

# marc0gram



Official Publication of The Montreal Amateur Radio Club Inc. Box 53047 - RPO Dorval, Dorval Quebec H9S 5W4

A MARC Monthly Newsletter

Volume 54, Number 8 May 2009

*Next meeting - Wednesday 27, May 2009*

**Ragchew and Fleamarket: 19:30, Club meeting: 20:00**

## **SHOW and TELL**

St. Ignatius of Loyola Parish Church

4455 West Broadway (corner of Terrebonne) in N.D.G. - Montreal

Please enter by the back door)

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Don Dashney, VE3RM's



## A Word from The President

Hello,

Well the good weather is finally here and more people are spending time outdoors but also more folks seem to be attending some of the flea markets. Again our thanks to all those who made our flea market the success it was and perhaps you'll bring some of those newly acquired goddies or that interesting project you've been working on to the meeting for Show and Tell.

For those despairing for the future of amateur radio I am encouraged to hear that a study group has been formed at Concordia University to help a number of electrical engineering students get their tickets and hopefully and they may well be interested in experimenting and trying out new things. I firmly believe that we owe this group and any others interested in joining the hobby all the support we can offer.

Show and Tell always has something interesting so I look forward to seeing you all at the meeting.

73 de Jim.

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**Club Website:** <http://www.marc.qc.ca>

**Club Email:** [ve2arc@rac.ca](mailto:ve2arc@rac.ca)

### Repeaters

VE2BG 147.06 MHz (+)

*Owned and operated by Montreal Amateur Radio Club. Located on the Point Claire water tower.*

VE2RED 147.27 MHz (+)

*Owned and operated by the Montreal Amateur radio Club.*

### Meetings of the Board of Directors

Meetings of the Board of Directors are open to any member to attend. Board meetings are held on the first Wednesday of the month (Sept. to June) at 7:30 PM at the Montreal Association for the Blind, 7000 Sherbrooke St. West.

Should you wish to attend one of the meetings you are welcome. Just speak to one of the directors before-hand to make certain that the meeting has neither been cancelled, nor the location changed.

The MarcOgram is published nine times per year on the second to last Wednesday of September through June, excepting December, by the Montreal Amateur radio Club. Advertising and copy deadline is one week prior to publication.

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### Annual Fees are:

GeneralMembers...	\$25.00
Associate Members	\$25.00
White cane members	\$15.00
Family members (per family)	\$30.00

The membership year runs from September 1 to August 31. Membership received on or after June 1 commences immediately and extends through the subsequent membership year - covering a period of up to fifteen months.

Articles published in the MarcOgram may be reproduced provided credit is given to the original author and the Montreal Amateur radio club.

The opinions expressed herein are, unless otherwise stated, solely those of the authors concerned, and not those of the Club, the Directors or members and do not represent the policy of the Club.

### Club Activities - Monthly Meetings

Club meetings are held on the last Wednesday of the month. The meetings will be held in the Lounge which is the rearmost door on the South side of the building unless we have reason to hold it in the Parish Hall which is the first door on the South side of the building. An informal flea-market and ragchew session starts at 19:30 with the formal meeting starting at 20:00. STM buses 51, 162, and 105 stop-

### From the Editor's Desk

You'll see, starting on page 5 of this issue I have produced an article that introduces a new Amateur Radio Initiative to connect all Amateur Radio text messaging capabilities together so that any ham anywhere at any time, using any text messaging device can text message any other ham using whatever communications device is

**MARC Fundraiser WE NEED YOUR SUPPORT**

In order for MARC to reach some of its goals, the BOD have decided to increase the advertising in the marcOgram newsletter. The rates are as follows:

Business card	\$ 5.00 per issue	Quarter page	\$ 7.00 per issue
Half page	\$12.00 per issue	Full page	\$20.00 per issue

The "Marcogram" from September to May, which is eight issues. This year we added June, which becomes a free month. So we actually publish nine issues. We have a list distribution of about 200 persons. A business card placed for 8 issues would only be \$ 40.00. We are asking for all members to try and contribute either via a donation, or asking a friend or family who has a business to place an ad.

available to him, anywhere using only call signs. This article is being reproduced (with a few minor changes to fit our style and size) by Mr. APRS, "Bob Bruninga, WB4APR." I contacted Bob a few months back and he forwarded me the article which will later this year appear in the QST. On behalf of all members of MARC I thank Bob very much for his permission to publish his paper on this very important subject.

Regarding another VIP but somewhat closer to home, Don Dashney, VE3RM's a long time member of MARC, is planning to attend the May 27th Club meeting, so those who haven't had an opportunity to chew the rag with Don recently, here's your chance.

That's it -  
*Your editor..*  
*Rjcam the Video-n-Podcast Ham,*  
*VA2RJC*

**ARRL NEWS****BOSTON AREA HAMS PROVIDE COMMUNICATIONS SUPPORT FOR ANNUAL MARATHON**

More than 250 Amateur Radio operators provided communication support for the 113th running of the Boston Marathon <<http://www.bostonmarathon.com>> on Monday, April 20. With more than 26,000 official runners and 500,000 spectators along the 26 mile route, the marathon utilized amateurs at the starting line, along the course at each water

and first aid station, and at the finish line.

"This is the largest public service event in New England in terms of the number of Amateur Radio operators required for a one-day event, and we can always use more hams to help us," said Marathon Amateur Radio Communications (MARC) <<http://marc.mmra.org/marc/index.html>> Course Coordinator Steve Schwarm, W3EVE. "We're glad that the weather was cool and the number of ambulance requests this year was lower than past years, where we had higher temperatures and more medical issues."

Even with the more temperate weather, MARC Finish Line Coordinator Paul Topolski, W1SEX, said the medical tents at the finish line were near capacity by mid-afternoon. "Hams provided communications, status and logistical issue updates between the medical tents to our finish line net control as needed," he said.

The Massachusetts Emergency Management Agency (MEMA) was active with operations at the State Emergency Operations Center in Framingham, with their operations room acting as a Unified Command Center (UCC) for the marathon. RACES members staffed the communications room at the SEOC, and ARRL Eastern Massachusetts Section Manager Mike Neilson, W1MPN, staffed the UCC. Neilson fed status reports on any issues along the marathon route into the operations room, as well as issues from the UCC to the operations room.

"This is the first time we've had an Amateur Radio Operator in the operations room of the UCC," said Massachusetts State RACES Radio Officer Tom Kinahan, N1CPE. "We have been coordinating with the Boston Marathon Net Control and the finish line communications in Boston to provide updates into our station and to our Amateur Radio operator in the UCC."

The Net Control center is located with a line-of-sight to the Boston area and

**dvcam-ham productions**



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## *Submissions for entry into marcOgram*

*For submissions of text only it is preferable that you send as a ".txt" file, however, MS Word is acceptable.*

*For pictures please use "jpg" format with maximum size 400 x 240. Where possible use at least 240 dpi.*

*For clip art if possible use "gif". Maximum size 480 x 340 pix. This will give a picture size of approximately 8 Kb.*

Contact me at:  
[va2rjc@videotron.ca](mailto:va2rjc@videotron.ca)

Home Tel: 514-767-2804

to the entire 26 mile route in case simplex communication is required. More than a dozen repeaters were utilized to provide overlapping coverage to the marathon route. The Clay Center Amateur Radio Club, the Minuteman Repeater Association, the Framingham Amateur Radio Association and many other clubs in the New England area support the marathon operations.

With so many amateurs placed along the marathon route, ARRL Eastern Massachusetts Section Emergency Coordinator Rob Macedo, KD1CY, placed Eastern Massachusetts ARES on standby in case something went wrong along the marathon route, or a major incident occurred coincident with the marathon. "This is standard operating procedure for 'Marathon Monday'" he said. "We want our members to maintain a heightened state of awareness during the event."

### **SCIENTISTS PREDICT SOLAR CYCLE 24 TO PEAK IN 2013**

At the annual Space Weather Workshop held in Boulder, Colorado last month  
<<http://www.swpc.noaa.gov/sww/index.html>>, an international panel

of experts led by NOAA's Space Weather Prediction Center (SWPC) predicted that Solar Cycle 24 will peak in May 2013 with 90 sunspots per day on average. If the prediction proves true, Solar Cycle 24 will be the weakest cycle since Solar Cycle 16, which peaked with 78 daily sunspots in 1928, and ninth weakest since the 1750s, when numbered cycles began.

The panel predicted that the lowest sunspot number between cycles -- the solar minimum -- occurred in December 2008, marking the end of Solar Cycle 23 and the start of Solar Cycle 24. If December's prediction holds up  
<<http://www.arrl.org/news/stories/2008/01/07/100/>>, at 12 years and seven months Solar Cycle 23 will be the longest since 1823 and the third longest since 1755. Solar cycles span 11 years on average, from minimum to minimum.

An unusually long, deep lull in sunspots led the panel to revise its 2007 prediction that the next cycle of solar storms would start in March 2008 and peak in late 2011 or mid-2012. The persistence of a quiet sun also led the panel to a consensus that Solar Cycle 24 will be what they called "moderately weak."

Although the peak is still four years away, a new active period of Earth-threatening solar storms will be the weakest since 1928. Despite the prediction, the scientists said that Earth is still vulnerable to a severe solar storm. Solar storms are eruptions of energy and matter that escape from the Sun and may head toward Earth, where even a weak storm can damage satellites and power grids, disrupting communications, the electric power supply and GPS. A single strong blast of "solar wind" can threaten national security, transportation, financial services and other essential functions.

The most common measure of a solar cycle's intensity is the number of sunspots -- Earth-sized blotches on the sun marking areas of heightened

magnetic activity. The more sunspots there are, the more likely it is that solar storms will occur, but a major storm can occur at any time.

"As with hurricanes, whether a cycle is active or weak refers to the number of storms, but everyone needs to remember it only takes one powerful storm to cause huge problems," said NOAA scientist Doug Biesecker, who chaired the panel. "The strongest solar storm on record occurred in 1859 during another below-average cycle." The 1859 storm shorted out telegraph wires, causing fires in North America and Europe and sent readings of Earth's magnetic field soaring. It also produced northern lights so bright that people read newspapers by their light, he said.

Biesecker cited a recent report by the National Academy of Sciences that found if a storm that severe occurred today, it could cause \$1-2 trillion in damages the first year and require four to 10 years for recovery, compared to the \$80-125 billion of damage that resulted from Hurricane Katrina  
<[http://www.nap.edu/nap/cgi/report.cgi?record\\_id=12507&type=pdfxsum](http://www.nap.edu/nap/cgi/report.cgi?record_id=12507&type=pdfxsum)>.

The Space Weather Prediction Center is part of the National Weather Service and is one of the nine National Centers for Environmental Prediction. It is the nation's official source of space weather alerts, watches and warnings. SWPC provides real-time monitoring and forecasting of solar and geophysical events that impact satellites, power grids, communications, navigation and many other technological systems.

### **NATIONAL HURICANE CENTER'S WX4NHC SETS ON-THE-AIR STATION TEST**

The annual WX4NHC On-the-Air Station Test from the National Hurricane Center (NHC) in Miami will take place Saturday, May 30, from 1300-2100 UTC. "The purpose of this annual Station Test is to test all of our radio equipment, computers and antennas using as many modes and

frequencies as possible. This is not a contest or simulated hurricane exercise. New equipment and software will be tested, and we will also conduct some operator training," said WX4NHC Assistant Amateur Radio Volunteer Coordinator Julio Ripoll, WD4R.

Ripoll said that WX4NHC also will be testing new computers and software, as well as conducting operator training. "NHC Director Bill Read, KB5FYA, will be at WX4NHC, making contacts," he said. WX4NHC will be on the air on HF, VHF and UHF, plus 2 and 30 meter APRS. Suggested SSB frequencies are 3.950, 7.268, 14.325, 21.325 and 28.525 MHz, +/- QRM; WX4NHC reports that they will mostly be on 14.325 MHz and will make announcements when they change frequencies. WX4NHC also will be on the VoIP Hurricane Net 1700-1900 UTC (IRLP node 9219/ EchoLink WX-TALK Conference) and on South Florida area VHF/UHF repeaters and simplex; APRS and e-mail will also be monitored.

Stations working WX4NHC exchange call sign, signal report, location and name plus a brief weather report, such as "sunny," "rain" or "cloudy." Non-hams may submit their actual weather using the On-Line Hurricane Report Form. QSL to WD4R and include a self-addressed, stamped envelope. Do not send cards to the NHC. Due to security measures, no visitors will be allowed at NHC during the test.

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## ARRL RELEASES REVISION OF "EXPERIMENTAL METHODS IN RF DESIGN"

The revised first edition of "Experimental Methods in RF Design" is now

available from the ARRL  
<<http://www.arrl.org/catalog/?item=9239>>.

Co-written and updated by Wes Hayward, W7ZOI, Rick Campbell, KK7B, and Bob Larkin, W7PUA, "Experimental Methods in RF Design" explores wide dynamic range, low distortion radio equipment, the use of direct conversion and phasing methods and digital signal processing. Use the models and discussion included in the book to design, build and measure equipment at both the circuit and the system level.

Readers are immersed in the communications experience by building equipment that contributes to understanding basic concepts and circuits. The updated version of "Experimental Methods in RF Design" is loaded with new, unpublished projects. Presented to illustrate the design process, the equipment is often simple, lacking the frills found in current commercial gear. The authors understand that measurement is a vital part of experimentation. Readers are encouraged to perform measurements on the gear as they build it. Techniques to determine performance and the measurement equipment needed for the evaluations are discussed in detail and include circuits that the reader can build.

Contents of "Experimental Methods in RF Design" include:

- \* Basic Investigations in Electronics
- \* Amplifiers, Filters, Oscillators and Mixers
- \* Superheterodyne Transmitters and Receivers
- \* Measurement Equipment
- \* Direct Conversion Receivers
- \* Phasing Receivers and Transmitters
- \* DSP Components
- \* DSP Applications in Communications
- \* Field Operation, Portable Gear and Integrated Stations

A follow-up to the widely popular "Solid-State Design for the Radio Amateur" (published in 1977), "Experimental Methods in RF Design"

includes a CD-ROM with design software, listings for DSP firmware and supplementary articles. It is available from the ARRL for \$49.95.

## Universal Ham Radio Text-Messaging System

Reproduced with kind permission from Bob Bruninga, WB4APR

### PART - I

This article introduces a broad new Amateur Radio Initiative to connect all Amateur Radio text messaging capabilities together so that any ham radio operator anywhere at any time using any text messaging device can text message any other ham radio operator using whatever device is similarly available to him, anywhere using only call signs.

We are not just Hams with single focus interests, we are communicators with experience, resources, intuition and initiative to help establish communications anywhere at any time. Although we have our own frequencies and radios, our diversity of frequencies is not just our best asset; it is also our worst curse. With 1000 frequencies on HF and 2000 channels on VHF/UHF below 500 MHz, how can we find each other when needed? And it is not just the dimension of frequency, its space and time as well.

Ham radio needs a Universal Text-messaging system to tie all of its disparate messaging systems together so that text-messages can easily reach any ham radio operator by call sign alone, anywhere at any time on any device!

After 9/11 and Katrina it was clear that amateur radio needs immediate responsive communications to simply locate and establish initial communications. Although APRS provides an excellent tool for mutual exchange of location information what is needed for emergent contact anywhere, anytime is a Local and Global Text-Messaging -by-call sign- capability that makes it possible to connect peo-

ple independent of frequency. Fortunately, this instant contact across the dimensions of space, time and frequency has been in APRS since day one, and it is so powerful because it is all done on a single local/national APRS calling frequency; anytime, anywhere. We just need to link in all other ham radio texting systems, not just APRS to make this an all-ham radio system..

The following techniques, devices or systems are a means for hams to establish communications with other hams anywhere, anytime:

**1. ARRL CALLSIGN EMAIL REGISTRATION:**

The ARRL has greatly simplified the end-to-end connectivity of ham radio operators by providing an email-callsign registration service. This registration allows members to associate an email address with their callsign so that they can receive email from anyone who only knows their call sign. Similarly, AMSAT and other ham radio organizations also provide this service. With these services, global internet email, and global APRS message delivery, all we need is a little more software glue to tie this altogether to make Universal end-to-end text-messaging a reality. Some of this software glue is used for the end delivery to and from a variety of radios and existing Amateur Radio text-messaging systems as detailed in the following paragraphs.

**2. ORGANIC APRS MESSAGING:**

First of course, are all the APRS radios. APRS client software and APRS built-in radios are designed specifically to send and receive messages on their front panel as shown in figure 1. On the TH-D7 handheld, to send a text-message just press the MSG button, select INPUT on the MSG Menu, select an existing call or enter the callsign of any APRS ham radio operator anywhere in the world and your message will be delivered in real time via the local/global APRS system.

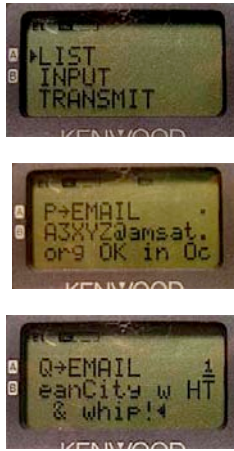


Figure 1.

Figure 1 shows the message menu and a typical APRS message. In this case, instead of a message to callsign, it is a message to Email which causes the APRS system to convert it to standard email for ultimate delivery. The actual email address is included as the first word in the message such as [A3XYZ@AMSAT.ORG](mailto:A3XYZ@AMSAT.ORG) as shown here. The text is “OK in OceanCity w HT & whip!”

Normal APRS messaging is just like text messaging in that it is sent and received in real time. Fortunately, APRS also provides many links between live messaging and email as well.

Simply address the message to the word EMAIL instead of a callsign, and make the first text of the message be an email address followed by your message.

**3. TEXT-MESSAGING with ANY RADIO:**

But it is not just APRS radios that can be used for text-messaging. The HAMHUD device is an add-on to the speaker-mic of any radio shown in



Figure 3

figure 3. It gives a plug-n-play solution that brings full APRS functionality including text-messaging to any radio.

The new Kenwood RC-D710 APRS display head (figure 4) can be purchased alone independent of the TM-D710 and also plugged into the external audio interfaces of any radio. All of the APRS hardware and functionality is in the display head itself!



Figure 4

In figure 4 it is shown plugged into an inexpensive \$88 Alinco HT to provide front-panel APRS and text-messaging capabilities and email to the operator.

**4. PAGING RADIO MESSAGING:**

In addition to the APRS radios and add-on hardware, there are other radios with text messaging capability. The FT-51R family and TH-78A radios (from the 1990's) have a built-in TEXT messaging and paging function that can also be used for messaging. Messages are entered from the Keypad and displayed on the radio front panel. A user of these radios when traveling just sets his radio on the National Paging Radio simplex channel. There he will receive any local information such as the locally recommended voice frequency for travelers as well as receive any text-messages. He can also send in his callsign and request any pending messages. A simple gateway program in the area converts all paging text messages and local information to and from the global APRS network.

TO BE CONTINUED IN THE NEXT ISSUE OF THE MARCOGRAM

## 6 Meter FM for ARES Ops

Most ARES communications are performed on 2 meter FM and for good reasons: The majority of amateurs own 2 meter FM radios and many have mobile installations that provide great coverage in most urban and suburban areas. There are in many areas so many repeaters up that there is a waiting list for frequencies. For many events here in Northern Virginia, a handheld radio will do the job well.

We do, however, have some events that are run in large, forested park areas where 2 meter repeater coverage is poor or in some cases, the repeaters that cover areas are also popular on weekends with the clubs that sponsor those repeaters. It can be unfair to run a 50 mile event and tie up a wide area repeater for a day.

Our solution was to try other VHF bands. While most of us also have 440 MHz FM gear, we found that it did not provide the range in wooded areas. We went to 6 meters for several reasons. First, there are many amateurs who own the ICOM IC-706 and other compact radios that have 6 meter FM capability. The coverage of 6 meters in a wooded environment is unbelievably good. We have found that a 5 watt 6 meter simplex FM signal can be heard more clearly than a 50 watt 2 meter simplex signal.

We have two events that are along the Occoquan Reservoir in Fairfax County, Virginia and two other events that are run along the Potomac River from Alexandria to Mt. Vernon. We've found that 2 meter repeater coverage along both the reservoir and the river is not good and running events with mobile equipment on 2 meter simplex is not the best approach.

When trying 6 meters we found that coverage was much better. While there are many commercial 6 meter FM radios on the market, there are also many surplus commercial radios available if you can find the right ones and they are properly converted.

Commercial gear has a few advantages over our amateur equipment. One is that it is easy to use. Turn it on, set the channel, set the squelch and talk. These radios are generally bullet proof; they will take more abuse. They were designed to live in cabs, trash trucks, and police cars. They also have a great deal of audio gain available. If you are in a high noise environment you will still be able to hear your traffic.

Six meter antennas are another consideration. For mobile operations, you can use a 2 meter 5/8th wave that also loads up as a ¼ wave on 6 meters. Alternatives are home made or commercially made ground planes, J-poles, and dipoles. I use a 6 meter Ringo for portable use on a set of military mast sections. I've marked the vertical parts so they can be collapsed for easy transport and set up quickly.

. -- Richard Bunn, N4ASX, ARES EC, Alexandria, Virginia

## Hamfest Calendar - 2009

### Saturday, June 6

Central Ontario Fleamarket and Hamfest. - Fergus, Ontario

Location: Centre Wellington Community Sportsplex, 550 Belsyde Ave, 10 km north of Guelph off Highway 6.

See [www.hamfest.on.ca](http://www.hamfest.on.ca) for a map.

Vendors at 07:00, Tailgaters at 08:00 and the Public at 09:00 to 12:30. Admission \$7.00 -- Vendors - \$14.00 plus admission -- Tailgaters \$8.00 plus admission.

Talk-in: 145.210 (-) VE3ZMG or VE3KSR on 146.970 (-) and switch to 146.520 simplex the Fergus.

E-mail: [info@hamfest.on.ca](mailto:info@hamfest.on.ca)

Web page: <http://www.hamfest.on.ca>

### Saturday, June 13

London Vintage Radio Club Outdoor Flea Market. - Guelph, Ontario  
Location: Hammond Manufacturing Company (east parking lot), 394 Edinburgh Road North, Guelph Ont. near the corner of Edinburgh Road and Speedvale Avenue

Vendors and public at 07:00, Vendors - \$10.00 with the public free.

The Hammond Museum of Radio at 595 Southgate Drive, Guelph, ON will be open from 11h00 to 15h00. The museum is located just off the Hanlon Expressway (Highway 6) Laird Road exit.

E-mail: [larry.asp@sympatico.ca](mailto:larry.asp@sympatico.ca)

Web page: <http://lvrc.homestead.com/>

### Saturday, July 11

Friday June 19 - Sunday June 21

Central Alberta ARC 39th Annual Picnic - Red Deer, Alberta

Location: Poplar Ridge Community Hall west of Red Deer

Registration starts at Noon on Friday, June 19 and a potluck supper on Saturday.

Talk-in: 147.150 (+)

See the Web page for more information at: <http://www.caarc.ca/>

### Friday, July 10 - Sunday July 12,

46th International Hamfest - International Peace Gardens Boissevain, Manitoba/Dunsleith, North Dakota

Location: International Peace Gardens Boissevain, Manitoba/Dunsleith, North Dakota at the US Lodge.

More information at:

<http://www.mts.net/~holderr/ihf.htm>

Information: Richard Holder, VE4QK at (204)-268-1702

E-mail: [ve4ihf@mts.net](mailto:ve4ihf@mts.net)

### Saturday, July 11

Saskatchewan Hamfest 2009. - Lanigan Arena/Town Hall, Main Street, Lanigan, Saskatchewan

Location: , Lanigan Arena/Town Hall, Main Street Lanigan, Saskatchewan

09:00 - noon

E-mail: David Klatt, VE5GN

[dfklatt@sasktel.net](mailto:dfklatt@sasktel.net)

Web page: <http://www.sarl.ca/>

Note: - The Saskatchewan Amateur Radio League Annual General Meeting will be held after the hamfest is over at 13:00.

**RADIO H.F.**



**PO Box 67063-Lemoyne  
St-Lambert, Quebec  
J4R 2T8**

**tel/fax :450-671-3773  
sans frais - toll free in Canada  
1-800-463-3773  
email : [info@radiohf.ca](mailto:info@radiohf.ca)  
Web: <http://www.radiohf.ca>**

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A.O.R., ALINCO, GRUNDIG/ETON, ICOM, JRC, S.G.C., YAESU

**SCANNERS / BALAYEURS D'ONDES**

A.O.R., ALINCO, ICOM, UNIDEN/BEARCAT, WINRADIO

**AMATEUR RADIO / RADIO-AMATEUR**

ALINCO, ICOM, KENWOOD, RANGER, S.G.C., YAESU

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ASTATIC, COBRA, GALAXY, K40, MACO, PARADYNAMICS, RANGER, ROAD NOISE, SHAKE-SPEARE, SOLARCON/ANTRON, UNIDEN, VALOR/PRO-AM, WILSON, WORKMAN

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AMERITRON, ASTRON, BENCHER, CONNECT QUICK, DAIWA, D.C.I., GARMIN, GEOCRON, HEIL, KANTRONICS, KIWA ELECTRONICS, L.D.G., MAGELLAN, MAHA, MFJ, MIRAGE, NYE VIKING, OPTOELECTRONICS, OREGON SCIENTIFIC, PALOMAR, PALSTAR, PRYME, RF CONCEPTS, R.F. SYSTEMS, RIGBLASTER, S.G.C., TIMEWAVE, UNADILLA, VECTRONICS, VIBROPLEX, WEST MOUNTAIN RADIO

**PUBLICATIONS / PUBLICATIONS**

AMERICAN RADIO RELAY LEAGUE (ARRL), ARTSCI, BAYLIN PUBLICATIONS, BILLBOARD (WRTH), CQ, CRB, HIGHTEXT, IBS (PASSPORT), KLINGENFUSS, KRAUSE, LOOMPANICS, NATIONAL RADIO CLUB, RADIO SOCIETY OF GREAT BRITAIN, RADIO AMATEUR CALLBOOK, RADIO AMATEURS DU QUEBEC, SCHIFFER BOOKS, SONORAN, TAB, TIARE

**NATURE BOOKS / LIVRES DE LA NATURE**

SIBLEY GUIDES, PETERSON FIELD GUIDES, NATIONAL AUDUBON SOCIETY