPECIAL ICOM PROMOTION PRICE ??

## IC-745 BASE

- 160-10M
- 100KHz-30MHz Receiver
- SSB/CW/AM/RTTY
- 16 Memories
- FM Option
- Microprocessor Controlled
- 12 VDC Operation



### HF Transceiver/General Coverage Receiver

ICOM's IC-745 has features to fine tune received signal and ignore interference. ICOM delivers 100dB dynamic range plus these standard features:  
• All Solid State  
• 100% Duty Cycle  
• Dual VFO/Split Operation  
• 16 Memories  
• Adjustable Noise Blanker  
• Adjustable AGC  
• With Off  
• Squelch on Call Modes  
• IF Shift and Passband Tuning  
• Notch

-6dB, FL-44A 455KHz SSB Filter  
2.4kHz  $\pm 6$ dB IC-PS35 Built-in Type Power Supply  
**Some Specifications:**  
• Frequency Coverage: 0.1MHz - 30.0MHz, 1.8MHz - 29MHz, 3.5MHz - 4.1MHz, 6.95MHz - 7.5MHz, 9.95MHz - 10.5MHz, 12.95MHz - 14.5MHz, 17.95MHz - 18.5MHz, 20.95MHz - 21.5MHz, 24.45MHz - 25.1MHz, 27.95MHz - 30.0MHz  
• Frequency Control: CPU based 10kHz digital PLL synthesizer, Independent transmit-receive frequency available  
• Frequency Stability: Less than 500Hz after switch on 1 min. to 60 min. and less than 100Hz after 1 hour. Less than 10Hz in the range of 10Hz to  $\pm 60$ Hz  
• Power Supply: Requirements: DC 13.8V  $\pm 15\%$ , Negative ground Rx Current: 5A, Current drain 20A MAX (at 200W input)  
• Antenna Impedance: 50 Ohms Unbalanced  
• Weight: 6.0kg  
• Dimensions: 111x123mm (H) x 286x304mm (W) x 355x383mm (D)

LIST \$1299  
SPECIAL ICOM PROMOTION PRICE ??

## IC-730 MOBILE

- 80 - 10M
- SSB/AM/CW
- Microprocessor Controlled
- Small Size
- 12 VDC Operation



### HF Transceiver

ICOM's IC-730 is the go anywhere HF rig for everyone's pocketbook. This compact size HF transceiver for the amateur band will fit in extremely small spaces, measuring only 7.7" x 7.1" x 10.8" deep. The unit is perfect for car, airplane, boat or suitcase portable operation. Convenient to use features such as 3-speed tuning with tuning rates of 1KHz, 100Hz or 10Hz, electronic dial lock, 1 memory per band, and dual VFO's are built in or no extra cost.

automatic protection circuit for high SWR conditions, digital readout and selectable AGC. Options include up/down microphone, marker oscillator, LDA unit, CW audio filter, SSB filter, and CW narrow band filter. Accessories available are the IC-PS15 base power supply, the IC-2KL linear amplifier, the IC-AH1 mobile antenna, IC-SMS base microphone, IC-HM10 scanning microphone, IC-SP3 external speaker, and IC-MB5 mobile mount.  
The IC-730 is truly a superior grade transceiver at an affordable price.  
**Some Specifications:**  
• Frequency Coverage: 3.5MHz - 4.0MHz, 7.0MHz - 7.3MHz, 10.0MHz - 10.5MHz, 14.0MHz - 14.35MHz, 16.0MHz - 16.5MHz, 21.0MHz - 21.45MHz, 24.5MHz - 25.0MHz, 28.0MHz - 29.7MHz  
• Power Supply Requirements: DC 13.8V  $\pm 15\%$ , Negative ground Current  
• Dimensions: 94mm (H) x 241mm (W) x 275mm (D)  
• Weight: 6.4kg  
• RF Power: SSB (A1) 200 Watts PEP Input, CW (A1) 200 Watts PEP Input, Continuous Adjustable Output Power: 10 - 100W, AM (A1) No Trans, 54W PEP 200 Watts (Option)  
• Emission Mode: A1 SSB (Upper sideband and lower sideband), A1 CW, F1 RTTY (Frequency Shift Keying), F1 F (1.5kHz - FM Option)  
• Receiving Mode: A1 (USB, LSB), F (USB, LSB), F1 (USB, LSB), F1 F (FM Option)  
• IF Frequencies: 1st 7.04515MHz, 2nd 9.0115MHz, 3rd 455KHz with continuous Bandwidth Control  
• Sensitivity: SSB/CW/RTTY for 10dB S/N: 1.0 - 3.0MHz Preamplifier On 0.15uV, AM for 10dB S/N: 0.1 - 0.8uV  
• Selectivity: SSB, CW, RTTY 2.2kHz at -60dB, 4.5kHz at -60dB, CW AF Filter: Passband Tuning will narrow to 700Hz, AM AF filter: 15kHz at -60dB, FM 15kHz at -60dB, 30kHz at -60dB, Audio 2.0kHz BW, RTTY 1.5kHz, Notch Filter: 30dB

LIST \$999  
SPECIAL ICOM PROMOTION \$749/\$779

## IC-2KL LINEAR AMPLIFIER

- 117/220 VAC
- Autoband switching
- Broadband



### HF 500 Watt Linear

IC-2KL solid-state amplifier by ICOM features all solid state broadband tuning with fully protected finals and automatic bandswitching, when used with the IC-701, IC-720A, or IC-730, plus full metering. (\$740 745 751)

linear amplifiers, and provides exceptional protection of the final system.  
The IC-2KL provides 500 watts of power output on 160 thru 15 meters, including the new 18 and 10MHz bands.  
**Some Specifications:**  
• Frequency Range: 1.8 - 18MHz, 2.0MHz - 3.5MHz, 4.1MHz - 7.0MHz, 7.5MHz - 10.9MHz, 10.5MHz - 14.35MHz, 14.5MHz - 16.5MHz, 21.0MHz - 21.45MHz, 24.5MHz - 25.0MHz, 28.0MHz - 29.7MHz  
• Power Supply Requirements: DC 13.8V  $\pm 15\%$ , Negative ground Current  
• Dimensions: 111x123mm (H) x 286x304mm (W) x 355x383mm (D)  
• Weight: 6.4kg  
• RF Power: SSB (A1) 200 Watts PEP Input, CW (A1) 200 Watts PEP Input, Continuous Adjustable Output Power: 10 - 100W, AM (A1) No Trans, 54W PEP 200 Watts (Option)  
• Emission Mode: A1 SSB (Upper sideband and lower sideband), A1 CW, F1 RTTY (Frequency Shift Keying), F1 F (1.5kHz - FM Option)  
• Receiving Mode: A1 (USB, LSB), F (USB, LSB), F1 (USB, LSB), F1 F (FM Option)  
• IF Frequencies: 1st 7.04515MHz, 2nd 9.0115MHz, 3rd 455KHz with continuous Bandwidth Control  
• Sensitivity: SSB/CW/RTTY for 10dB S/N: 1.0 - 3.0MHz Preamplifier On 0.15uV, AM for 10dB S/N: 0.1 - 0.8uV  
• Selectivity: SSB, CW, RTTY 2.2kHz at -60dB, 4.5kHz at -60dB, CW AF Filter: Passband Tuning will narrow to 700Hz, AM AF filter: 15kHz at -60dB, FM 15kHz at -60dB, 30kHz at -60dB, Audio 2.0kHz BW, RTTY 1.5kHz, Notch Filter: 30dB

LIST \$1799  
SPECIAL ICOM PROMOTION ??

**INSURED SHIPPING AND HANDLING:** Ontario and East add 2% - MINIMUM \$3.50; Manitoba and West add 3% - MINIMUM \$4.50; UNLESS OTHERWISE STATED.....  
**IF TWO PRICES ARE SHOWN THE LOWER PRICE APPLIES TO ALL ORDERS WHICH ARE PREPAID BY CASH, CHEQUE, MONEY ORDER, OR BANK TRANSFER. THE HIGHER PRICE APPLIES TO ALL OTHER ORDERS INCLUDING C.O.D., CREDIT CARDS, CHARGES, ETC....**  
**FOR INFORMATION OR PRICE REQUESTS PLEASE SEND 64¢ IN STAMPS. THANK YOU...**

## Automatic HF Antenna Tuners 500 and 100 Watt Models

\$599 LIST \$455 SPECIAL ICOM PROMOTION ??  
The IC-AT500 and the IC-AT100 Automatic Antenna Tuners provide automatic adjustment of the ICOM HF transceivers to the transmission line. Working at 500 and 100 watt levels respectively, the IC-AT500/100 detects the resistance and reactance of

the load presented by the transmission line. Powerful motors tune the two variable capacitors, so that the tuner presents a 50 ohm non-reactive load to the transceiver.  
These tuners, when attached to ICOM radios such

as the IC-720A, ICOM IC-730 with the optional LDA unit installed) or the IC-701, feature automatic band switching, changing bands to correspond with the band selected on the transceiver. The tuner has dual accessory sockets so that information from the transceiver may be transferred to the tuner, as well as the IC-2KL amplifier for automatic channeling of all three units at once.  
The IC-AT500/100 selects one of four antennas automatically giving the proper antenna for the band in use. When the power is turned off, this tuner can be used as an automatic antenna

selector. These tuners exhibit preset capability which allows the capacitors to move to a position near the actual operating position, so that QSY can be made quickly and receiving capability will not be interrupted. Presence of RF is not necessary for the preset capability function. Application of RF to the IC-AT500/100 will cause the matching circuit to adjust the variable capacitors to fine tune the circuit for a perfect match (160 - 10 meters) (160 meters not available in AT100).  
This tuner can be used with either 13.8 volts or 110 volts AC at 230 Watts AC. \$740 745 751

## MAJOR PRIZE



## IC-PS30 SYSTEM POWER SUPPLY

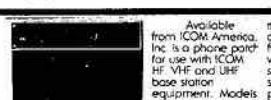
• Fully Regulated  
• Fully Protected  
The IC-PS30 is a high technology switching power supply designed by ICOM to supply a complete station of ICOM equipment.  
This rugged 25 Amp power supply is designed to

match ICOM's amateur equipment requirements and styled to bring the power supply up off the floor and into view for operator convenience. Metering of the output voltage and total current

consumption from the power supply is standard and allows monitoring to immediately detect a station malfunction or misconnection.  
Up to four pieces of ICOM equipment may be connected to the IC-PS30 and run at the same time, eliminating the need for an independent AC power supply for each rig.  
Each piece of equipment may be connected to the supply through its own DC power cord by using the supplied connectors. Additional optional cables with plugs for the transceiver and power supply are available.

**Some Specifications:**  
• Number of Semiconductors: Transistor - 5, IC - 2, Diode - 9  
• Input Voltage: 117/240VAC (50/60Hz)  
• Regulation:  $\pm 10\%$  of input voltage (output line voltage)  
• Input Capacity: 430W (at 24A load)  
• Output Voltage: 13.8V  
• Max. Load Current: 25A (10 min.)  
• On/Off Time: 50% duty cycle  
• Polarization: Negative  
• Dimensions: 111mm (H) x 241mm (W) x 300mm (D)  
• Weight: Approximately 5.0kg  
• Accessories Included: Spare fuse (10A for 117V, 5A for 240V) - 2, 2P Connector housing - 3, Connector pins - 6

LIST \$349  
SPECIAL ICOM PROMOTION ??



PP-1 Phone Patch  
LIST \$179  
ICOM PROMOTION ??

Available from ICOM America, Inc. is a phone patch for use with ICOM HF, VHF and UHF transceivers. Models are available for the IC-701, IC-720A, IC-730, IC-745, and IC-745. Station microphone is plugged into the back of the phone patch, the phone patch connects to



## HF General Coverage Receiver

ICOM introduces the IC-R71A 100KHz-30MHz super-grade general coverage receiver with innovative features including keyboard frequency entry and wireless remote control (optional).

This easy-to-use and versatile receiver is ideal for anyone wanting to listen in to worldwide communications. Demanding no previous ham radio receiver experience, the IC-R71A will accommodate an SWL (shortwave listener), Ham (amateur radio operator), marine operator or commercial operator.

With 32 programmable memory channels, SSB/AM/RTTY/CW/FM (optional), dual VFO's, scanning, selectable AGC and noise blanker, the IC-R71A's versatility is unmatched by any

other commercial grade unit in its price range.

Utilizing ICOM's DFM (Direct Feed Mixer), the IC-R71A is virtually immune to interference from strong adjacent signals, and has a 100dB dynamic range.

ICOM introduces a unique feature to shortwave receivers, direct keyboard entry for simplified operation. Precise frequencies can be selected by pushing the digit keys in sequence of frequency. The frequency will be automatically entered without changing the main tuning control. Memory channels may be called up by pressing the VFO/M (memory) switch, then keying in the memory channel number from 1 to 32.

A quartz-locked rock solid synthesized tuning system provides superb stability. Three tuning rates are provided: 10KHz / 50KHz / 1KHz.

Thirty-two tunable memories, more than any other general coverage receiver on the market, offer instant recall of your favorite frequency. Each memory stores frequency, VFO and operating mode, and is backed by an internal lithium memory backup battery to maintain the memories for up to five years.

Options: FM synthesized voice frequency readout (activated by SPEECH button), RC11 wireless remote controller, IC-CK70 DC adapter for 12 volt operation, MB12 mobile mounting bracket, two channel mounting brackets, two CW filters FL52 - 500Hz, and FL63 - 250Hz, high-grade 455KHz crystal filter FL44A, and CR64 high stability crystal.

**Some Specifications:**  
■ Frequency Coverage: 0.1MHz - 30.0MHz; ■ Frequency Control: CPU based 10Hz step Digital PLL synthesizer with dual VFO system; Direct frequency entry through keyboard or RC-11 remote unit; ■ Memories: 32 tunable memories store frequency and mode; ■ Scanning: Memory and band scan with auto-stop; ■ Frequency Readout: 6 digit 100Hz fluorescent readout; ■ Frequency Stability: less than 250Hz after switch on 1 min to 60 mins, and less than 50Hz after 1 hour; Less than 500Hz in the range of +10°C to +50°C. With optional CR64

high stability crystal. Less than 150Hz after switch on 1 min to 60 mins, and less than 10Hz after 1 hour at normal room temperature. Less than +100Hz in the range of -10°C to +50°C.

■ Power Supply Requirements: 117V or 235V -10% to 60Hz 30V A/100V/200V/220V use requires internal modification; ■ Antenna Impedance: 50 ohms Unbalanced (Single wire can be used on 0.1 - 1.6MHz); ■ Weight: 7.5kg (16.5 lbs); ■ Dimensions: 111mm(H) x 268mm(W) x 274mm(D) (4 1/8 in x 11 1/4 in x 10 3/4 in); ■ Receiving System: Quadruple Conversion Superhetrodyne with continuous Passband Tuning (FT); Triple Conversion Superhetrodyne.

■ Receiving Mode: A: AM (USB, LSB), F: (Output FSK audio signal), A: F; ■ IF Frequencies: 1st: 70.4515MHz, 2nd: 9.0115MHz, 3rd: 455KHz, 4th: 9.0115MHz (except FT); with continuous Passband Tuning (except FT); ■ 2nd IF Center Frequency: SSB (A/F): 9.0115MHz, CW (A/F): 9.0115MHz, AM (A/F): 9.0100MHz; ■ Sensitivity (when preamplifier is ON): SSB, CW, RTTY: Less than 0.5 microvolts (0.1 - 1.6MHz, 1 microvolt) for 10dB S+N/N; AM: Less than 0.5 microvolts (0.1 - 1.6MHz, 3 microvolts) for 10dB S+N/N; FM: Less than 0.3 microvolts for 12dB S+N/N (0.1 - 30MHz); ■ Selectivity: SSB, CW, RTTY: 2.3KHz or -60dB (Adjustable to 500Hz min), 4.2KHz or -60dB; AM: 500Hz or -60dB, 1.5KHz or -60dB; FM: 6KHz or -60dB (Adjustable to 2.7KHz min), 5KHz or -50dB; FM: 1.5KHz or -60dB, 25KHz or -60dB; ■ Spurious Response Rejection Ratio: More than 60dB; ■ Audio Output: More than 2 watts; ■ Audio Output Impedance: 8 ohms.

## IC-R71A BASE

- 100KHz - 30MHz General Coverage Receiver
- Keyboard Frequency Entry
- 32 Memories
- FM Option
- Microprocessor Controlled
- 110/220 VAC
- 12 VDC Option

LIST \$999  
SPECIAL ICOM PROMOTION ??



## GC-4 WORLD CLOCK \$119

This new world clock will let you know the time in any part of the world instantly. Turn the globe and small LED's light up corresponding to the time in the city lit up. A second 24 hour display will show either local or UTC time. Operates on four AA penlight batteries which are included.

\*When optional FM unit is installed.

## IC-271H(A) BASE

- 100/25 Watts
- 32 Built-in Subaudible Tones
- 32 Memory Channels
- 12 VDC
- Internal Power Supply Option
- Fluorescent Display

LIST A \$899  
H \$1229

SPECIAL ICOM PROMOTION

IC-271H \$1069/1099  
IC-271A \$825/\$849  
FREE HM-12 MIKE



## 2-Meter/FM/CW/SSB 100 or 25 Watts

For the ultimate in 2-meter communications, ICOM presents the IC-271H transceiver with a high dynamic range receiver and a 100 watt transmitter. Operating from the IC-PS30, IC-PS15, or the internal IC-PS35 (optional), the IC-271H brings all the advanced functions of the latest CPU controlled radios to your shack.

Standard features include 100 watts of power, 32 built-in subaudible tones which are easily selected by rotating the main

tuning knob, 32 memory channels which hold frequency, offset, offset direction, mode and subaudible tone. PLL locked at 10KHz, ICOM's high visibility, easy-to-read fluorescent display...memory and programmed band scanning, including Mode scan which scans memories with a particular mode or looks out busy frequencies so the receiver will not stop at that memory channel while scanning.

Optional features

include a switchover preamplifier, CTCSS encoder/decoder (encoder is standard), computer interface and voice synthesizer.

The 25 watt IC-271A is also available and has the same outstanding features and size (11 1/4" W x 4 3/8" H) as the IC-271H. An optional IC-PS25 Internal power supply makes the IC-271A a compact, go-anywhere 2-meter station.

**Some Specifications:**  
■ Frequency Coverage: 143.8000 - 148.1999MHz; ■ Frequency Resolution: SSB, 10/100 Hz Steps; FM 5KHz steps, 1KHz steps with 15 buttons depressed; ■ Frequency Readout: 7 digit fluorescent display 100Hz readout w/RT; ■ Frequency Stability: ±10 PPM (±10° -160° C); ■ Memory Channels: 32 channels, only in-band frequency programmable; ■ Usable Conditions: Temperature: -10°C - 60°C (14°F - 140°F); Duty cycle: continuous; ■ Power Supply Requirement: 13.8V DC

±15% (negative ground) 6A max. or 117V AC ±10%; ■ Dimensions: 111mm(H) x 268mm(W) x 274mm(D); ■ Transmitter Output Power: SSB 25W (PEP), CW 25W, FM 1 - 25W (Adjustable); ■ Receiving: At max. audio output Approx. 1.4A; Squelched Approx. 1.2A; ■ Dimensions: 111mm(H) x 268mm(W) x 274mm(D); 471H - 324mm(D); ■ Transmitter Output Power: SSB CW 1 - 25W (Adjustable); 471H - 10 - 75W (AC); ■ Modulation System: SSB Balanced modulation, FM Variable response frequency modulation, FM Variable response frequency modulation; ■ Max. Frequency Deviation: ±5KHz; ■ Microphone: 600 ohm electret; ■ Operating Mode: Simplex, Duplex (only in-band frequency separation programmable); ■ Receiving Mode: SSB (A/F), USB (L/S), CW (A/F), FM (F); ■ Sensitivity: SSB, CW: Less than 0.5 microvolts for 10dB S+N/N; FM: More than 0.3 microvolts for 12dB S+N/N; D of 1 microvolt; ■ Selectivity: SSB, CW: More than 2.3KHz or -60dB point, Less than 4.2KHz or -60dB point; FM: More than 2.7KHz or -60dB point, Less than 5KHz or -50dB; FM: 1.5KHz or -60dB, 25KHz or -60dB; ■ Audio Output Power: 20W; ■ Audio Output Impedance: 8 ohms; ■ RT Variable Range: ±9.9KHz

## IC-471(H)A BASE

- 75/25 Watts
- 430 - 450MHz
- Fluorescent Display
- 32 Memories
- 32 PL Tones
- 12 VDC
- Operation

LIST A \$1025  
H \$1399

SPECIAL ICOM PROMOTION ??



## 430 - 450MHz/FM/CW/SSB/75 or 25 Watts

Full 20MHz coverage 430 - 450MHz. 32 Memories. Each memory holds frequency, mode, offset direction, offset frequency and subaudible tone for easy return to an often used frequency or for remembering a new repeater or simplex frequency.

Subaudible tones are selected by rotating the main tuning knob. These tones may then

be stored into memory along with the frequency, offering ease of operation. An extremely low noise and good signal to noise ratio PLL design allows the IC-471(H)A to lock to 10KHz for extreme accuracy. New Display. ICOM's new easy-to-read two color fluorescent screen situation display shows frequency, mode, offset direction, VFO in

use, memory channel, and RT offset direction and amount. Scanning. Scanning of memories, programmable band scan, and mode scanning are available and easy to use. New Size. Only 11 1/4" W the IC-471(H)A is styled to look good and engineered for ease of operation. Internal power supply / mast-mounted preamp optional.

**Some Specifications:**  
■ Frequency Coverage: 430 - 450MHz; ■ Frequency Resolution: SSB 10/100Hz steps, FM 5KHz steps, 1KHz steps with 15 switch turned ON; ■ Frequency Readout: 7 digit fluorescent display 100Hz readout / RT; ■ Frequency Stability: ±10 PPM (±10° -160° C); ■ Memory Channels: 32 Channels, only in-band frequency programmable; ■ Usable Conditions: Temperature: -10°C - 60°C (14°F - 140°F); ■ Power Supply Requirement: 13.8V DC ±15% (negative ground) 6A Max

or 117V AC ±10%; ■ Current Drain (at 13.8V DC): Transmitting: SSB Approx. 8.0A, CW, FM Approx. 6.0A, FM Approx. 2.5A (471H 4.0A); Receiving: At max. audio output Approx. 1.4A; Squelched Approx. 1.2A; ■ Dimensions: 111mm(H) x 268mm(W) x 274mm(D); 471H - 324mm(D); ■ Transmitter Output Power: SSB CW 1 - 25W (Adjustable); 471H - 10 - 75W (AC); ■ Modulation System: SSB Balanced modulation, FM Variable response frequency modulation; ■ Max. Frequency Deviation: ±5KHz; ■ Microphone: 600 ohm electret; ■ Operating Mode: Simplex, Duplex; ■ Receiving Mode: SSB (A/F), USB (L/S), CW (A/F), FM (F); ■ Sensitivity: SSB, CW: Less than 0.5 microvolts for 10dB S+N/N; FM: More than 0.3 microvolts for 12dB S+N/N; D of 1 microvolt; ■ Selectivity: SSB, CW: More than 2.3KHz or -60dB point, Less than 4.2KHz or -60dB point; FM: More than 2.7KHz or -60dB point, Less than 5KHz or -50dB; FM: 1.5KHz or -60dB, 25KHz or -60dB; ■ Audio Output Power: 20W; ■ Audio Output Impedance: 8 ohms; ■ RT Variable Range: ±9.9KHz



## 2-Meter/FM/CW/SSB

Ease of operation on FM is provided by 5 memories plus 2 VFO's. Priority channel. Programmable offsets: 5 or 1 KHz tuning CW and SSB can be used equally conveniently with features such as squelch on sideband, 2 VFO's with equalizing capability for making your signal frequency 1 KHz or

100KHz tuning, CW sidetone, RT, AGC selective, and noise blanker. The IC-290H incorporates a full capability scanning system which allows scanning the whole band, part of the band, or the memories. Automatic stop and automatic resume after carrier drop or predetermined adjustable

delay is selectable by the user. The ICOM IC-290H features provide Remote tuning from the optional HM10 microphone. Digital frequency display, Hi/Lo power switch, LED indicators, LED bar meter. Touchtone® microphone standard, and offsets are variable in 100KHz increments.

**Some Specifications:**  
■ Frequency Coverage: 143.8000 - 148.1999MHz; ■ Power Supply Requirement: 13.8V DC ±15% (negative ground) 3.5A Max; ■ Current drain (at 13.8V DC): Transmitting: SSB (PEP 10W) Approx. 2.2A, CW, FM (10W/1W)

Approx. 3.2A/1.6A Receiving; at max. audio output Approx. 0.9A; Squelched Approx. 0.7A; ■ Transmitter Output Power: SSB High 25W (PEP), Low 1W (PEP), CW High 25W/10W, FM High 25W/10W (Variable 12.5 Watts); ■ Microphone: 1.3k ohm dynamic microphone with built in preamplifier; ■ Receiving System: SSB, CW single conversion superhetrodyne, FM double conversion superhetrodyne; ■ Receiver Intermediate Frequency: SSB, CW 10.75 MHz, FM 10.75 MHz, 455KHz; ■ Receiver Sensitivity: SSB, CW: Less than 0.5 microvolts for 10dB S+N/N; More than 3dB S+N/N/D of 1 microvolts; Less than 0.5 microvolts for 20dB noise quieting.

## IC-290H MOBILE

- 2 Meter Multimode
- 25 Watt
- Green LED
- Microprocessor Controlled
- 12 VDC

## 430MHz Multimode

The IC-490A transceiver provides many desirable base station features in a mobile package. This compact, high performance multimode radio features FM, SSB and CW (CW monitor included) to satisfy your needs in the 430-440 MHz region. Two VFO's, priority call frequency, 1 MHz up button and 4 memories mean convenience in quickly selecting important frequencies. Scanning features include full band scan, programmable band scan (scans between memory 1 and 2) or memory scan.

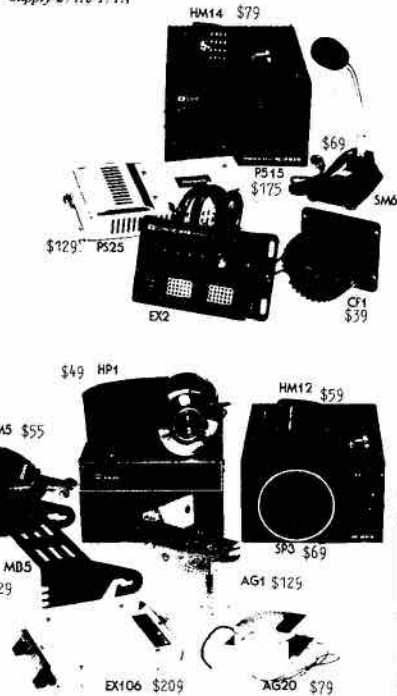
Using internal switches, the IC-490A will resume scan after an adjustable time delay, resume scan after carrier drop, sense busy or empty channels, and control scan speed. The IC-490A has a highly visible green LED readout for use over a wide range of ambient light conditions. Also, there are LED annunciators for receive, send, priority, call and duplex, as well as an LED meter for receive on SSB, AGC speed and noise blanker are controlled from the front panel. Memory backup is available with the optional IC-DU1 memory backup unit.

Scanning features include full band scan, programmable band scan (scans between memory 1 and 2) or memory scan.

## VHF/UHF ACCESSORIES

- AG20 Preamp 271A
- Filters
- Mics
- HM12/14/6
- PS25 Internal Power Supply 271A/471A

NEW !! NEW !!  
SM-8 DESK MIKE \$99.00  
UP/DN SCAN CONTROL  
COMES WITH 2 CORDS TO FIT  
2 TRANSCEIVERS... FOR ALL  
ICOM TRANSCEIVERS.....



## IC-27H/A MOBILE

- Compact
- Internal Speaker
- 32 PL Frequencies
- 9 Memories
- 45/25 Watts
- Scanning

LIST \$485  
H \$529  
SPECIAL ICOM  
PROMOTION ??



### 2-Meter/FM

ICOM presents the IC-27A, 25 Watt and its brother, the IC-27H, 45 Watt, 2 meter mobiles. Together they constitute an important breakthrough in 2 meter mobile communications. Both measure only 1 1/2" x 5 1/2" and have internal speakers which make them the most

compact 2 meter mobiles available. The IC-27's are full featured. The IC-27H has 32 PL frequencies front panel selectable from the main tuning knob, 9 memories which store a receive frequency, transmit offset and P tone, priority scan, dual VFO's, 1 meg-up button, tuning speed button and

optional speech synthesizer. The HM23 microphone with up/down buttons and DTMF pad are standard. A new style mobile mount allows front mounting of the unit without having to swing the mobile mount open.

The optional speech synthesizer (UT16) verbally announces the receiver frequency of the transceiver through the simple push of a button. This unique feature allows the user to hear what frequency he is operating on without looking at the transceiver.

**Some Specifications:**  
Frequency Coverage: 144.000-148.000 MHz  
Frequency Resolution: 5KHz/10KHz steps  
Frequency Control: Microcomputer based 5KHz step Digital PLL synthesizer  
Independent Dual VFO Capability  
Frequency Stability: Within  $\pm 0.001\%$   
Memory Channels: 9 channels with any in-band frequency programmable  
Usable Conditions: Temperature: -10°C - 60°C (14°F - 140°F)  
Operational time: Continuous  
Antenna Impedance: 50 ohms unbalanced  
Power Supply Requirement: 13.8V DC, 1.5A (negative ground)  
7A Max. Current Drain (at 13.8V DC)  
Transmitting High (25W) Approx. 0.5A  
Low (SW) Approx. 0.3A  
Receiving At max audio output: Approx. 0.7A  
Squelched Approx. 0.5A  
Dimensions: 38.41mm(H) x 140mm(W) x 177.19mm(D) (1.5" x 5.5" x 7.0") Shows the dimensions including projections  
Weight: Approx. 1.2kg  
Output Power: High 25W Low 5W  
Emission Mode: 16F (F3E)

approx. 6.0A (25H, 45 watts, 10A) Dimensions: 140mm(W) x 177mm(H) x 177mm(D) (220mm - 25H) Weight: Approx. 1.2kg  
Transmitter Output Power: 45W/25W High, 5 Watt Low  
Emission Mode: 16F3  
Microphone: 600 ohm electret condenser mic PTT switch  
Modulation: 100% AM  
Operating Mode: Simplex or duplex with 100KHz or 50KHz increments  
Receiving System: Double conversion superheterodyne  
Receiver Intermediate Frequency: 10.695MHz, 2nd: 455KHz  
Receiver Sensitivity: Less than 0.4µV for 20dB noise queuing, less than 0.3µV for 12dB SINAD  
Squelch Sensitivity: Less than 0.4µV for 20dB noise queuing, less than 0.3µV for 12dB SINAD  
Squelch Response Selection Ratio: More than 60dB  
Selectivity: More than 15KHz at -60dB point, Less than 30KHz at -60dB point  
Audio Output Power: More than 2.0W  
Audio Output Impedance: 4 - 8 ohms

**Modulation System:** Variable reactance frequency modulation  
Max. Frequency Deviation:  $\pm 5$ KHz  
Emission: More than 60dB below carrier  
Microphone: 600 ohm electret condenser microphone with push-to-talk and frequency UP/DOWN switches, and 16 key dual tone pad  
Operating Mode: Simplex, Duplex (Any offset in-band in 100KHz increments programmable)  
Receiving System: Double conversion superheterodyne  
Modulation: 100% AM  
Acceptance: 16F (F3E 16K0)  
Intermediate Frequencies: 1st: 21.830MHz, 2nd: 455KHz  
Sensitivity: Less than 0.4µV for 20dB noise queuing, less than 0.3µV for 12dB SINAD  
Squelch Sensitivity: Less than 0.4µV for 20dB noise queuing, less than 0.3µV for 12dB SINAD  
Squelch Response Selection Ratio: More than 60dB  
Selectivity: More than 15KHz at -60dB point, Less than 30KHz at -60dB point  
Audio Output Power: More than 2.0W  
Audio Output Impedance: 4 - 8 ohms

## IC-37A MOBILE

- 220 - 225MHz
- 9 Memories
- Scanning
- 32 PL Tones
- 25 Watts
- Internal Speaker
- 12 VDC

LIST \$559  
SPECIAL ICOM  
PROMOTION  
\$459/\$479

## ICOM Marine Handheld



LIST \$529  
SPECIAL ICOM  
PROMOTION !!

### M5

**GENERAL:**  
Freq. Range: 156.3 - 162.475MHz  
Emission Mode: 16F3  
Power Supply: 30 Ohms  
Requirements: 12VDC  
Current Drain @ 12.6V (CAT):  
Rx Standby: 35mA  
Rx Full Audio: 140mA  
Tx Low: 400mA  
Tx 1: 1.1A

Operating temperature range: -20° to +60°C  
Size (W x H x D): 8.25" x 3.00" x 1.50" (210mm x 76mm x 38mm)

**TRANSMITTER:**  
Output Power (CAT): H: 5.5W  
Modulation: 100% AM  
Max. Freq. Deviation:  $\pm 5$ KHz  
Spurious Emissions: More than 60dB below carrier  
Microphone: Built-in electret condenser mic

**RECEIVER:**  
Receiving System: Double conversion superheterodyne  
Intermediate Frequencies: 1st: 10.695MHz, 2nd: 455KHz  
Sensitivity: 0.3µV @ 12dB SINAD  
Selectivity: 15KHz at -60dB, 30KHz into 0.5 ohms with 10% distortion  
Spurious Response Rejection Ratio: More than 60dB

The IC-M5 comes standard with a flexible antenna, ICOM7 rechargeable NiCd battery pack, CM-16U Wall Charger, Earphone, Wrist Strap and Belt Clip.

All Accessories compatible with Icom 02AT Handheld...

OTHER ICOM MARINE TRANSCEIVERS:  
M2/76 channel handheld similar to IC-2A-----\$ 499  
M12 6-6 channel diode programmable handheld-----\$ 399  
M80 82 channel 13.8VDC 25 Watt transceiver-----\$ 799  
M700 150 Watt SSB transceiver 48 Memories 16-24\$3195

SPECIAL ICOM PROMOTION PRICES ??

MARINE DEALER INQUIRIES INVITED !!

## IC-47A MOBILE

- 440 - 450MHz
- TT Mic Included
- Microprocessor Controlled
- Scanning
- 9 Memories
- 32 PL Frequencies
- 25 Watts
- 12 VDC

LIST \$609  
SPECIAL ICOM  
PROMOTION  
\$449/\$469



### 440MHz/FM

The IC-47A 440MHz FM mobile is ICOM's microcomputerized transceiver for UHF communications. It has 25 Watts of RF power, internal speaker, 32 PL frequencies built-in and selectable with the main tuning knob, 9 memories storing frequency, offset and PL tone with lithium battery backup, scanning of memories and band, priority scan plus an optional speech synthesizer. HM23 DTMF microphone is standard, as is a stacking front loading mobile

mount, for use in conjunction with either the IC-27A or the IC-37A. The optional speech synthesizer (IC-UT16) verbally announces the receive frequency. Tones are selected by holding the tone button in and rotating the main tuning knob. Tone channel number appears in the display. Memory scanning, priority scanning and band scanning are easily accessed through 3/5 button. Top panel controls are for scan parameters.

**Some Specifications:**  
Frequency Coverage: 440MHz - 450MHz  
Frequency Resolution: 5KHz/25KHz steps  
Frequency Control: Microcomputer based 5KHz step Digital PLL synthesizer  
Independent Dual VFO Capability  
Frequency Stability: Within  $\pm 0.001\%$   
Memory Channels: 9 channels with any in-band frequency programmable  
Usable Conditions: Temperature: -10°C - 60°C (14°F - 140°F)  
Operational time: Continuous  
Antenna Impedance: 50 ohms unbalanced  
Power Supply Requirement: 13.8V DC, 1.5A (negative ground)  
7A Max. Current Drain (at 13.8V DC)  
Transmitting High (25W) Approx. 0.5A  
Low (SW) Approx. 0.3A  
Receiving At max audio output: Approx. 0.7A  
Squelched Approx. 0.5A  
Dimensions: 38.41mm(H) x 140mm(W) x 177.19mm(D) (1.5" x 5.5" x 7.0") Shows the dimensions including projections  
Weight: Approx. 1.4kg  
Output Power: High 25W Low 5W  
Emission Mode: 16F (F3E 16K0)  
Modulation System: Variable reactance frequency modulation  
Max. Frequency Deviation:  $\pm 5$ KHz  
Emission: More than 60dB below carrier  
Microphone: 600 ohm electret condenser microphone with push-to-talk and frequency UP/DOWN switches, and 16 key dual tone pad  
Operating Mode: Simplex, Duplex (Any offset in-band in 100KHz increments programmable)  
Receiving System: Double conversion superheterodyne  
Modulation: 100% AM  
Acceptance: 16F (F3E 16K0)  
Intermediate Frequencies: 1st: 21.830MHz, 2nd: 455KHz  
Sensitivity: Less than 0.4µV for 20dB noise queuing, less than 0.3µV for 12dB SINAD  
Squelch Sensitivity: Less than 0.4µV for 20dB noise queuing, less than 0.3µV for 12dB SINAD  
Squelch Response Selection Ratio: More than 60dB  
Selectivity: More than 15KHz at -60dB point, Less than 30KHz at -60dB point  
Audio Output Power: More than 2.0W  
Audio Output Impedance: 4 - 8 ohms

**Modulation System:** Variable reactance frequency modulation  
Max. Frequency Deviation:  $\pm 5$ KHz  
Emission: More than 60dB below carrier  
Microphone: 600 ohm electret condenser microphone with push-to-talk and frequency UP/DOWN switches, and 16 key dual tone pad  
Operating Mode: Simplex, Duplex (Any offset in-band in 100KHz increments programmable)  
Receiving System: Double conversion superheterodyne  
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Squelch Sensitivity: Less than 0.4µV for 20dB noise queuing, less than 0.3µV for 12dB SINAD  
Squelch Response Selection Ratio: More than 60dB  
Selectivity: More than 15KHz at -60dB point, Less than 30KHz at -60dB point  
Audio Output Power: More than 2.0W  
Audio Output Impedance: 4 - 8 ohms

# SUPER SPECIAL!

## IC-2A(T) HANDHELD 2 Meter/FM

Here are a few reasons why the IC-2A is an extremely popular handheld. It's versatility, 3 sizes of battery

pouches which easily slide on or slide off providing other power outputs and operating cycles.



Extremely compact. Fits in the palm of your hand. Only 2.6" x 1.4" x 6.5" with 800 channels transmit and receive. Synthesized. Excellent audio quality. Separate speaker and mic built-in. Output power 11 watts high with BP3, 5 watt battery saving on low TouchTone® pad on the 2A is provided as standard. Each 2A and 2AT comes complete with BP3 NiCd pack, AC wall charger, flexible antenna, earphone, wrist strap and belt clip. All standard or no extra cost.

WITH 12 BUTTON TouchTone® PAD.....

## IC-02A HANDHELD

SPECIAL PURCHASE -- LIMITED QUANTITY !!

The IC-02A is identical to the very popular IC-02AT except it does NOT have the TouchTones® built in. It still features digital frequency entry and all other features of the 02AT. It is ideal in those areas where TouchTone® is not needed. LIST PRICE \$409  
SUPER-SPECIAL \$309/\$319 LIMITED QUANTITY !!



INSURED SHIPPING AND HANDLING: Ontario and East add 2% - MINIMUM \$3.50; Manitoba and West add 3% - MINIMUM \$4.50; UNLESS OTHERWISE STATED..... IF TWO PRICES ARE SHOWN THE LOWER PRICE APPLIES TO ALL ORDERS WHEN ARE PREPARED BY CASH, CREDIT, MONEY ORDER, OR BANK TRANSFER. THE HIGHER PRICE APPLIES TO ALL OTHER ORDERS INCLUDING C.O.D., CREDIT CARDS, CHECKS, ETC..... FOR INFORMATION OR PRICE REQUESTS PLEASE SEND \$4.00 IN STAMPS, THANK YOU!!

## ATLANTIC HAM RADIO LTD.

HOURS: Mon-Fri 10 a.m.-9 p.m.  
Saturday 10 a.m.-5 p.m.  
Sunday 10 a.m.-5 p.m.  
MINIMUM CHARGE CARD ORDERS \$50  
P.O. Box 755  
Saint John, N.B.  
Canada E2L 4B3  
(506) 852-5753

ATLANTIC TIME PLEASE !!

## IC-120 MOBILE

- 1260 - 1300MHz
- Green LED
- 6 Memories
- Scanning
- Programmable Offsets
- 12 VDC Operation

LIST \$639  
SPECIAL ICOM  
PROMOTION ??



### 1.2GHz/FM/1 Watt

ICOM gives you the opportunity to explore the spectrum from 1260 to 1300MHz... with all the features found on popular 2 meter and 440MHz rigs plus some. Memories: Six memory channels plus 2 VFO's provide storage of most used frequencies in this wide band. Each memory allows memory of frequency, offset direction, offset frequency, and tone encoder frequency. Internal memory backup available.

Scanning: Scan the memories, scan all 40MHz or program a segment to be scanned. All scanning has the option of scanning for a busy or open channel. Duplex: Be able to work different repeater offsets with ICOM's programmable offset system, as they become available. 3 Tuning Rates: Tuning increments of 10KHz, 20KHz or 1MHz are available for rapid or slow tuning of the band.

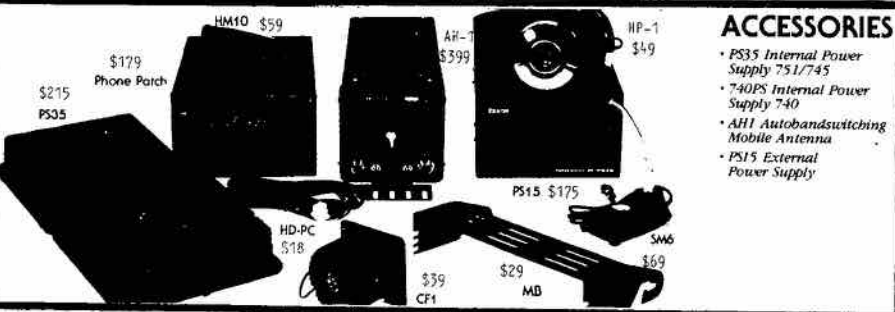
**Some Specifications:**  
Frequency Coverage: 1260 - 1300MHz  
Frequency Resolution: 10KHz or 20KHz steps with 1MHz up/down  
Frequency Control: Microcomputer based digital PLL synthesizer  
Independent dual VFO Capability  
Frequency Resolution: 4-Digit LED, 10KHz resolution  
Frequency Stability:  $\pm 0.001\%$  (-10°C - 60°C)  
Memory Channels: 6 Channels, only in-band frequency programmable  
Usable Conditions: Temperature: -40° to

+60°C (14°F to 140°F). Duty cycle: continuous  
Antenna Impedance: 50 ohms unbalanced  
Power Supply Requirement: 13.8V DC, 1.5A (negative ground)  
7A Max. Current Drain (at 13.8V DC): Receiving max audio (approx.) 0.8A, transmit @ 1 watt (approx.) 2.0A  
Dimensions: 140mm(W) x 50mm(H) x 207mm(D)  
Weight: 1.9kg (approx.)  
Transmitter Output Power: 1 watt  
Emission Mode: 16F3  
Modulation System: Variable reactance frequency modulation  
Max. Frequency Deviation:  $\pm 5$ KHz  
Spurious Emissions: 60dB or more below carrier  
Microphone: 600 ohm electret condenser mic PTT switch  
Receiving Mode: 16F3  
Sensitivity: Less than 0.5µV for 20dB noise queuing, less than 0.3µV for 12dB SINAD  
Squelch Sensitivity: 0.4 microvolt or better  
Squelch Response Selection Ratio: More than 60dB  
Selectivity: More than 15KHz at -60dB, less than 15KHz at -60dB  
Audio Output Power: 2.0 watts or more  
Audio Output Impedance: 8 ohms  
Variable Range: 3.5KHz

**Modulation System:** Variable reactance frequency modulation  
Max. Frequency Deviation:  $\pm 5$ KHz  
Spurious Emissions: 60dB or more below carrier  
Microphone: 600 ohm electret condenser mic PTT switch  
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Selectivity: More than 15KHz at -60dB, less than 15KHz at -60dB  
Audio Output Power: 2.0 watts or more  
Audio Output Impedance: 8 ohms  
Variable Range: 3.5KHz

## ACCESSORIES

- PS35 Internal Power Supply 751/745
- 740PS Internal Power Supply 740
- AH1 Autobandswitching Mobile Antenna
- PS15 External Power Supply



January 1985



## IC-02AT HANDHELD

- Digital Readout
- Scanning
- 10 Memories
- 32 PL Tones
- 3 Watt Std/ 5 Watt Opt

LIST \$449  
SPECIAL ICOM  
PROMOTION  
\$359/\$369



2-Meter/FM

ICOM's new top-of-the-line IC-02AT complements its existing line of popular handheld transceivers and accessories. The new direct entry microprocessor controlled IC-02AT is a full-featured 2-meter handheld.

Some of its many features are: scanning, 10 memories, duplex offset storage in memory, odd offsets, 32 keyboard selectable PL tones which store in memory, and internal lithium battery backup.

Keyboard entry through the 16-button pad allows easy access of frequencies, duplex, memories, memory scan, priority, dial lock, PL tones and DTMF.

An easy-to-read custom LCD readout indicates frequency, memory channel, signal strength and transmitter output, PL tone, and scanning functions.

The new IC-02AT has a high/low power switch battery lock, frequency lock, and lamp on/off switch. An aluminum case back is provided for superior heat-sinking when the IC-02AT is run at 5 Watts.

A variety of batteries are available for the IC-02AT, including the new long-life 8.4 volt IC-BP8 and 13.2 volt IC-BP7. The IC-BP7 and BP8 may be charged from a special power connector for 13.8 volts which will also power transceiver operation.

ICOM's IC-2A(T) continues to be available, and its complete line of accessories are compatible with the new IC-02AT(T).

**Some Specifications:**  
■ Frequency Coverage: 140.000 - 151.550MHz ■ Frequency Resolution: 5kHz steps ■ Frequency Control: Digital PLL synthesizer with keyboard entry ■ Scanning System: Priority, memory, program ■ Frequency Readout: LCD display (with switchable back light)

**Power Supply Requirement:** 12VDC or equivalent batteries  
■ Current Drain (at 8.4VDC):  
Transmitting - High (3.0W) approx. 1.0A, Low (0.5W) approx. 0.35A, Receiving - At max. audio approx. 140mA, squelched approx. 35mA ■ Dimensions: 155.5mm (H) x 65mm (W) x 35mm (D) without battery case ■ Weight: 515g (including BP3 battery pack and flexible antenna)  
■ Transmitter Output Power: High - 3.0W (at 8.4VDC), 0.5W (at 13.2VDC) Low - 0.5W (at 8.4VDC) ■ Emission Mode: 16K3 ■ Receiver Receiving System: Double conversion superheterodyne ■ Receiving Mode: 16K3 ■ Receiver Intermediate Frequencies: 1st 10.7MHz, 2nd 455KHz ■ Receiver Sensitivity: Less than 0.32µV for 20dB noise quieting ■ Receiver Audio Output Power: More than 500mW ■ Audio Output Impedance: 8 ohms  
Can be modified to cover 24MHz.

## ICOM PRICE LIST

## DISCOUNTS AVAILABLE ON MANY ITEMS

### TRANSCIEVERS & RECEIVERS

IC-751 HF Transceiver (General Coverage RX)	\$1799
IC-745 HF Transceiver (General Coverage RX)	\$1299
IC-730 HF Transceiver 60-10M Digital	\$999
IC-R71A General Coverage Receiver 100kHz-30MHz	\$999
IC-271A 2M Multimode Transceiver 25 Watts	\$899
IC-271H 2M Multimode Transceiver 100 Watts	\$1299
IC-290H 2M Multimode Mobile Xcvr 25 Watts	\$1299
IC-271 2M FM Mobile c/w TI-Mike 25 Watts	\$489
IC-27H 2M FM Mobile c/w TI-Mike 45 Watts	\$529
IC-2AT 2M FM Handheld 1.5 Watts 144-148MHz	\$309
IC-02AT NEW 2M FM SUPER HANDHELD 3/5 Watts	\$449
IC-37A 220MHz FM Mobile c/w TI-Mike 25 Watts	\$559
IC-3AT 220MHz FM Handheld 1.5 Watts	\$359
IC-471A 430-450MHz Multimode Xcvr 25 Watts	\$1025
IC-471H 430-450MHz Multimode Xcvr 75 Watts	\$1399
IC-490A 430-450MHz Multimode Mobile Xcvr 10Watts	\$799
IC-4AT 440-450MHz FM Handheld 1.5 Watts	\$359
IC-04AT New 440-450MHz FM SUPER HANDHELD 3/5W	\$469
IC-RP3010 440MHz Repeater with CTCSS/IDR/DTMF	\$1299
IC-120 1.26-1.30GHz FM Mobile Xcvr 1 Watt	\$639
IC-1210 1.2GHz Repeater - Syn/IDR/DTMF	\$
IC-222 500M 2M & 440 FM Mobile	\$

### ACCESSORIES

IC-2K1 Solid State Linear HF Amplifier & P.S.	\$1799
AT-500 500 Watt Automatic Antenna Tuner	\$599
AT-100 100 Watt Automatic Antenna Tuner	\$455
AM-1 Automatic Mobile Antenna with Tuner	\$399
PS-30 NEW Station Power Supply 25 Amp ICS	\$349
PS-15 Standard 20 Amp Power Supply	\$175
PS-35 Internal Power Supply 751 745 271H 471H	\$215
PS-25 External Power Supply 271A 471A	\$129
PS-45 External P.S. 27/37/47A 290H 490A 2/471A	\$149
IC-PP Phone Patch for 701 720 730 740 745 751	\$179
SP-3 Base Station External Speaker	\$69
SP-4 Small Magnetic Mount External Speaker	\$28
SP-10 NEW Slim Line External Speaker	\$39
AG-1 Mast Mount Preamp for 451A 471A	\$129
AG-20 (EX-338) Internal Preamp for 271	\$79
AG-25 Mast Mount Preamp for 271H	\$129
AG-35 Mast Mount Preamp for 471H	\$149
BC-10 Memory Backup for 551 720 730 740	\$15
BC-16U AC Wall Charger for BP-7 & BP-8	\$15
BC-25U AC Wall Charger for BP-3	\$12
BC-35 Desk Charger (Rapid) All NicaD Batteries	\$99
BP-2 450ma NicaD Low Power - Long Life	\$25
BP-2 250ma Standard NicaD	\$14
BP-1 Alkaline Battery Case for 6 AA Cells	\$15
BP-5 425ma NicaD High Power on 2/3/4AT's	\$65
BP-7 425ma NicaD High Power on 02/04AT's	\$95
BP-8 800ma NicaD Long Life for 2/02/3/4/04AT's	\$86
BU-1 Memory Backup NicaD Pack for 25A/H 290H/490H	\$35
CF-1 Cooling Fan for PS701 PS20 PS15 with EX144	\$39
CK-70 (EX-299) 12VDC Option for R-70 R-71	\$15
CM-60 6 Position Multi Charger for All NicaDs	\$10
CP-1 Cigarette Lighter Cord for 2/02/3/4/04AT's	\$10
CR-64 High Stability Osc. Crystal R-71 751 745	\$10
BC-1 12VDC Option Pack for 2/3/4AT's	\$22
BC-HD DC Cord for 6 Pin HF Rigs	\$20
BC-VHF-L DC Cord for All 25 Watt or less rigs	\$20
BC-VHF-H DC Cord for 45 Watt rigs and 47A	\$10
EX-144 CF-1 Adapter for PS-15	\$10
EX-195 Marker Unit for IC-730	\$36
EX-202 LBA-2 Unit for Auto Bandswitching IC-730	\$25
EX-203 CW Audio Filter 150Hz/6dB IC-730	\$25
EX-205 TRV Unit for Transverter Switching IC-730	\$25
EX-241 Marker Unit for IC-740 & 745	\$27
EX-242 FM Unit for IC-740 & 745	\$59
EX-243 Electronic Keyer for IC-740 & 745	\$80
EX-257 FM Unit for R-70 & R-71	\$50
EX-310 Voice Synthesizer R71A 751 271 471	\$55
EX-388 Voice Synthesizer IC-27A/H 37A 47A	\$39
FL-30 SSB Passband Tune Crystal Filter IC-730	\$55
FL-32 500Hz 9MHz CW Filter 720 751 770 871	\$89
FL-37 6kHz 9MHz AM Filter 751	\$25
FL-44 2.4kHz 455kHz SSB Filter 745 740 730 721	\$149
FL-45 500Hz 9MHz CW Filter 730 740 745	\$69
FL-52A 500Hz 455kHz CW Filter 740 745 751	\$115
FL-53A 250Hz 455kHz CW Filter 740 745 751	\$115
FL-54 270Hz 9MHz CW Filter 740 745	\$60
FL-63 250Hz 9MHz CW Filter 751 770 871	\$65
FL-70 2.8kHz SSB Filter 751	\$15
GC-4 World Desk Clock	\$119
HM-7 Standard Hand Mike 730 740 Old Style 8 Pin	\$26
HM-8 TouchTone® Mike for 255 25 45	\$75
HM-9 Speaker Mike for 2/02/3/4/04AT's	\$49
HM-10 Scan Hand Mike 730 25 255 260 290	\$59
HM-12 Scan Hand Mike 745 751 271 471	\$59
HM-14 Scan TouchTone® Mike 25 45 271 471	\$75
HP-1 Headphone with Wide Strip	\$49
HS-10 Headset for 2/02/3/4/04AT's use with SAS8	\$30
HS-103A VOX Unit use with HS-10 02/04AT ONLY	\$30
HS-103B Switch Box 2/02/3/4/04AT's	\$30
LC-2AT Leather Case for 2/3/4AT's	\$65
LC-02AT Leather Case for 02/04AT's	\$50
LC-07 Vinyl Case 2/3/4AT's	\$15
LC-11 Vinyl Case 02/04AT with BP-3	\$27
LC-14 Vinyl Case 02/04AT with BP-7/8	\$27
MMB Mobile Mounting Bracket Specify Radio	\$29
RC-10 Remote Frequency Speech VFO Control 751	\$49
RC-11 Remote Control for R-71A (Infrared)	\$85
Service Manual HF VHF Handies	\$35
SM-2 Desk Mike 4 Pin 211 551 701	\$69
SM-5 Desk Mike 8 Pin 720 730 251 290 25 255	\$69
SM-6 Desk Mike 8 Pin 745 751 271 471	\$69
SM-8 NEW Scan Desk Mike for 2 Xcvrs All Icom's	\$99
UT-155 Interface Bd with TS32 En/Decoder 2/471	\$149
IC-7072 Transceiver Unit 720A-R70	\$149
MMB-21 Car Hanger for 2/02/3/4/04AT's	\$20
RC-01 Rain Case for 2/02/3/4/04AT's	\$35

## HANDHELD ACCESSORIES

ATLANTIC HAM RADIO LTD.  
P.O. BOX 755  
SARATOGA, N.Y. 12158  
(508) 652-5755

HS10-HS10SB for IC-2/3/4AT  
R02/04AT

HS10-HS10SA VOX for 02/04AT

HS-10 Header  
HS-10SB PTT Switchbox  
HS-10SA VOX Unit (Not shown, works only with 02AT and 04AT)

IC-M11 12VDC 144MHz Booster 10W out/1.2 VDC (comes w/5 ft. coax, DNC to ext. PL-259)

IC-02AT 2-Meter

IC-3AT 220MHz

IC-04AT 440MHz

IC-BP8 8.4VDC

IC-BP7 13.2VDC

IC-BP3 3.0VDC

IC-BP2 2.5VDC

IC-BP1 1.5VDC

IC-BP0 0.5VDC

IC-BP-1 1.5VDC

IC-BP-2 2.5VDC

IC-BP-3 3.0VDC

IC-BP-4 4.0VDC

IC-BP-5 5.0VDC

handheld transceiver for 440 - 450MHz. Frequency entry, control functions and the 32 PL tones are controlled by the 16-button pad on the face of the radio. Also included are priority scanning (both of memories and programmable band scan), custom LCD readout, and DTMF.

Ten memories with internal lithium battery backup give the ultimate in flexibility for easy access to most-used channels. The IC-04AT may be used to bring up any frequency between 440 and 449.995MHz with 5KHz spacing, or favorite frequencies may be stored in the memory and recalled at the touch of a button.

The IC-04AT comes complete with a sealed case, an aluminum headset and battery lock. The IC-04AT utilizes the existing accessories for the IC-02AT, plus new accessories such as long-life and high-power battery packs and a boom headset.

**Some Specifications:**  
■ Frequency Coverage: 440.000 - 449.995MHz ■ Frequency Resolution: 5kHz steps ■ Frequency Control: Digital PLL synthesizer with keyboard entry ■ Scanning System: Priority, memory, program ■ Frequency Readout: LCD display (with switchable back light) ■ Power Supply Requirement: 13.8VDC or equivalent batteries ■ Current Drain (at 8.4VDC): Transmitting - High (3.0W) approx. 1.2A, Low (0.5W) approx. 0.35A, Receiving - At max. audio approx. 170mA, squelched approx. 45mA ■ Dimensions: 116.5mm (H) x 65mm (W) x 35mm (D) without battery case ■ Weight: 515g (including BP3 battery pack and flexible antenna) ■ Transmitter Output Power: High 3.0W (at 13.2VDC), Low 0.5W (at 8.4VDC) ■ Emission Mode: 16K3 ■ Receiver Receiving System: Double conversion superheterodyne ■ Receiving Mode: 16K3 ■ Receiver Intermediate Frequencies: 1st 10.7MHz, 2nd 455KHz ■ Receiver Sensitivity: Less than 0.32µV for 20dB noise quieting ■ Receiver Audio Output Power: More than 500mW ■ Audio Output Impedance: 8 ohms  
Can be modified to cover 24MHz.

(0.5W) approx. 450mA Receiving - At max. audio approx. 170mA, squelched approx. 45mA ■ Dimensions: 116.5mm (H) x 65mm (W) x 35mm (D) without battery case ■ Weight: 515g (including BP3 battery pack and flexible antenna) ■ Transmitter Output Power: High 3.0W (at 13.2VDC), Low 0.5W (at 8.4VDC) ■ Emission Mode: 16K3 ■ Receiver Receiving System: Double conversion superheterodyne ■ Receiving Mode: 16K3 ■ Receiver Intermediate Frequencies: 1st 10.7MHz, 2nd 455KHz ■ Receiver Sensitivity: Less than 0.32µV for 20dB noise quieting ■ Receiver Audio Output Power: More than 500mW ■ Audio Output Impedance: 8 ohms  
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HS10-HS10SA VOX for 02/04AT

HS-10 Header  
HS-10SB PTT Switchbox  
HS-10SA VOX Unit (Not shown, works only with 02AT and 04AT)

IC-M11 12VDC 144MHz Booster 10W out/1.2 VDC (comes w/5 ft. coax, DNC to ext. PL-259)

IC-02AT 2-Meter

IC-3AT 220MHz

IC-04AT 440MHz

IC-BP8 8.4VDC

IC-BP7 13.2VDC

IC-BP3 3.0VDC

IC-BP2 2.5VDC

IC-BP1 1.5VDC

IC-BP0 0.5VDC

IC-BP-1 1.5VDC

IC-BP-2 2.5VDC

IC-BP-3 3.0VDC

IC-BP-4 4.0VDC

IC-BP-5 5.0VDC

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IC-02AT 2-Meter

IC-3AT 220MHz

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IC-BP8 8.4VDC

IC-BP7 13.2VDC

IC-BP3 3.0VDC

IC-BP2 2.5VDC

IC-BP1 1.5VDC

IC-BP0 0.5VDC

IC-BP-1 1.5VDC

IC-BP-2 2.5VDC

IC-BP-3 3.0VDC

IC-BP-4 4.0VDC

IC-BP-5 5.0VDC

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IC-M11 12VDC 144MHz Booster 10W out/1.2 VDC (comes w/5 ft. coax, DNC to ext. PL-259)

IC-02AT 2-Meter

IC-3AT 220MHz

IC-04AT 440MHz

IC-BP8 8.4VDC

IC-BP7 13.2VDC

IC-BP3 3.0VDC

IC-BP2 2.5VDC

IC-BP1 1.5VDC

IC-BP0 0.5VDC

IC-BP-1 1.5VDC

IC-BP-2 2.5VDC

IC-BP-3 3.0VDC

IC-BP-4 4.0VDC

IC-BP-5 5.0VDC

# New CP Amateur Radio Club assists with local CP Rail Marathon

TCA's cover shows some members of a newly-formed Canadian Pacific Amateur Radio Club posing on the back platform of a retired railway caboose at the Montreal location of the 1984 CP Rail President's Trophy Run, last Oct. 13.

The marathon race is run in several locations across Canada and the Lachine Canal Bicycle path was the location of the Montreal run. More than 200 Canadian Pacific employees, pensioners and their families participated in this year's

event, at locations across Canada.

Some readers may recognize the call letters posted on the rear of the caboose as those formerly belonging to Club Payette Radio, an organization well remembered for supplying parts, service and equipment to the radio fraternity for many years.

The new CP Amateur radio group as its first activity provided the CP Rail Marathon organizers with communications for the course monitoring, half-way turn around confirmation, survey of the

course for stranded or injured runners, both during and after the event, and were on standby in case there was an injury or emergency. The operation took place on 2 metres direct.

Canadian Pacific employees, retirees and family members who are interested in further information about the new group should contact Ron Patterson VE2GMT, Room C-23, 910 Peel St., P.O. Box 6042, Station "A" Montreal P.Q. H3C 3E4. Δ

K. Baker VE2XL

## Amateurs help Man of Vision

Dr. John Warnica VE3JKW is an ophthalmologist who spends his vacations working in Third World countries. The mission of which he is a member can use an item of scrap from many households—discarded eyeglasses. John's group can take old glasses, check the prescription, and fit them to some less fortunate individual far away.

If the glasses are too scratched for use, the group will strip the frames for parts. Nothing is wasted.

A letter in TCA, July/August this year, from Geoff Smith VE3KCE, an Ontario director of CAREF, alerted the Federation to this need for glasses. To follow up, the CAREF table at the Ontario Radio Club's Convention carried a box to hold any glasses that might be brought.

That box was full to overflowing at the convention's end. When we counted the loot, we had 60 pairs of glasses in cases, 67 pairs without, 36 odd lenses—and one deaf aid!

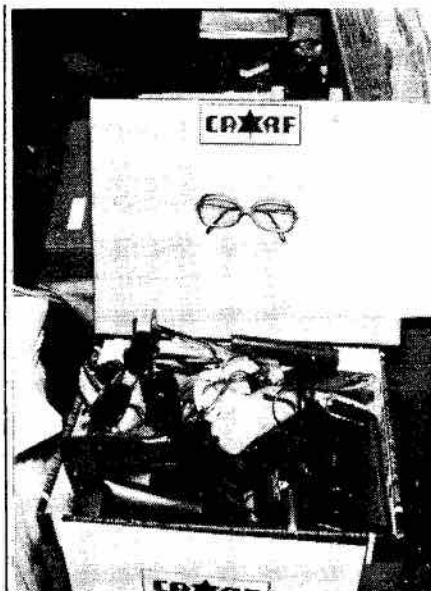
"We are most grateful to those

who took the trouble to bring in old glasses," says John VE3JKW. "They will be distributed in Haiti this coming February and March. In the fall we plan to go to Nicaragua.

"The gift of a pair of glasses to a patient frequently makes it possible for them to work at a handicraft to earn themselves a living, something impossible without glasses: they are outstandingly grateful for the gift.

"The work is a busman's holiday, but it is extremely interesting and worthwhile. And I'd like to express my own appreciation to those Amateurs who work phone patches for us when we are abroad. It means a lot to keep in touch so easily."

So bring your old glasses to the CAREF table at any flea market or convention or hamfest. We'll see they get to John's group. Δ



Good measure, pressed down, and shaken together. Old eyeglasses, 163 of them, off to Haiti soon.

### ADDRESS WANTED

For Daniel Doddridge VE2FTB, last known at St. Etienne de Lauzon, Quebec.

### LATE DOC NEWS

Amateur licence fees will be raised to \$20 a year as of April 1, 1985. Re-read Page 22 and write your M.P.



# Ontario Ra Conve



October 5, 1984, and the RSO Convention. So off to the Westin Hotel, Ottawa, and to the Convention floor. There we sign on at the registration desk, and get a bagful of goodies and a handful of tickets, like Sydney VE3GVI in the picture. He's being signed on by Al VE3LNH and Joan VE3FVO, while VE3CDS looks on.



Then in to the exhibits. There's a table, right across the door, where the Ottawa Amateur Radio Club welcomes us. The OARC is the host club this year, and their efficient organization has put it all together.



On our right, the VE3QSL bureau, run by the Ontario Trilliums for -- what's this? CRRL and CARF together? I thought they were -- Anyway, Thelma VE3CLT and Marie VE3AHG are happy to handle our cards for us.





# Radio Society Convention

And right in the middle of the room, with the Ontario and Canadian flags over all, is the CARF table, and there's Gerry VE3CDS talking to Doug VE3CDC. Lots of goodies to buy, and here's where you deposit old eyeglasses and Dominion slips.



Over on the left, there's some of the distributors, with the usual crowd slaving over the goodies on display.



And here, posing for a picture, are Joan VE3FVO and Tom VE3CDM. President of CARF and President of CRRRL respectively! Will wonders never cease?



# CONTEST SCENE

By John Connor VE1BHA



**H**ere we are in the first month of a new year, 1985. The Christmas tree has been stripped of its decorations and pitched into the garbage, the New Year's Eve parties are over, the bills are coming in and all we have to look forward to is the longest month of the year, February. (Yes, I know it only has 28 days. It doesn't matter.) Well, there is a bit more to look forward to. For with the end of February comes the ARRL International DX Contest.

This month we will look at the results of last year's ARRL Contest. But first, let's look back to last fall and recall the CQ WW Phone Contest.

The consensus of opinion seems to be that, all things considered, conditions for the CQ Phone test were not bad. Ten metres was only a shadow of its former self, of course, but 15 and 20 were in good shape. Openings may have been a bit shorter than we have been used to in the past few years, but they were there. Forty meters was in excellent shape, although 80 and 160 were a bit disappointing.

As usual, lots of good DX showed up for the contest. Among some of the better multipliers noted here were 5R8AL, VP8PU, HZ1AB, 3D6DX and CE0ZIJ. Not so exotic but very prominent were such operations as 4V2C, VP2VCW and P44A.

As for Canadians, there seemed to be a good level of activity, with several stations doing quite well. Four scores have been reported to me. Read call, category, QSO's, zones, countries and score:  
XN7EIK 20M 720 23 56 136k

VE3OCU (VE2ZP) 20M 1139 25 87 321k

VE3BMV 40M 2000 30 100 600k

VE2USA MM 3800 57 175 1.8M

Thanks to VE2ZP and VE7EIK for this info.

VE2USA was an expedition to zone 2 by four W8's. In addition to this group, VO2CP was doing a FB job from Churchill Falls. I also heard a few other stations on from zone 2, so it wasn't too hard to get your zone 2 multiplier that weekend. If you missed it, it's your own fault, hi!

Jan. 26/27— CQ WW 160 CW

Feb. 16/17— ARRL CW

23/24— CQ WW 160 Phone

Mar. 2/3— ARRL DX Phone

16/17— Bermuda Contest

30/31— CQ WPX Phone

## ARRL DX Contest Rules

Dates: Feb. 16/17 CW; Mar. 2/3 Phone; Full 48 hour period.

Categories: Single operator, single band; single op, all band; multi single; multi op, two transmitter; multi op, multi transmitter; QRP single op, all band.

Exchange: Send signal report and province; receive signal report and input power

QSO's: Work anyone outside of W/VE.

Multiplier: Sum of DXCC countries worked per band.

Points: Score three points per DX QSO.

Score: QSO points times multiplier.

Full information available from ARRL.

Got any information on contests?

Let John know!

## ARRL DX Contest Results

Next page is a listing of the Canadians listed in the official results from the 1984 ARRL DX Contest, which appeared in October 1984 QST.

In the all band phone competition, VE7AAQ led the pack with 465k. Second was VE2AYU with 255k points. Breaking the 100k barrier in the single band category was VE1FW with 103k on 15 metres. A couple of other scores of note in the phone section were VE1YX, who had the top W/VE score on 160 with 12,696 points; and VE8DX, who made 144 people very happy with a multiplier while taking top honours in Canada on 20 metre monoband.

On CW, the all band category proved popular, with VE3IY keying his way to a first place, 637k finish, closely followed by VE1FH with 596k.

Not everybody was at home for this contest, though. On phone VE5RA talked his way to tenth place worldwide, making 2900 QSO's and 2.2M points from 3D2DX. On CW, we find VE3KZ still basking on the beach in St. Kitts, and turning in the number two world score with a fine 3.4M effort as VP2KBZ. Also soaking up the sunshine was VE3LKU/HI8, who made 1.2M points. (Must have spent more time on the beach than Bob.)

Just a reminder, if you take part in the ARRL Contest, let me know how you do, and I'll put your call/name in lights.

Well, that does it for another month. To avoid February, I'm going to bed and pulling the blankets over my head. Wake me for the ARRL CW Contest, okay?

△



# RESULTS 1984 ARRL DX CONTEST

<u>CW</u>	<u>CALL</u>	<u>SCORE</u>	<u>QSOs</u>	<u>COUNTRIES</u>
28 MHz	VE2AEJ/3	10,800	90	40
	VE1ENN	4,263	49	29
21 MHz	VE1FW	50,403	317	53
7 MHz	VE3CUI	11,868	92	43
ALL BAND	VE3IY	636,795	801	265
	VE1FH	596,070	895	222
	VO1MP	458,595	711	215
	VE2AYU	421,971	673	209
	VE3DZV	332,529	557	199
	VE7AAQ	247,968	574	144
	VE5RA	189,600	395	160
	VO1AW	156,732	353	148
	VE3LDT	132,753	323	137
	VE3NBE	116,586	306	127
	VE2DPO	104,922	261	134
	VE6OU	65,400	218	100
	VE3LEJ	9,102	74	41
	VE2FFE	3,159	39	27
	VE4YO	1,311	23	19

<u>PHONE</u>	<u>CALL</u>	<u>SCORE</u>	<u>QSOs</u>	<u>COUNTRIES</u>
28 MHz	VE3CVX	52,206	226	77
	VE1ENN	41,418	177	78
	VE3NBE	18,000	120	50
	VE5ACY	858	22	13
21 MHz	VE1FW	103,248	478	72
14 MHz	VE8DX	15,552	144	36
	VE7BIK	15,042	109	46
	VE6XS	11,583	99	39
	VE5ADA	11,070	82	45
7 MHz	VE3MFA	9,963	81	41
	VE3CUI	108	6	6
1.8 MHz	VE1YX	12,696	92	46
ALL BAND	VE7AAQ	465,300	825	188
	VE2AYU	255,339	441	193
	VE2WA/3	155,310	334	155
	VE3DLT	150,936	331	152
	VE4JK	142,710	355	134
	VE6OU	441,120	420	112
	VE3FDP	135,864	306	148
	VE4CCC	59,670	195	102
	VE3FEA	35,604	138	86
ALL BAND	VO1CA	35,235	135	87
	VE4ALO	26,862	121	74
	VE2AEJ/3	9,936	69	48
	VO1AW	9,372	71	44
	VE5AFF	1,458	27	18
MULTI SINGLE	VE6AO	24,300	150	54

## News Briefs

### PRESIDENT RESIGNS

Joan Powell VE3FVO has resigned the CARF Presidency for personal reasons. Ron Walsh VE3IDW has accepted the position and will take over on Feb. 1.

### U.S. AIRLINES BEGIN SKY PHONE SERVICE

Washington (UPI)— For the first time Monday, passengers on wide-body commercial jetliners flying across the United States were able to make calls from pay phones. The phones, initially available in 20 planes operated by six major airlines, are soon expected to be widely available.

Calls will cost \$7.50 for the first three minutes and \$1.25 for each additional minute, but for the first week or so passengers will be allowed to make calls free and asked to fill out questionnaires.

To place a call to anywhere in the United States, passengers insert a major credit card into the base unit on the phone. After the call is approved, they can take the cordless phone back to their seats.

VE7HL

Vancouver Province

Oct 16/84

### WORTH COPYING

The program for the evening was quad antenna construction under emergency conditions! No books, no solder! Those in attendance broke up into two groups and attempted to build an antenna capable of raising VE3TOP in Elliot Lake. — from

The Algoma Amateur.

### MASTERCARD & VISA SERVICE NOW OFFERED

It is now more convenient than ever to join CARF and to order CARF Publications. When ordering, simply send your Name, address, Card Number and Expiry Date, with your signature.





# FINAL RESULTS OF THE LAST THREE CARE CONTESTS

Well here I am again with these last three Contests. After rushing through the initial tabulations and along with Murphy to help me, the October issue of TCA with the contest results were mixed up quite badly. As a result of many calls and letters, I have had to go through all of the logs of the last three contests and start all over again.

Here are the complete results with all of the logs I have received, and I hope I have all of the stations now in their right place and contest. I guess this is what happens when the contests results are very late and overlap. My apology to all of the Amateurs that I have disappointed with the poor results in the October issue. Anyway, from now on the results should be fairly quick and should be out in TCA about four months after the contest.

73, Norm VE6VW

## CANADA DAY CONTEST 84

CLASS	CALL	TOTAL	QSOs	MULTIPLIERS	THOMMY/ CERTIFICATE
A	WJLW/P NB	47250	165	30	T
A	VO1VCA	29680	122	28	X
A	W3JGH	29400	236	25	C
A	YU3AZC	28449	108	23	C
A	VE3KHE	18910	78	31	C
A	VE6CB	16602	106	19	C
A	W3ARK	9360	84	24	
A	W5WG	8876	61	14	
A	VE6PW	8668	55	16	
A	NOCLV/Q	6097	84	13	
A	NC2V	5222	49	14	
A	VE7BAG	4575	35	15	C
A	W8CQA	4560	52	15	
A	K8CW	3352	128	8	
A	AG5C	7824	65	16	
A	VY1TCA	3110	32	10	
A	KA9OIH	2570	36	15	
A	VE2AEJ/3	2190	22	10	
A	N4JRH	2360	49	10	
A	XO3OMU	1183	25	7	
A	VE1ENN NS	1971	32	9	
A	VE7AV	1120	15	7	
A	N2LTF	1127	25	7	
A	VE7XYL	960	15	6	
A	N3CZB	980	14	7	
A	LJ1EWL	938	25	7	C
A	W4BFLV	924	67	12	
A	VE2BQQ	720	12	6	C
A	W5HR	518	20	4	
A	W6AGD	244	7	4	
A	KR5CP	126	9	2	C
A	N1CRD	120	4	3	
7	CZ1CCM NS	6918	123	14	C
7	CZ1Caf NS	8778	83	14	
7	VE2FUP	4220	97	10	C
7	VE7BS	2696	67	8	C
7	N4LNX	2448	53	8	C
7	YU7SF	444	21	4	C
7	VE3MCH	230	50	7	C
14	XO3NBE	38320	400	20	
14	VE1ZB	13167	126	11	C
14	VE7ELK	12628	190	14	C
14	CZ1TX	10440	192	15	C
14	VE31QJ	7248	56	16	
14	VE7LDA	5835	47	15	
14	HB9CSA	3500	34	10	C
14	VE7DRI	2884	160	7	
14	AA6EE	1547	32	7	C
14	YV5JEA	680	24	5	C
14	YU1KQ	801	137	16	C
14	W3DKD	760	19	10	C
14	VE3KXT	630	11	7	
14	Y54VA	408	12	4	C
14	JAB7AU	306	48	3	C
14	OK1HCH	72	24	3	C
14	X24TU	11	2	1	
14	HA5UK	10	1	1	C
M	VE6CAW	69615	339	35	T
M	DA2CF	8810	106	10	C
M	JA9YBA	3402	108	9	C

Check Logs- HB9CSA, VE6CB, AG5C, VY1TCA, XO3OMU  
Multi Stns- JA9YBA, JH7UJR, JA9LW, JA9ODA  
DA2CF, DA2ZS, DA2GN, VE1AHE  
VE6CAW, VE6CCO

## CANADA DAY CONTEST 83

CLASS	CALL	TOTAL	QSO	MULTIPLIERS	THOMMY/ CERT.
A	VE5GF	348264	625	72	T
A	VE3JAN	118508	248	52	C
A	VE3LW	103296	287	64	
A	CY1LW/P	94794	352	37	C
A	VE1CEG	76498	230	46	C
A	VE7EAW	44928	143	32	
A	VE3JAS	38984	203	22	
A	VE3MXY	25260	68	60	
A	VE5VCA (VE5AE)	14640	103	16	
A	VE3KFT	13816	141	22	
A	VE2GPH	12580	74	17	C
A	VE7GCD	11934	72	17	
A	VY1CW	10716	59	19	C
A	VE3KQI	6120	36	20	
A	VE7BAG	5328	34	16	
A	VE3KHE	4900	34	14	
A	VE3NFI	2100	22	12	
A	WA3JXW	1728	20	9	C
A	JALYAX	1498	41	7	C
A	LJ1EWL	1377	18	9	C
A	VE4ZH	960	16	6	C
A	VE1REI	952	19	7	
A	VE3GWH	707	11	7	
A	VELIN	5	5	0	

1.8	VE3INQ	12	3	1	C
7	VY1CCM	13266	116	18	C
7	VE3NVO	438	10	6	
14	VE8MA	26729	307	12	C
14	VE2ZP	20812	106	22	C
14	VE3HPT	18000	96	18	C
14	VE3NOS	16321	98	19	
14	VE7OLM	13300	86	19	C
14	VE8PZ	8955	62	15	
14	JH3DPB	8289	12 8	9	C
14	VE3CEY	6936	61	12	
14	JA0VHI	1505	25	7	
14	VO1QU	1414	22	7	C
14	VY1DV	1384	20	8	C
14	JH3WKE	200	5	4	
14	JA1OYB	40	2	2	

21	YU7ORQ	10	1	1	C
M	VE6CAW	140556	380	53	T
M	VE3GSQ	7008	78	16	C
M	JA9YBA	19708	334	13	C

Check Logs- VE1CEG, VE3JAS, VE3INQ, VE8PZ, VY1DV, JH3WKE, VE3GSQ

Multi Stations- VE6CAW, VE6CCO  
VE3GSQ, VE3JAS  
JA9YBA, OYX, QAJ, VBA, VDA, JHOCAL

## CANADA CONTEST 83

CLASS	CALL	TOTAL	QSO	MULTI	THOMMY/ CERT.
A	VE7VX	109417	230	49	T
A	VE2KHZ (VE3KZ)	89056	412	46	C
A	VE6CAW	35122	194	34	C
A	VE4QST (VE1MG)	32305	103	35	C
A	VE5VCA (VE5AE)	22761	96	27	C
A	VE3HRE	9158	76	19	C
A	VY1CW	7480	33	22	C
A	VO1JST (VO1AW)	570	34	5	C
A	LJ1EWL	96	5	3	C
7	VE3CRD	5460	49	14	C
7	VE7GHH	4334	41	11	C
7	VE7BS	2016	35	8	
14	VE3LQJ	11823	64	21	C
14	VE3NOS	6069	38	17	
14	VE3DWE	4345	43	11	
14	VE7GCK	1750	23	7	C
14	VE1TCA (VE1ZN)	1372	24	7	C
14	VE3PQ	910	10	7	
14	VE2AEJ/3	485	16	5	
14	VE3LCH	153	6	3	
M	VE2FSM	35594	104	37	T
M	VE3IRA	5680	38	16	C
M	DA2CF	4272	57	12	C

Checklogs- VY1CW, VE1TCA

Multi-Stns- VE2FSM, VE2GPN  
VE3IRA, VE3CES, VE3NZQ, VE3AZO plus the code class.  
DA2CF, DA2ZS, VE3MNO, VE3LXJ, VE3IVQ, VE3JSY, DA2CH



# AMSAT NEWS

by Gordon Wightman VE5XU  
Regina, Saskatchewan  
S4T 1M4

**S**ince writing last months column dealing primarily with the Russian satellites, a change has occurred that should be noted. Because of longer periods when the satellites are in eclipse and not battery charging, mode operations have been somewhat curtailed. This is not permanent, but you should be aware of it when you find you not only cannot hear the transponder but also the beacon may be shut down. Generally, at least one of the three, RS5, 7 or 8, will be heard, although in all likelihood not all three, nor every day.

*Just in from Amsat UK via 20 mtr net. Latest RS schedule: RS5 Mon/Fri, RS7 Tue/Sat, RS8 Thur/Sun.*

## Stepping up to Oscar 10

Operation on this satellite is almost the ultimate in reliability and long range. Due to its high elliptical orbit Oscar 10 remains above one's horizon for long periods daily. Many of the difficulties experienced on the low altitude satellites— such as rapidly changing azimuths or elevations and doppler shift— are not present. Because of its relatively slow motion across the sky, especially near apogee, these adjustments are required infrequently. The higher frequencies utilized do, however, require more care and attention to top quality feedlines. For the downlink, use of good 2 metre receivers or converters plus a sensitive preamp, preferably a gasfet, is highly desirable.

There are available at this time a number of excellent transverters or transceivers for the 70 CM uplink.

These are in the 10 watt category, all one needs, or should use Mondays UTC, designated QRP day. Linear amplifiers generally run up to 100 watts with a good selection available. A good low cost transceiver is the Echo 70 which has been advertised second-hand in TCA for under \$300. It would be wise to concentrate on improving downlink reception first. Keep in mind you want as short a feedline as possible. In most cases this can be accomplished by mounting the antennas low and close to the shack.

Once major obstructions have been cleared, height can be minimal. In some cases, right at ground level via short mast or tripod.

## Downlink Antenna

The old adage "you can't work them if you can't hear them" was never more true than with Oscar 10. Improving the 2 metre receiving is the key to good operation. While linear polarization vertical or horizontal will work, the ideal is selectable circular polarization

*Continued on next page ►*

## MODE B FREQUENCY GUIDE

Exclusive of Doppler shift.

Uplink		Downlink	
435.025	Scheduled Use	145.987	Beacon, Engineering
435.035	Scheduled Use	145.972	SSC H1
		145.965	SSC H2
435.033		145.962	Upper Limit
.040		.960	
.045		.955	
.050		.950	
.055		.945	
.060		.940	
.065		.935	
.070		.930	
.075		.925	
.080		.920	
.085		.915	
.090		.910	
.095		.905	
435.100	Center Band	145.900	
.105		.895	
.110		.890	
.115		.885	
.120		.880	
.125		.875	
.130		.870	
.135		.865	
.140		.860	
.145		.855	
.150		.850	
.155		.845	
.160		.840	
.162		145.838	Lower Limit
435.165	Scheduled Use	145.835	SSC L2
435.175	Scheduled Use	145.825	SSC L1
		145.810	Beacon, General



either right-hand (RHCP), or left-hand (LHCP), such that most of the rapid spin QSB of the signal will be minimized. The ham magazines advertise a wide variety of suitable antennas with selectable circular polarization.

#### Uplink Antenna

With the smaller dimensions, greater gain per area can be obtained at 70 CM. Once again good results can be achieved with linear polarization but, as in the downlink, circular polarization reduces spin QSB considerably. If you are limited to one, then use right-hand as Oscar 10 is optimum for this polarity over the greater part of its orbit. An excellent inexpensive easy-to-build is the helix to be discussed next month.

#### Satellite Operation

Mean Anomaly Count	Transponder Mode
0-99	B
100-117	L
118-204	B
205-245	OFF
246-256	B

Hourly Beacon Mode Minutes	
0-05, 30-35	CW
5-15, 20-30	PSK
30-45, 50-60	PSK
15-20, 45-50	RTTY

The 145.810 kHz beacon on the hour and half-hour will announce the mean anomaly count (MA) and from the table can be ascertained its approximate position in the orbit and times of transponder activation. Oscar 10 repeats after 19 days within one degree with a slightly lower Northern Apogee. Each day the apogee shifts East by about 9 degrees equivalent to about 45 minutes earlier. Each orbit of 699.5 minutes is divided into 256 parts perigee to perigee. Thus apogee occurs at Mean Anomaly 128.

#### Your Letters

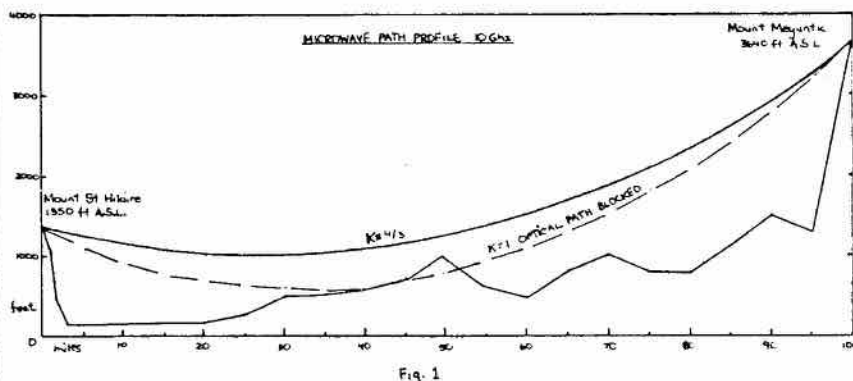
Next month, more to follow,

particularly operating and DX news. Your letters and photos plus news will be welcomed for publishing. Your input will help to

generate a monthly column. Satellite operation is a whole new experience—give it some thought. Better still, try it!  $\Delta$

## Correction

The chart below was accidentally omitted from the story on 10 GHz operating in the December issue of TCA. Please excuse the error.



Do you have news  
of interest to  
Canadian Amateurs?

# Call the TCA Newsline

# 613-632-9847

(24 Hrs. a day)



# Microwaves

By Michael Ross VE2DUB  
2285 St. Mathieu  
Apt. 1401  
Montreal, Quebec H3H 2S7

Anyone contemplating serious microwave communications with a Gunnplexer will require something better than the 17 dB gain horn antennas supplied with the units to achieve distances over about 25 miles. At 10 GHz, even a one foot diameter parabolic dish antenna will increase the antenna gain by 10 dB and going to a two foot dish will give you another 6 dB. This equates to increasing the 15 mW output of the Gunnplexer from about .5 W ERP with the horn to nearly 30 W ERP with the two-foot dish, with the associated reduction in half power beamwidth from 30 to 4 degrees. Each additional foot in dish diameter will only provide 3 dB increases from the two-foot dish as the antenna gain is directly proportional to the area, not the diameter, of the dish. Thus, a two-foot dish is a good choice for optimum gain, minimal wind-loading and a manageable beamwidth. (It's also not too big to lug up a mountain.) This is not to say that the family 10-foot TVRO dish could not be put to good use for fixed operation at just under a KW ERP, but don't get in its way!

With such a narrow beamwidth, accurate directional control in both planes and reliable mount stability become very critical. Movements of centimetres at the antenna can create differences of kilometres in the desired direction. For portable operation, a heavy-duty camera tripod, aimed by hand with the aid of a compass level, and a detailed topographical map will be sufficient. Don't forget to consider magnetic declination.

Suitable two-foot dishes can be fabricated easily from children's aluminum snow slides or from dishes used for terrestrial direct

broadcast pay TV in the US.<sup>1</sup> To check if your snow slider is really parabolic, refer to Fig. 1 and take the following measurements: D—Diameter, c—dish depth, and substitute them into Equation 1 to determine the focal point of the dish—F. Take a series of measurements of points x and y from the center of the dish out to the rim and substitute each set into Equation 2. If the equation holds true for each set, your dish is truly parabolic. By dividing the focal length F by the dish diameter D as in Equation 3, you will have determined the F to D

ratio which will be important in designing a proper feedhorn for the antenna.

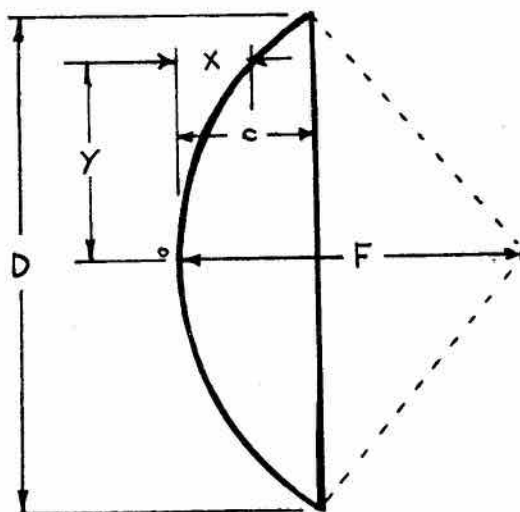
A wooden H frame tripod dish mount can be made, as described by Richardson in his Gunnplexer Cookbook<sup>2</sup>, from an 8½ inch square piece of ¼-inch plywood with two 8½x3x¼ vertical sides of the H and one 5x3x¼ support piece with nut matching camera tripod bolt glued to a hole in the center. ¼-inch holes, spaced seven inches apart in the corners of the square, are drilled

*Continued on next page* ▸

<sup>1</sup> Galaxy Electronics Inc., 5644 North 53rd Avenue, Glendale, Arizona U.S.A. 85301, 20-inch dish \$24.95 U.S.

<sup>2</sup> The Gunnplexer Cookbook by Robert M. Richardson W4UCH/2, Ham Radio Publishing Group, Greenville, New Hampshire, U.S.A. 03048.

PARABOLIC ANTENNA



$$\begin{aligned} \text{EQ. 1} & \quad y = \frac{2}{c}x^2 \\ \text{EQ. 2} & \quad y = \frac{2}{c}x^2 \\ \text{EQ. 3} & \quad F = \frac{D^2}{8c} \end{aligned}$$

Figure 1

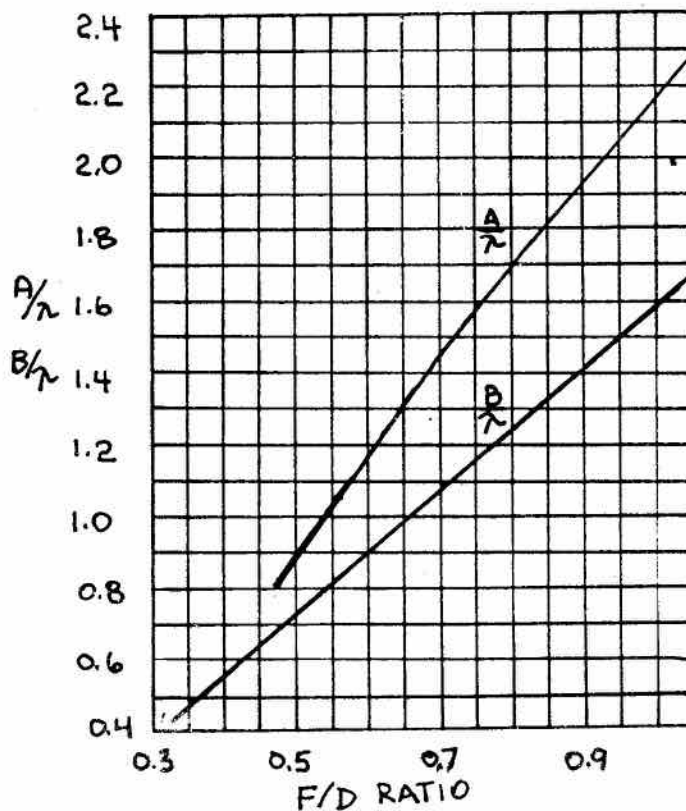
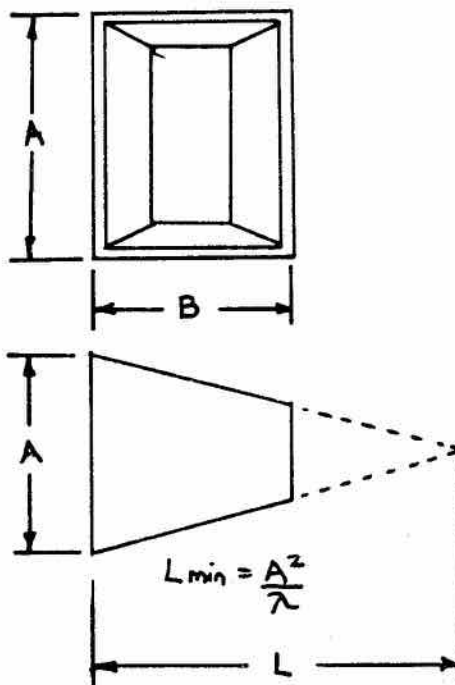
through the dish and four one-inch dowels cut at an angle to match the curved surface of the dish to the flat plate. Bolts hold the dish to the plate through the spacers. (See photo.)

While the supplied 17 dB horn may be suitable for use as a feedhorn on some one-foot dishes, most two-foot dishes will require a much shorter horn to properly illuminate the dish. Dimensions for the feedhorn may be obtained by referring to Fig. 2 for the F/D ratio of your dish. Sheet brass or copper found in most hobby stores in various thicknesses is ideal for horn construction. I have found that laying the four sides out in one continuous pattern, bending three edges, then soldering only one edge is easier than trying to correctly solder four separate edges. The flange, to mate the horn to the end of the Gunnplexer, should be made of much thicker sheet metal than the horn to prevent warping when soldering on the horn. Make the .9x.5 inch hole in the flange a little smaller and file to size after the horn has been attached. Notice that the flange is made larger than the front of the Gunnplexer to allow mounting legs to support the entire Gunnplexer at the flange. The corners may be bent to accommodate the angle required for the mounting legs to meet the holes drilled in the dish for each leg. 10-inch leg separation on the dish produces good support. The legs can be made from 3/8-inch wooden dowels fitted with 1/16x2 inch threaded rod (or bolts with the heads cut off) glued into each pre-drilled end. With at least an inch of exposed thread at each end, the feedhorn may be positioned at the focal point by adjusting the position of the nuts on either side of the mounting flange. As the focal distance of each dish will determine leg length, exact dimensions will have to be calculated separately but should probably be around one foot.

For initial positioning, the

Figure 2

# FEEDHORN



mixer diode or circulator should be placed at the calculated focal point of the dish, with final adjustment, in 1/16 inch increments, to be performed on a test range at opposite ends of a football field. RG-174 mini-coax can be used to connect the three control lines to the transceiver, terminated with BNC connectors. Upon completion of a pair of these antennas, free-space range of over 1000 miles should be possible.

When making any adjustments to the feedhorn, be sure to turn the Gunnplexer off, make the adjustment, then turn it back on. You should not be working in front of the dish while the Gunnplexer is in operation. The additional time involved waiting for it to warm up again is relatively small when compared to the potential damage that could be caused by looking into the dish or feedhorn when transmitting— safety first!

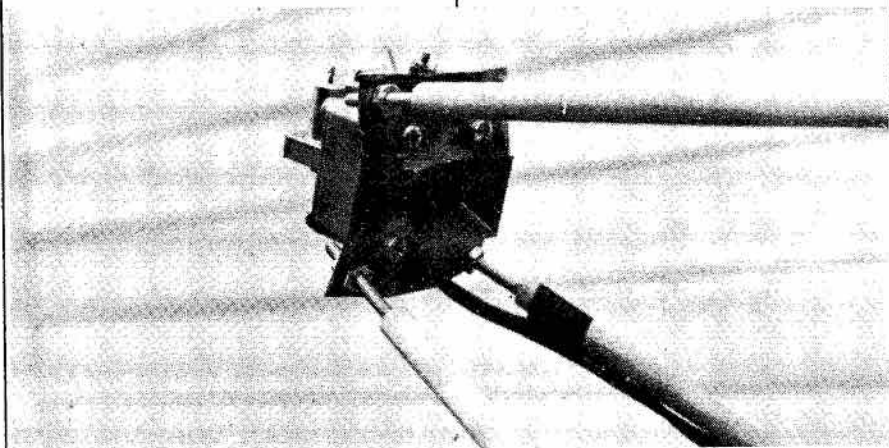
### Microwave News

Some interest was shown in 10 GHz operation by the audience of a presentation given by VE2AF and VE2DUB at the Radio Society of Ontario convention in Ottawa on Oct. 6. After a slide presentation on the theory and practical aspects of microwave communications, several VE3's and one W made their first contact on the band using a demonstration system set up after

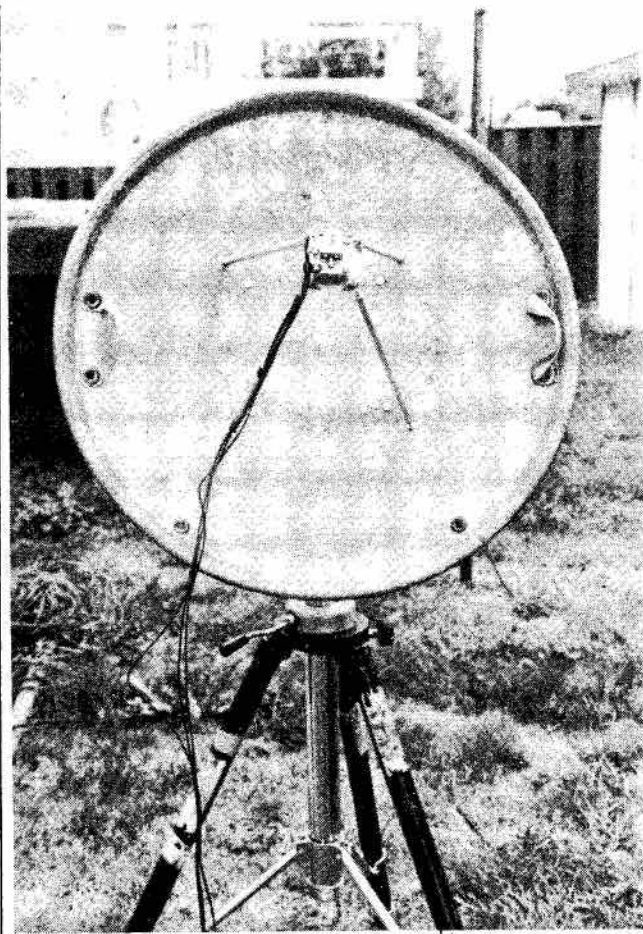
the presentation.

For those of you contemplating VUCC on the microwave bands, the ARRL is accepting suggestions on the number of grids that should be required for awards on bands above 23cm. I would appreciate receiving copies of your suggestions to obtain a Canadian perspective, as well as reports of any Canadian microwave activity.

△

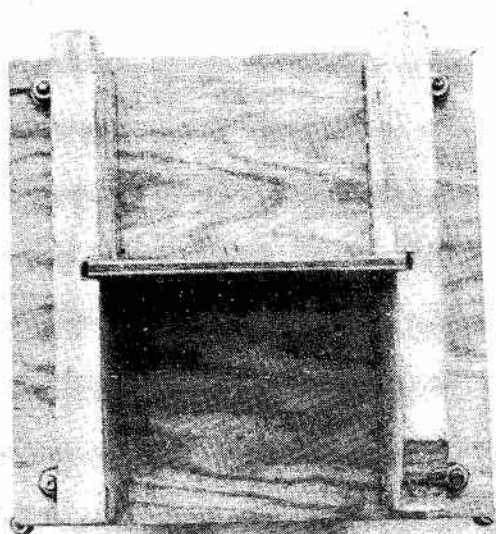


*Above: Gunnplexer fitted with homebrew feedhorn.*



*Left: Two-foot snow slider dish antenna for 10 GHz.*

*Below: H-frame tripod dish mount.*





# Maidenhead Locator System

By Folke Rasvall SM5AGM

## Background

About 30 years ago European VHF Amateurs felt a need for a short way of giving positions in contests because the scoring was based on the distance, normally one point per kilometre. The so-called 'QRA Locator' was invented, consisting of two letters, two digits and a final letter, giving an accuracy of about five kilometres. In the beginning the system was only used in contests, and only in the Federal Republic of Germany and neighbouring countries. Later the system came into universal use on VHF and higher frequencies and expanded to all parts of Europe, Western Asia and Northern Africa. A popular game was to collect the  $2^0 \times 1^0$  'squares,' indicated by the first two letters of the locator.

However, the alphabet consisted of only 26 letters, and to cover more than  $52^0$  in longitude and  $26^0$  latitude the system had to repeat itself. The same locator could unfortunately be found in many parts of Europe. Almost ten years ago the author tried without much initial success to start discussion about a new system that could expand to world-wide coverage without repetition. In 1978 IARU Region 1 decided to contact Regions 2 and 3 on this matter. Later in 1978 a Region 3 conference was held in Bangkok, Thailand where JARL (Japan) was asked to study the question on behalf of Region 3. W3XO discussed the locator question in QST, Sept. 1979.

In October 1979 I proposed a system with  $20^0 \times 10^0$  units  $2^0 \times 1^0$  smaller units and  $6' \times 3'$  smallest units. Two months later I received a

letter from G4ANB who had proposed a system that was almost exactly the same without having seen my system. The main difference was that G4ANB had  $5' \times 2.5'$  as the smallest unit.



*The Author*

In April 1980 a meeting of European VHF Managers was held in Maidenhead, U.K., where I presented the more than 20 systems that I had received so far. It was found that the best possible system was a modified version of the system that G4ANB had proposed and it was decided that this system should be sent to the other regions for comments. The modification consisted of shifting the starting point from Greenwich to the date-line in accordance with the system that I had proposed. In summer 1980 JARL had finished their study and recommended 'The Human Language Code System,' longitude and latitude. In October 1980 Region 2 held a conference in Lima, Peru, where it was decided to "defer the approval of the locator system." In April 1981 a Region 1 conference was held in Brighton, U.K., where

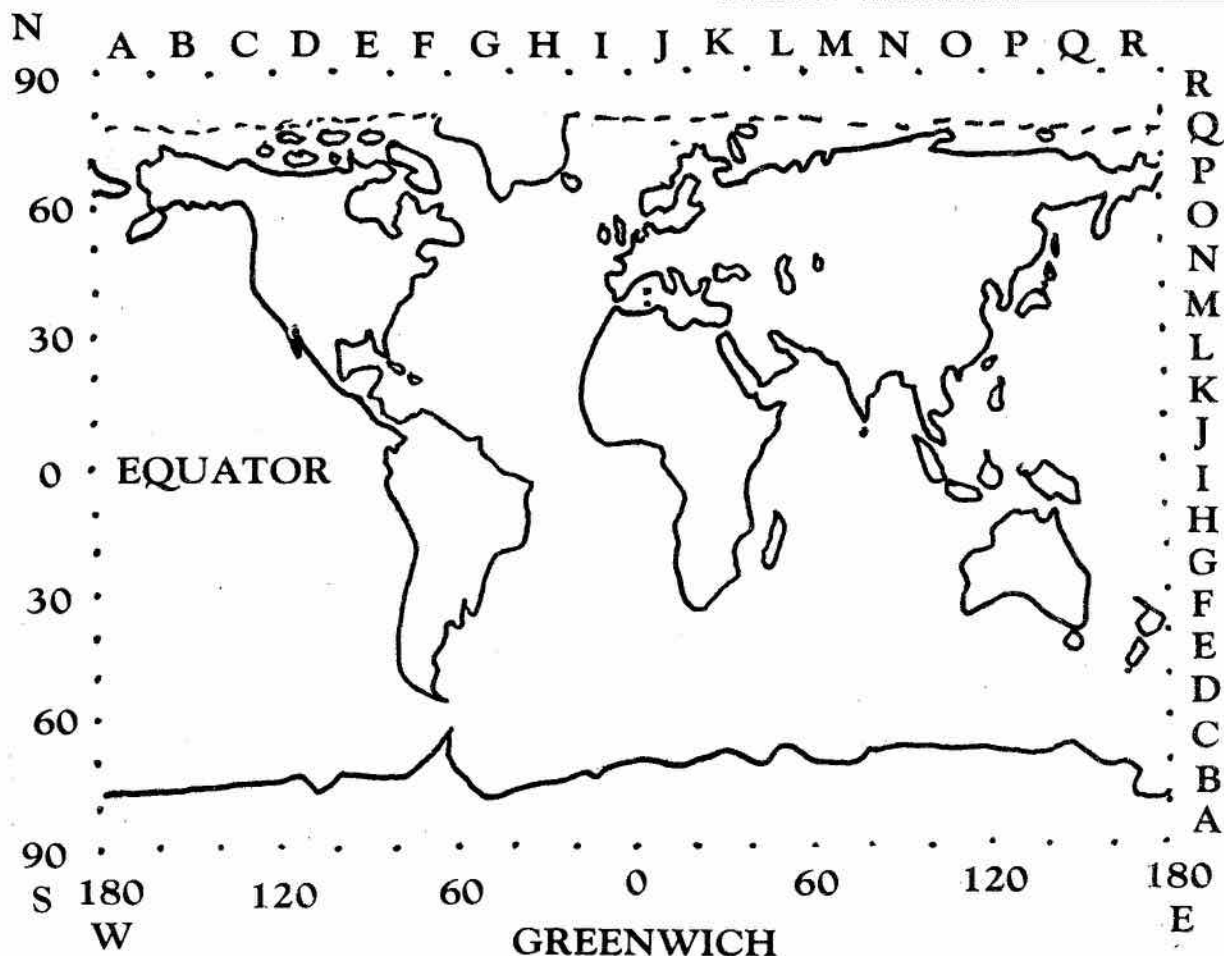
RSBG and SSA (Sweden) jointly proposed that Region 1 should adopt the new locator. The proposal was lost because the majority felt that the response from the other Regions was not positive enough. ("Why should we change if there is no interest outside Europe?")

Via Region 3 secretary, 9V1RH, I had got in contact with the then NZART Vice-President ZL2AMJ, who recommended that a possible way out of the stalemate was to adopt both longitude-latitude and the Maidenhead Locator in parallel. This was proposed by NZART at the next Region 3 conference in Manila, The Philippines, in April 1982. At that conference the Human Language Code System was adopted for immediate use and the Maidenhead Locator was adopted with the addition of "when the time is appropriate". During January 1983, ARRL announced their new 'VUCC Award' for having worked a number of Maidenhead Locator squares on 50 MHz and higher bands. Region 2 held a conference in Cali, Colombia, in June 1983, where latitude-longitude and the Maidenhead Locator were adopted for immediate use. In April 1984, Region 1 finally decided in Cefalu, Italy, that the present locator shall be replaced by the Maidenhead Locator as at Jan. 1, 1985.

## The Maidenhead Locator

The earth's surface is divided into  $18 \times 18$  'fields,' each one  $20^0$  (longitude)  $\times 10^0$  (latitude). Each field is divided into  $10 \times 10$  'squares,' each one  $2^0 \times 1^0$ . Each square is finally divided into  $24 \times 24$  'sub-





squares, each one  $5^\circ \times 2.5'$ . The fields are indicated by two letters, the squares by two digits and the sub-squares by two letters. The direction of the numbering is always west to east and south to north in all parts of the earth's surface.

Many readers might now ask why the system is based on  $2^\circ \times 1^\circ$  blocks instead of  $1^\circ \times 1^\circ$ . There are two reasons for this. The first and most important reason is historical. Thousands of Amateurs in Europe have used thousands of hours to collect the  $2^\circ \times 1^\circ$  squares and many countries declared that any new locator must be based on the old  $2^\circ \times 1^\circ$  squares to be acceptable. The original reason that  $2^\circ \times 1^\circ$  was chosen 30 years ago was that Europe was so far from the equator that  $2^\circ \times 1^\circ$  blocks look more like squares than  $1^\circ \times 1^\circ$ . The other

reason is that if want to arrive at  $1^\circ \times 1^\circ$  we must use four letters. Since we do not want the locator to consist of only letters, we must use digits for the final subdivision arriving at  $6' \times 6'$ .

In the Maidenhead Locator the subsquares are  $5' \times 2.5'$  representing a somewhat closer accuracy. A possible solution would have been to start with both letters and digits in the first position giving  $10^\circ \times 10^\circ$  fields and  $1^\circ \times 1^\circ$  squares, but then the format would not have been constant (letters and digits in the same position). A long discussion about the reasons for the Maidenhead Locator can be found in an article in *Radio Communication*, November 1980, pp. 1160-1163, by G4ANB.

#### Finding One's Locator

Start by finding your longitude

and latitude in degrees and minutes from a map and use the computer-printed table for any place worldwide. When finding the final two letters, keep in mind that the square is two degrees wide. For example the fractional part of  $173^\circ 16'$  is  $1^\circ 16'$ , not  $16'$ . Example: Longitude  $173^\circ 16'E$  and latitude  $41^\circ 48'S$  gives locator RE68PE.

#### Practical Use

For many years the old locator has been exchanged in Europe during all types of contacts. This has many advantages: You always know the position of the other station within 5 km, and you know where to direct your antenna, you know the distance, you can collect the fields and squares for lists and awards, you can use them in contests as multipliers or for bonus

Continued on next page ►

points, etc. Since the Maidenhead Locator was introduced in U.S.A. in January 1983, it has become very popular and much faster than expected. Expeditions are often made to rare squares in the same way as done in Europe for many years, e.g. to FN51 at the eastern tip of Massachusetts.

So far the locator has almost only been in use on frequencies above 30 MHz and the reason is that it was impossible to use the old system on HF because it was repeating itself outside central Europe. With the new locator system just adopted by all three regions of IARU we have an excellent opportunity to start using it on shortwave. The largest unit 'field' could be an interesting thing

to collect for those who have already worked all continents, all zones, all DXCC-countries, etc. There are 324 fields on the earth and it should be very difficult to work them all, especially the 36 triangle-shaped fields around the poles.

Since the end of 1982 I have been compiling a list of fields worked on VHF and UHF. On 144 MHz the first place is shared by K1WHS (FN) and SM7BAE (JO) with 36 fields. On 432 MHz the first place is also shared, 31 fields by K2UYH (FN) and DL9KR (JO), and on 1.3 GHz K2UYH (FN) has 16 fields. If there is interest among HF-Amateurs I would be glad to extend the field-list to all bands. Who is number one worldwide on each shortwave band? I am looking

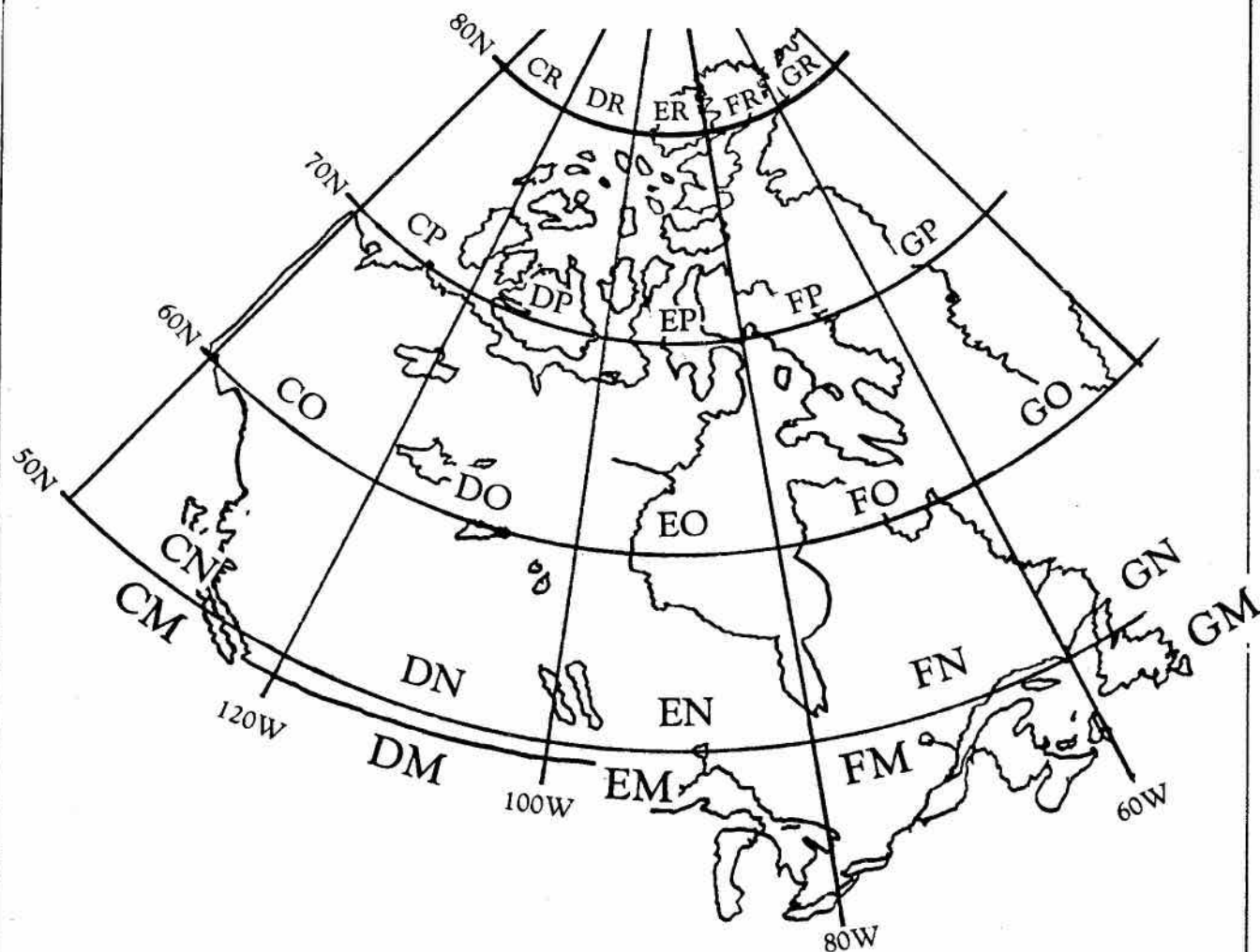
forward to your letters!

### Acknowledgements

The way to adoption of a world-wide locator system by all three regions of IARU has been long and full of hard work. There have been two major difficulties, the first one was to change a system in Europe that had been in use for decades by thousands of Amateurs, the second one was to get support from the other continents for an idea that was new to them and for which they never might have asked for.

Fortunately there was one person in ZL who was more far-seeing than most other Amateurs outside Europe, namely Fred Johnson ZL2AMJ. During many years the three IARU regions were

Continued on page 46 ▷





# MAIDENHEAD LOCATOR

## GENERAL DESCRIPTION:

THE EARTH'S SURFACE IS DIVIDED INTO 18 \* 18 FIELDS, EACH ONE 20 \* 10 DEGREES.  
EACH FIELD IS DIVIDED INTO 10 \* 10 SQUARES, EACH ONE 2 \* 1 DEGREES.  
EACH SQUARE IS FINALLY DIVIDED INTO 24 \* 24 SUBSQUARES, EACH ONE 5 \* 2.5 MIN.

FIELDS:			SQUARES:			SUBSQUARES:															
NORTH	90D	<table><tr><td>AR</td><td>BR</td><td>CR</td><td>-</td><td>RR</td></tr></table>	AR	BR	CR	-	RR	10D	<table><tr><td>09</td><td>19</td><td>29</td><td>-</td><td>99</td></tr></table>	09	19	29	-	99	60 M	<table><tr><td>AX</td><td>BX</td><td>CX</td><td>-</td><td>XX</td></tr></table>	AX	BX	CX	-	XX
	AR	BR	CR	-	RR																
	09	19	29	-	99																
	AX	BX	CX	-	XX																
	80	<table><tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table>						9	<table><tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table>						57.5	<table><tr><td> </td><td> </td><td> </td><td> </td><td> </td></tr></table>					
60	<table><tr><td>AC</td><td>BC</td><td>CC</td><td>-</td><td>RC</td></tr></table>	AC	BC	CC	-	RC	3	<table><tr><td>02</td><td>12</td><td>22</td><td>-</td><td>92</td></tr></table>	02	12	22	-	92	7.5	<table><tr><td>AC</td><td>BC</td><td>CC</td><td>-</td><td>XC</td></tr></table>	AC	BC	CC	-	XC	
AC	BC	CC	-	RC																	
02	12	22	-	92																	
AC	BC	CC	-	XC																	
70	<table><tr><td>AB</td><td>BB</td><td>CB</td><td>-</td><td>RB</td></tr></table>	AB	BB	CB	-	RB	2	<table><tr><td>01</td><td>11</td><td>21</td><td>-</td><td>91</td></tr></table>	01	11	21	-	91	5	<table><tr><td>AB</td><td>BB</td><td>CB</td><td>-</td><td>XB</td></tr></table>	AB	BB	CB	-	XB	
AB	BB	CB	-	RB																	
01	11	21	-	91																	
AB	BB	CB	-	XB																	
80	<table><tr><td>AA</td><td>BA</td><td>CA</td><td>-</td><td>RA</td></tr></table>	AA	BA	CA	-	RA	1	<table><tr><td>00</td><td>10</td><td>20</td><td>-</td><td>90</td></tr></table>	00	10	20	-	90	2.5	<table><tr><td>AA</td><td>BA</td><td>CA</td><td>-</td><td>XA</td></tr></table>	AA	BA	CA	-	XA	
AA	BA	CA	-	RA																	
00	10	20	-	90																	
AA	BA	CA	-	XA																	
SOUTH	90		0		0																
180160140120		180D	0 2 4 6	20D	0 5 10 15	120M															
WEST		EAST																			

NUMBERING ALWAYS WEST TO EAST AND SOUTH TO NORTH

## FINDING ONE'S MAIDENHEAD LOCATOR:

FIRST CHARACTER 

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

LONGITUDE D WEST 180 120 60 0 60 120 180 D EAST

THIRD CHARACTER 

0	1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---	---

LONGITUDE 0 2 4 8 12 16 20 D EAST

D WEST 20 16 12 8 4 2 0

FIFTH CHARACTER 

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

LONGITUDE 0 5 20 40 60 80 100 120 M EAST

M WEST 120 100 80 60 40 20 5 0

SECOND CHARACTER 

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

LATITUDE D SOUTH 90 60 30 0 30 60 90 D NORTH

FOURTH CHARACTER 

0	1	2	3	4	5	6	7	8	9
---	---	---	---	---	---	---	---	---	---

LATITUDE 0 1 2 4 6 8 10 D NORTH

D SOUTH 10 8 6 4 2 1 0

SIXTH CHARACTER 

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

LATITUDE 0 2.5 10 20 30 40 50 60 M NORTH

M SOUTH 60 50 40 30 20 10 2.5 0

EXAMPLE: 76 DEGREES 58 MINUTES WEST AND 39 DEGREES 6 MINUTES NORTH.

LONGITUDE 76 D 58 M WEST GIVES FIRST CHARACTER F, REST 16 D 58 M WEST GIVES THIRD CHARACTER 1, AND REST 58 M WEST GIVES FIFTH CHARACTER M.

LATITUDE 39 D 6 M NORTH GIVES SECOND CHARACTER M, REST 9 D 6 M NORTH GIVES FOURTH CHARACTER 9, AND REST 6 M NORTH GIVES SIXTH CHARACTER C.

RESULT: FM 19 MC



waiting for each other and nobody wanted to take the first step. Then the door was opened by the NZART proposal to the 1982 conference, followed by almost immediate action by ARRL and Region 2. Then it was easy for Europe and Region 1 to be the last one in line.

My warmest thanks to NZART for its invaluable help.

from BREAK-IN,  
NZART's magazine.

ARRL sells a map of The Maidenhead Grid for North America. Be warned: if you want the grid for Canada, the American idea of the northern limit for 'North America' is the fiftieth parallel.  $\Delta$

## COMPUTER TRANSFORMATION BETWEEN LONG.LAT. AND MAIDENHEAD LOCATOR

COMMODORE PET BASIC

THIS BASIC PROGRAM CONVERTS LONG.LAT. INTO MAIDENHEAD LOCATOR  
LONG. BETWEEN -180 (WEST) AND +179.999... (EAST),  
LAT. BETWEEN -90 (SOUTH) AND +89.999... (NORTH)

INPUT IN DECIMAL DEGREES

```
10 INPUT "LD,LA"; LD,LA
20 LD=(LD+180)/20
30 LA=(LA+90)/10
40 A=INT(LD)
50 B=INT(LA)
60 LD=(LD-A)*10
70 LA=(LA-B)*10
80 C=INT(LD)
90 D=INT(LA)
100 A$=CHR$(A+65)+CHR$(B+65)+CHR$(C+48)+CHR$(D+48)
110 A$=A$+CHR$(INT((LD-C)*24)+65)+CHR$(INT((LA-D)*24)+65)
120 PRINT "MAIDENHEAD LOCATOR ";A$;
130 END
```

EXAMPLE: 1.785 DEGREES WEST AND 51.078 DEGREES NORTH  
(INPUT -1.785, 51.078) GIVES MAIDENHEAD LOCATOR IO9ICB

THIS BASIC PROGRAM CONVERTS MAIDENHEAD LOCATOR INTO LONG.LAT.  
FOR MIDPOINT OF SQUARE

```
10 INPUT "MAIDENHEAD LOCATOR";A$
20 FORK=1TO6
30 A(K)=ASC(MID$(A$,K,1))
40 NEXT K
50 LD=-180+(A(1)-65)*20+(A(3)-48)*2+(A(5)-64.5)/12
60 LA=-90+(A(2)-65)*10+A(4)-48+(A(6)-64.5)/24
70 PRINT "LD";LD,"LA";LA;
80 END
```

EXAMPLE: MAIDENHEAD LOCATOR IO9ICB GIVES LONG.LAT.  
FOR MIDPOINT OF SQUARE 1.7917 DEGREES WEST  
(-1.7917) AND 51.0625 DEGREES NORTH

## News Briefs

### MORE U.S. PROPOSALS WOULD AFFECT CANADIAN AMATEURS

The FCC now proposes to re-allocate 1900-2000 kHz in the 160 metre band to 'non-government' radio-location use. The proposal notice calls for deletion of half of the current shared Amateur allocation to make room for radio-location stations which will be pushed upward because of the upcoming expansion of the AM broadcast band. Another notice proposed authorizing all popular modes of emission in the 160 band.

(Tnx Westlink Report)

(DOC has made no moves on the 160 band and the power restrictions are still in place for Canadians but not for U.S. operators.)

Harold Cottam, the wireless operator whose relay of the first news of the Titanic disaster in 1912 helped save more than 700 people aboard the doomed British liner, died in Nottingham, England, recently. He was 93.

As the only wireless operator on the rescue ship *Carpathia* he was at his key without sleep or rest from Sunday morning until sometime Tuesday night, when he collapsed at his post.

Niagara Peninsula ARC furnished communications for the Canadian Diabetes Association bike-a-thon, and got a nice letter of thanks from the Association's committee.

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newsline at 613-632-9847.





# Past, Present, Future

## Past

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# TECHNICAL SECTION

Section Editor  
Frank Hughes VE3DQB



## RTTY Demodulator

By Andre Bedard VE2FNF  
1525 Ferland ouest  
Alma, Quebec

With plenty of home computers around, it has become far easier for the Amateur radio operator to have access to new communication modes. RTTY is one of them, and it is quite fascinating. In its BAUDOT form, all that is needed is a program that can read, at the right time, the five bits of the byte, convert the byte into ASCII, the code used by computers, and put the character on screen.

Computers work with binary state circuitry (on/off or 1/0 or hi/low voltage). Amateur radio communications are done via modulated RF signals, so to convey information by ASCII or BAUDOT, two tone modulated signals are used.

For the Amateurs these audio tones are 2125 Hz, which is called the 'mark' and given the binary state '1,' and 2295 Hz, which is called the 'space' and given the binary state '0'. The shift is the difference between these two zones; in this case, it is 170 Hz. Of course there are other tones and shifts (850 Hz, 425 Hz) used, but the 2295/2125 tones are the most widely used in the Amateur area. What is unfortunate is that computers do not have senses to hear the tones; so, by the process of demodulation we convert these audio tones to binary state signals that can be read by the computer. This process is done by a demodulator. This

interface, like an sense organ, is the link between the computer and the outside world; it converts the 2295 tone to binary '0' and 2125 to binary '1'.

We can find many demodulators, some high priced and some low priced. Sometimes Amateurs like to experiment, try some electronic building, and have good performance at a low price. This is what this article is written for.

This demodulator is built around two ICs (LM7641), 3 transistors (2N2222), 4 LED's, 8 diodes (1N914) and some resistors (1/4W, 5%) and capacitors (mylar). It offers good sensitivity, filtering of received tones and both mark and space demodulation (contrary to phase locked loop circuits that use over/under reference frequency demodulation).

### Theory of operation

The circuit has four stages: limitation, bandpass filtering, detection and comparison. The limiter stage is an operational amplifier driven to saturation; it converts received tones to square waves, so that any variation in the amplitude of the received signal will give constant output to the next stages.

The next section is the bandpass filter; there are two sections, one for the 2295 Hz and one for the 2125 Hz tone. These sections are active filters that give sharp amplification of

the chosen frequency. They are followed by the detection stages, one for each tone, each one is a full-wave detector that converts the AC coming out of the active filter to DC, '+' for one filter and '-' for the other filter. This DC is fed to the fourth stage, a comparator, a differential amplifier that will amplify to full DC supply voltage any small difference (+ or -) between the two inputs. This comparator drives an open-collector transistor that puts the computer input data line HI or LOW.

### Building comments

For good performance, and good balance for demodulation, it is best to use the right value components, especially in the filter section (resistors tolerance 5%; Mylar capacitors).

The two LM7641 are CMOS IC's. Even if inputs are diode protected, it is good practice to be careful about static discharge. Use IC sockets, and insert IC's only at the end of the soldering and building process.

The rating of the IC supply is +/- 8 VDC and the current demand is about 20 mA for this design. The V+ is connected to pin 4 of IC and the V- to pin 11. I used a +/- 5 VDC supply configuration as follows with a 5 V zener diode regulation (Figure 1):



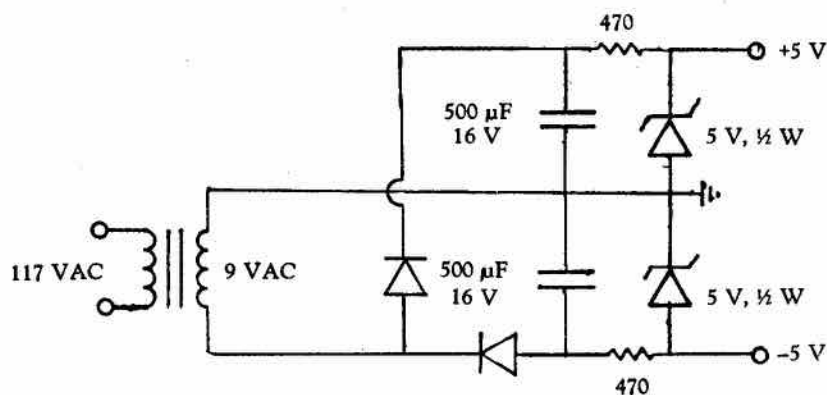


Figure 1

To eliminate noise and parasitic signals, put the board in a small aluminum enclosure. Be sure to route all ground wires to one point connected to the enclosure.

Choose four LED's that give the same illumination for the proper load. They should be placed through the front panel. The three tuning indicator LED's should be placed in a row and close together (5mm between LED's). Be sure to place in the middle position the one that is wired to the 470 ohms and to the V+ supply. This V+ supply should be taken directly at the +14 VDC on the + pole of the filtering capacitor (500 µf). The other LED, the 'mark' LED, should be placed away from the tuning indicator but on the same line.

Two 1/8" jack connectors mounted on the rear panel are used for the audio input and the output.

### Alignment and testing

Check and recheck the wiring and soldering before inserting IC's and applying power.

Use a high impedance voltmeter (FET-VOM). Check the AC voltage at the limiter output (U1, pin 14). With no audio input there should be almost no output. Increasing slowly and gradually the volume control of the audio input, the output should rapidly increase to a maximum and stay constant even if volume is increased further. A small audio signal should put the limiter in its saturated state.

With a reference audio signal of 2125 Hz, put the AC voltmeter at the output of the filter section (U1, pin 7); adjust the appropriate 2K potentiometer for maximum output. Change frequency to 2295 Hz and adjust the 2K pot of the other filter section for maximum output (U2, pin 7). When tuning is done and the tone is on 'mark,' LED should light. If the LED is off, invert the connections on it.

Check the output of the comparator (U2, pin 14) with a DC voltmeter. Changing the audio tone input from 2125 Hz to 2295 Hz, the output voltage should swing to opposite polarity, around a frequency of 2210 Hz.

Connect an ohmmeter between the open collector and the ground of the output. Repeat the preceding test, the reading should change from an open to close state or vice-versa, around a frequency of 2210 Hz.

If all is OK, then the demodulator is functional. If needed, there are two ways to invert the demodulator logic: one is to retune each filter section but inverting them (2295 Hz section is tuned to 2125 Hz, and vice-versa); the other is to invert the inputs of the comparator (U2, pin 12, 13). On the schematic, the input for the Apple computer via SW2 on the game port connector is illustrated.

### Operation

Tuning around a received

RTTY signal will produce a flickering of the 'mark' LED. If it stays on or off and there are two received tones, you are off frequency.

On the 3 LED's indicator, the left and right ones should alternately turn on and off.

For precise tuning, slowly tune the receiver frequency so that the middle LED stays stable, showing no variation in intensity. It is easier to adjust on medium volume position to begin and on low volume to finish.

The front panel should look this:

	3 LED	TUNING	'MARK' LED
MARK tone — 0	•	•	•
SPACE tone — •	•	0	0
	• = on		
	0 = off		

### Conclusion

I hope that you will enjoy the building and performance of this RTTY demodulator.

### Editor's note:

This demodulator will demodulate both ASCII and BAUDOT code. Your Apple computer will read it as GARBAGE until you write a program to Decode the input to the games port. Those of you who are good at PEEKING or POKING in BASIC might like to write us a program to do this. Have Fun!

### PARTS LIST

- 2 LM7641 Low Power Quad Op Amp
- 3 2N2222 NPN transistor
- 8 1N914 or 1N4148 diode
- 2 14 pins, IC socket
- 4 LED
- 4 .01 µf Mylar capacitor
- 1 .02 µf ceramic capacitor
- 2 240K, 1/4 w, 5%
- 2 150K 1/4 w, 5%
- 3 100K 1/4 w, 5%
- 6 82K 1/4 w, 5%
- 2 47K 1/4 w, 5%
- 1 4.7K 1/4 w, 10%
- 9 10K 1/4 w, 5%

Continued on next page ►

# Parts List (Cont'd)

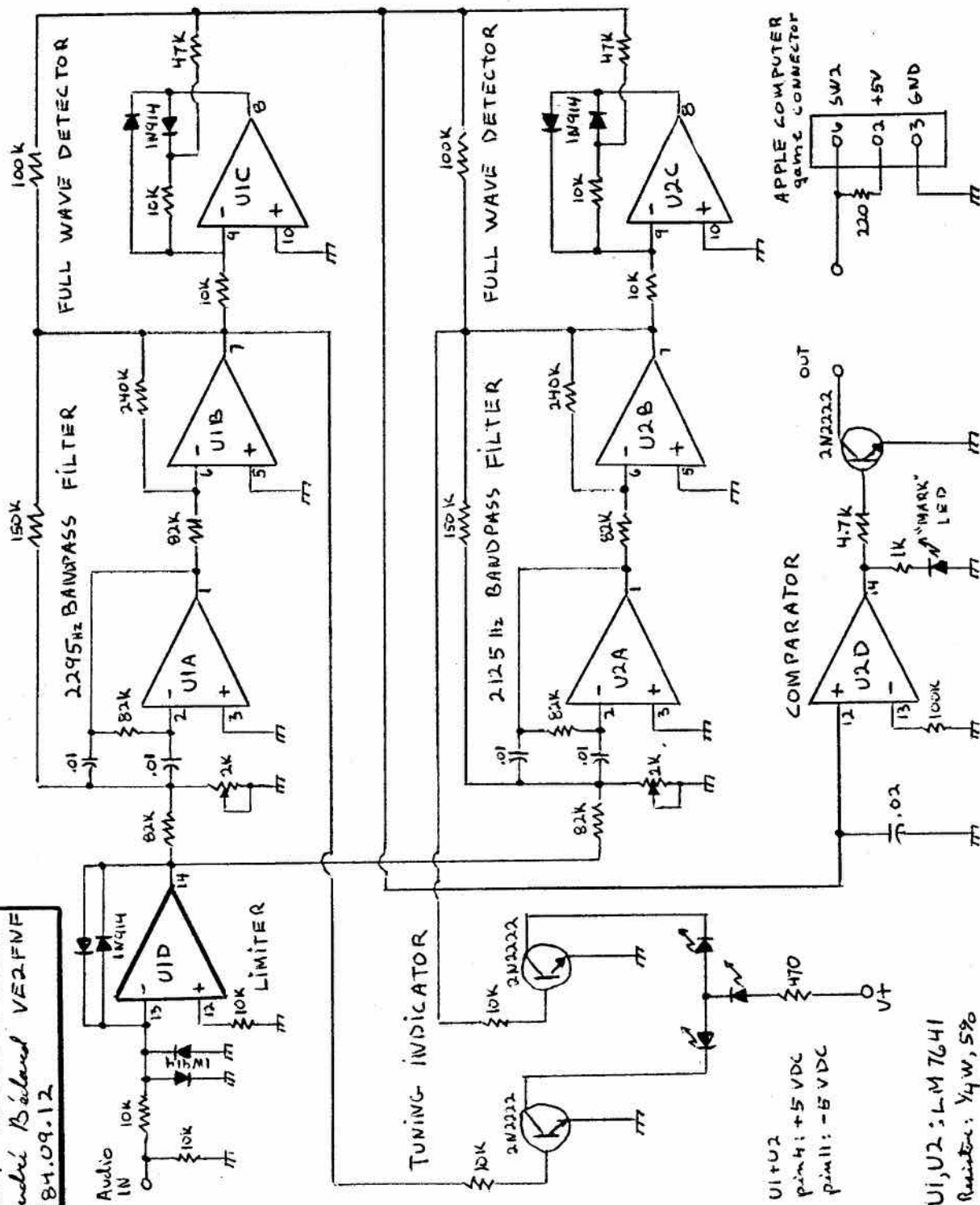
- 1 1K  $\frac{1}{4}$  w, 10%
- 1 470,  $\frac{1}{2}$  w, 10%
- 2 2k small circuit potentiometer
- 1 perforated board
- 1 aluminum enclosure
- 2 1/8" jack connector

## Power supply part

- 1 small 9 VAC output transformer, 100 mA
- 2 rectifier diode
- 2 500  $\mu$ f, 16 V electrolytic cap.

- 2 5V zener diode,  $\frac{1}{2}$  W

- 2 470,  $\frac{1}{2}$  W, 10%





# Amateur Design of Printed Circuit Boards

by John Iliffe VE3CES

*(Continued from December issue)*

If IC's in round cans are involved, or if there are a lot of components, or if the board is a digital circuit, or if you plan to turn out a lot and want all the circuits to be the same, then you have a candidate for a printed circuit board. A printed circuit board will also pay dividends in improved reliability and ease of mounting.

Having decided that your project is a candidate for a custom-made printed circuit board, you should consider the various ways they can be constructed and choose an appropriate one.

Printed circuit boards can be single or double sided. Double sided is almost mandatory for a digital circuit of any complexity, because there are no passive components such as resistors and capacitors to carry the signals over other leads and IC designers seem to be dedicated to providing the most awkward layout imaginable to the leads.

Double sided can also be used to advantage for RF circuits, especially at VHF or UHF, or where large amounts of power are involved. In these cases the pattern is laid out on one side and the other side is left unetched. When the holes are drilled, each one is reamed slightly large on the solid foil side and a large ground plane/shield is created. This will stabilize any RF circuit I have ever encountered and allows much more gain than regular point to point construction before feedback sets in. If you believe in breadboarding before you build, you will be astounded at how much better a circuit built this way will perform. The visible symptoms will

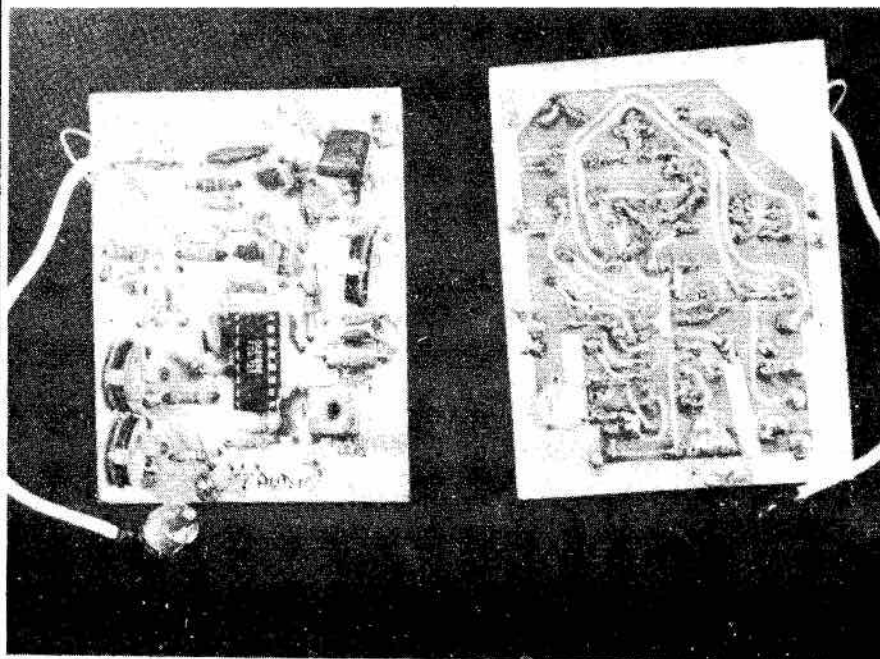
be: less white noise (from feedback not sufficient to cause oscillation), wider bandwidth (due to reduced regeneration) and more stable tuning (due to reduced pulling of the oscillators). There are also ample places to ground the bypass capacitors without having to worry about lead length.

Single sided boards are considerably easier to lay out and construct. Registration between sides is not a problem and etching problems that sometimes cause one side to etch faster than the other do not exist. A single sided board can be used if enough 'natural' cross-overs occur in the circuit to take care of the majority of interconnections. Remember, when you have laid out the board, you have done the work traditionally associated with the wiring of the project.

In some cases it may not be immediately apparent whether single or double sided will be required, or which of the several techniques to be described will best suit the project. In these cases it is best to assume the simplest way and try a layout. If it works, OK, if not then the path to proceed upon will be apparent. At this point I should mention that in many years of making up my own PC board designs, I have rarely, in fact never, found the optimum design on the first try.

Next month we will discuss some of the ways a circuit can be reduced to a form suitable for drafting in PC board form, and then we will examine some of the many ways to make a PC board and which techniques suit which types of circuits.

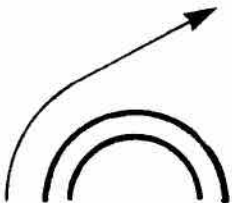
△



*The two sides of a double sided board.*

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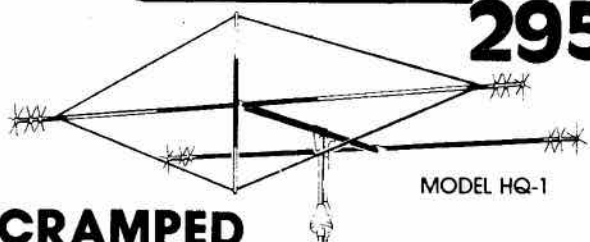


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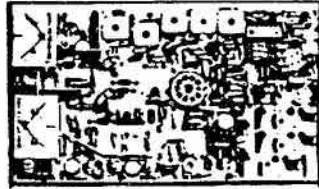
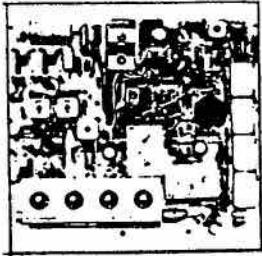
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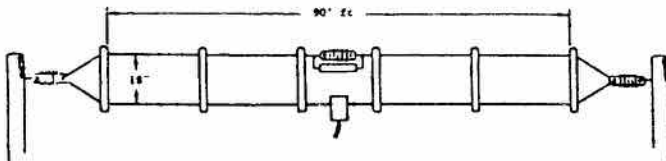




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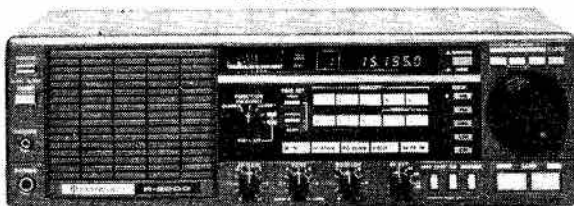
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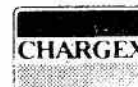


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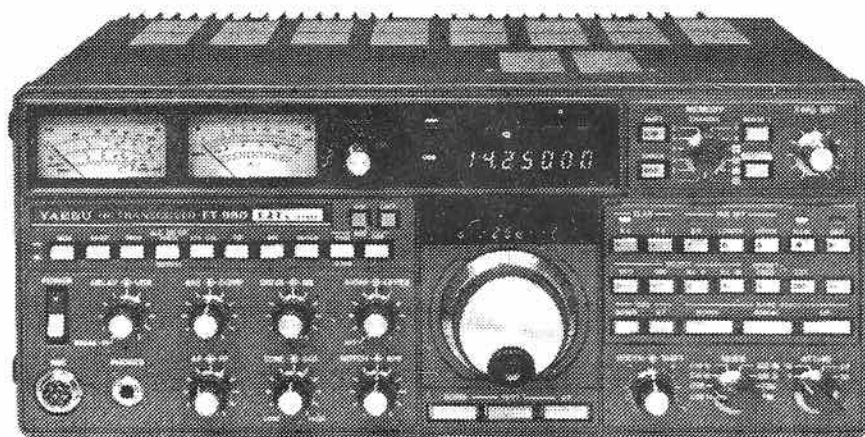
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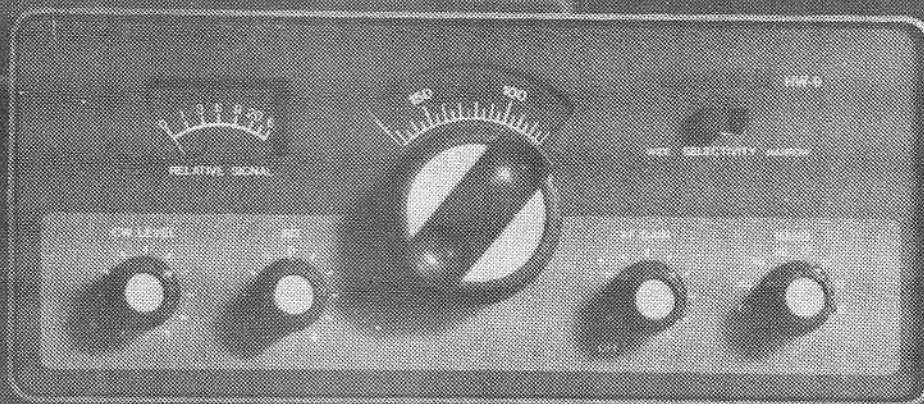
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