N E W S L E T T E R

marcOgram

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

A MARC Monthly Newsletter Volume 56, Number 07 April 2011

Next meeting - April 27, 2011

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

Ignatius of Loyola Parish Church

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

(Please enter by the back door)

Gilles Renucci VE2 TZT, will be presenting his home-brew antenna switching project.

A Word from The President.

Hello,

The 2011 edition of the Montreal Flea Market has come and gone and I want to thank everyone who attended. Several of the vendors reported good sales and in particular I thank those who volunteered to help out with the setup, tear down and and general operation of the event which was successful and no doubt our treasurer will have something to say about the event at the next meeting.

While I have to put the question to the directors I anticipate the 2012 flea market will be April 14 which is the second Saturday.

The Montreal Solder Spot will be having its first meeting on April 30 and I congratulate Paul Iarrera, VE2OFH for taking the initiative to get this group going. Sponsoring this activity is exactly the sort of thing the club should do and the board has been enthusiastic in its support.

This months topic fits right in with the start of the Solder Spot as Gilles Renucci, VE2TZT will be telling us about one of his projects. I'm looking forward to the presentation and to seeing you all at the meeting.

73 de Jim.

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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.

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 stops at or near the door!

From the Editor's Desk

"Urgent need for a Permanent Editor"!

Well it's April and as the saying goes, "April Showers Brings May Flowers"! It definitely is raining a-lot and if the weather keeps up like this, I'm not sure about the "May Flowers" due to a washout!!!

April certainly does mean that Spring is here and that means Ham-Fest Season once again. I was very pleased at our Ham-Fest on April 16th, especially seeing many old faces whom I haven't seen in years. The weather must have been in our favor!

April, also means antenna work and various other outdoor tasks in order to keep the shack in top shape. I hope that all of you out their, remember the following words "SAFETY FIRST"!!

CH The First Operational Radar.

Following the presentation of the documentary film regarding the story behind the Chain Home Radar Network of the UK. Here is a little more technical material that some may be interested in.

PRINCIPLES OF CH (CHAIN HOME) RADAR SYSTEM

GENERAL PRINCIPLE

The basic operating principle of CH is very simple: the volume of sky to be kept under surveillance is literally 'floodlit' with r.f. pulsed energy; the back-scattered pulses or echoes' from all aircraft within this volume are received back at the ground station by a set of crossed-dipoles connected to a low-noise, high-gain receiver and displayed as a Y-deflection along the time base of a CRT. The aircraft range is simply a precise measurement of the elapsed time between the transmitted pulse and the 'echo', and the bearing a measurement of the ratio of 'echo' strengths of the X- and Y-components of the crossed-dipoles.

Choice of frequency, polarization and p.r.f.

The choice of radio frequency was principally influenced by three factors: the 'state of the art' technology in 1935, feasible antenna dimensions to provide the vertical polar diagram and antenna gain required for efficient floodlighting and height finding; and a wavelength that was considered at that time likely to give the best 'echo' from a typical bomber of the period. Very little, if anything, was known at that time about the effective back-scattering cross-section of an aircraft or how it varied with frequency.

It was earlier thought that an approaching aircraft could be regarded as a half-wave, horizontally polarized dipole; in fact, a typical enemy bomber of that period, a Heinkel 111 with a wingspan of 22.5 metres, closely matched the original 'Daventry Experiment' frequency of 6 MHz. This theory was later abandoned.

The original plan was for each station to have the choice of operating on any of four allocated spot frequencies in the band 20 to 55 MHz as a counter-measure to possible jamming and as alternative frequencies should interference or propagation effects cause operational problems.

WANTED

SUPPORT FOR THE MARCOGRAM

The editorial staff of this illustrious monthly newsletter request the support of our hams. It's getting increasingly difficult to obtain material that's of interest to our membership and therefore provide something that you all look forward to read. We need activity news of our local radio amateurs, I'm sure we'd all like to know what you are doing.

Please contact one of the following with your news items and don't forget to include pictures.

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(submitted by the editorial board)

For that purpose, four transmitter and four receiver towers were provided, each pair of towers being dedicated to one spot frequency. It was later decided to abandon the four frequency plan and to have simply a main and standby in the frequency band 20-30 MHz. All CH Stations used horizontally polarized radiation. The decision t was based mainly on three factors:-

1. An approaching aircraft has a predominantly horizontal aspect, favouring - for metric wavelengths -a horizontally polarized wavefront.

2. The signal phase change on reflection from the ground is constant for all relevant angles of elevation; this is particularly important for the formation of the vertical polar diagram required for height finding.
3. A horizontally polarized antenna is inherently symmetrical with respect to ground, permitting balanced, open-wire transmission lines capable of withstanding very high peak voltages to be used without undue complication. Also the symmetrical nature of the antenna simplifies both its design and installation.

OUTLINE DESCRIPTION OF TYPICAL 'EAST COAST' STATION

There were approximately fifty early warning CH Stations, of which there were a number of variants, either in 24 hour operation or at standby around the coast of Britain. All used the same basic 'floodlighting/DF' principle but configured differently depending on their operational role; the West-Coast Chain used different antennae masts and transmitters to the East-Coast; and there were variations in the siting arrangements.

CH described here is a typical East-Coast version, figure 2. There were twenty one CH stations installed along the East and South-East coast .Each station employed four (later reduced to three) in-line, 360 feet steel transmitter towers spaced approx 180 feet apart, each tower being fitted with cantilevered platforms at 50, 200 and 350 feet. The transmitter 'curtains' were slung between towers and fed by strained 600 ohm transmission lines leading from the heavily protected transmitter building nearby. Two identical transmitters were used in a main and standby role, with rapid change-over arrangements.

Typical operating conditions were:-

Frequency:	20 to 30 MHz	
Peak Power:	350 kW	(later 750 kW)
p.r.f.:	25 and 12.5 p.p.s.	
Pulse Length:	20 us	

Four 240 feet wooden receiver towers, usually placed in rhombic formation, carried the receiver arrays. These towers and the associated receiver building were some hundreds of yards from the transmitter buildings and in some cases, were in a separate com-pounds.The low p.r.f. of 25 p.p.s. was determined by the need for a long interpulse period to minimize the effect of long range 'scatter' (or clutter) being returned via the ionosphere as 'second, third or fourth time round' signals cluttering the display and masking the area under surveillance. A further requirement was the need to synchronize all CH Stations to the National Grid system to avoid mutual interference. A sub-multiple of 50 Hz was therefore essential, plus the need for a long interpulse period to allow sufficient time space (40 ms) for adjacent stations to be allocated time slots which did not overlap. When ionospheric 'scatter' conditions were severe, the operator had a choice of an alternative p.r.f. of 12.5p.p.s., thereby increasing the interpulse period to 80 ms and extending the immunity range of the 'scatter' to over 6000 miles.

TRANSMITTER ANTENNAE SYSTEM

To provide the necessary 'floodlighting' the transmitter main array consisted of a vertical stack of eight half-wave dipoles. The dipoles were spaced by a half-wavelength and end-fed by an open wire transmission line with alternate feed points transposed to preserve in-phase excitation of the stack. Associated with each dipole was a 'tuned' reflector spaced by 0.18 wavelength. The mean height of the array was 215 feet, which produced a main elevation lobe resulting from ground reflection at about 2.6o, and a first gap at 5.2o. The horizontal 'beamwidth' of the dipole stack, influenced by the 0.18 wavelength spaced reflectors, was in the order of 100o.

To fill the first gap, an auxiliary stack of four similar end-fed dipoles and reflectors was provided at a mean height of 95 feet producing a main elevation lobe at about 6o. This auxiliary array, known as the 'Gapfiller', was selected remotely by the operator, the change over from main array to gapfiller being made by relay-operated stub switching of the transmission line. Both the eight-stack and the four-stack arrays were slung on the same centre line as a 'curtain' between the cantilevers of two of the four 360 feet steel towers. R.F. power from the transmitter was fed to the curtain by a 600 ohm, open-wire, balanced transmission line and stub matched to the array. The four-stack array was matched to the transmission line by a quarter-wave transformer of suitable impedance slung in the transmission line to the four-stack. As the system was not a true 'floodlight' because of the directional character-

istics of the dipole stack and the suppression of the unnecessary back radiation by reflectors, each station was allocated a 'line-of-shoot' (LOS), which determined the alignment of the antenna with respect to the coastline.

THE RECEIVING SYSTEM

The simplified approach to the operating principles**:** r.f. pulses 'back scattered' from all aircraft in the 'floodlit' zone are received by a set of crossed horizontal dipoles positioned at an effective height of 215 feet above the ground.

The output of the E-W dipole (Y) is fed to one of the stator coils of a goniometer and that of the N-S (X) dipole to the other. The signals are compared by 'swinging the gonio' for a minimum deflection of the 'echo' on the CRT display. A minimum rather than maximum was used as it gave a sharper and more precise indication of azimuth when the signal-to-noise ratio was adequate, the gonio bearing 'rose' being aligned accordingly. For weak signals, of poor signal-to-noise ratio, the gonio was swung for a maximum, and the indicated bearing corrected by 90o.

With this method of direction finding (D/F), an aircraft on a reciprocal bearing would give exactly the same indication on the gonio. This ambiguity was resolved by having remotely switchable reflectors 1/4 wavelength behind the dipoles and noting whether the signal strength increased or decreased when they were switched in. This 'sensing' was done by the operator at the console before passing a plot.

The effective height of the crossed dipole stack was 215 feet which, on a flat site, would give rise to a wide vertical gap in the polar diagram centred at an elevation angle of approximately 5.2o; the radar would, therefore be blind at this elevation. This was overcome by having a second crossed-dipole stack at a mean height of 95 feet with a main elevation lobe of approximately 5.9o which, in conjunction with the transmitter 'gapfilling' lobe, effectively closed the gap, the switching being done remotely by the operator at the console whilst searching for, and tracking, targets.

Heightfinding was achieved by comparing the signal received by the 215 feet dipole stack (angle = 2.6o) with the signal received from the same aircraft by the 95 feet (angle = 5.9o) stack, the ratio of these two signal strengths being related to the angle of elevation of the aircraft. The ratio of the signal strengths is measured by feeding the signals received by the Y dipoles of the A system at 215 feet to the Y coil of the goniometer and the signals received by the Y dipoles of the B system at 95 feet to the X coil of the goniometer. The goniometer was then 'swung' for a minimum deflection of the echo on the CRT in exactly the same way that the azimuth angle (D/F) was determined in the direction finding mode. The number indicated by the goniometer pointer was then 'inputted' to a simple electro-mechanical computer known as the 'fruit machine' which also accepted the range of the target and performed the simple calculation: height (in feet) = 5280 (R sin angle+ R2/10000). The R2/10000 term corrects for earth curvature, assuming an effective earth's radius equal to four thirds of the true radius.

Since heightfinding relied on measurement of the ratio of signal strengths received by lobes created by the ground interference pattern, the ground in front of the antennae should, ideally have been flat out to a range of about one mile. A flat site, when account was taken of all other essential requirements clearly was not achievable for all locations around the coast of UK, and compromises had to be made.

All the measurements were taken using the same goniometer, the feeders from the various antennae elements being selected by the operator, using buttons operating a remote, motorized set of change-over switches. Counting of aircraft in close formation (raid strength) relied on the skill of the operator who, when experienced, was able to make an assessment by observing the 'beat' rate of the composite echoes. To assist in this assessment, the transmitted pulse could be momentarily shortened to 6 microseconds (from 20 microseconds) by a push button on the console, the shorter pulse improving the range resolution by about 3:1.

It should be mentioned at this point that the great success of CH was due in no small measure to the incredible acquired skill of experienced operators, particularly the WAAFS (Women's Auxiliary Air Force). Signals at extreme ranges, well below 'noise' level, were detected and tracked.

***Note**: A **goniometer** is an instrument that either measures angle or allows an object to be rotated to a precise angular position. The term **goniometry** is derived from two Greek words, gonia, meaning angle and metron, meaning measure*.

Many thanks to Dick Barrett for permitting this material to appear in our monthly newsletter, "marcOgram." Ron Campbell, VA2RJC on behalf of the Montreal Amateur Radio Club.

Transatlantic Amateur Radio Balloon Launch

04/20/2011
The Project Blue Horizon 5 high-altitude transatlantic balloon is scheduled for launch, weather permitting, at 0400 UTC (midnight EDST) Friday, April 22, from Oswego, New York. The weather forecast for launch time calls for clear to partly cloudy conditions.

The Project Blue Horizon team is attempting to break current Amateur Radio high-altitude balloon records for distance (3361.81 miles) and duration (49 hours, 45 minutes). The payload will be carried beneath a 54,000 cubic foot capacity helium-filled balloon cruising between 85,000 and 100,000 feet.

Amateurs worldwide are encouraged to monitor the N2XE CW telemetry beacons at 7.1023 and 10.1466 MHz. The balloon is also equipped with an APRS beacon at 144.39 MHz using the call sign KC2ZJH. Amateurs can send reports via e-mail to **PBH15.data@gmail.com**. More information about the program, including the latest projected flight path, is at the **Project Blue Horizon website**. Launch and flight updates will also be available on **Twitter**.

Hamfest Listings!

27th Annual Smiths Falls Flea Market
Rideau Lakes Amateur Radio Club inc.
Saturday, May 14, 2011
http://ve3rlr.dyndns.org

Downeast Fleamarket sponsored by Halifax Amateur Club
Saturday MAY 14, 2011
Info: tgaum2@ns.sympatico.ca
Tables: VE1NN@rac.ca

Central Ontario Hamfest & Fleamarket
Guelph ARC & Kitchener-Waterloo ARC
Sunday, June 5, 2011
Cambridge, Ontario
http://www.hamfest.on.ca/

HAMFEST 2011
Sponsored by the Brantford Amateur Radio Club
Saturday August 20, 2011
Information: ve3sxb@rac.ca
Website: http://://www.ve3ba.com

Ottawa Amateur Radio Club 15th Annual Hamfest
Ottawa Amateur Radio Club, Inc.
Saturday, September 10, 2011
Ottawa (Carp), ON
http://www.oarc.net/fleamarket/

NEAR-Fest IX

Friday April 29th and Saturday April 30th 2011
0900 Friday through 1500 Saturday
Deerfield Fairgrounds - Deerfield NH, USA

Dayton Hamvention May 20-22
Dayton, OH. USA

ARRL Scores Partial Victory in ReconRobotics Proceeding

04/19/2011
The FCC has given radio amateurs a partial victory in response to the ARRL's challenge, in a Petition for Reconsideration, of a rules waiver that permits the certification and licensing of the Recon Scout -- a remote-controlled, maneuverable surveillance robot operating in the 430-448 MHz band. The device is marketed to public safety agencies and certain security personnel by ReconRobotics Inc.

In an Order on Reconsideration released on April 15, the FCC granted the ARRL's request for changes in the labeling and instruction manual requirements to ensure that users of the device are aware of its limitations, with regard to interference. Noting that no applications for individual licenses to operate the Recon Scout had been granted, the FCC's Wireless Telecommunications Bureau, the Public Safety and Homeland Security Bureau, and the Office of Engineering and Technology deferred to the

Commission's Enforcement Bureau with regard to complaints that ReconRobotics has been marketing uncertified devices and that the devices have been operating without authorization.

The FCC Order also acknowledged that the ARRL was correct in arguing that the waiver was insufficient in that it did not waive applicable provisions of Section 2.106 of the Commission's Rules, which contains the Table of Allocations of frequency bands to the various radio services. The Commission's solution was to "…retroactively waive the Table of Allocations to the extent necessary to permit use of the Recon Scout."

ReconRobotics did not object to the changes in labeling and instruction manual language sought by the ARRL. Recon Scout transmitters delivered after April 15, 2011 must carry the following label: "This device may not interfere with Federal or non-federal stations operating in the 420-450 MHz band and must accept any interference received." The instruction manual must also include the following: "Although this transmitter has been approved by the Federal Communications Commission, it must accept any interference received from Federal or non-federal stations, including interference that may cause undesired operation." The 430-448 MHz band is allocated to the amateur service on a secondary basis and to Federal users in the radiolocation service on a primary basis; non-federal radiolocation stations are secondary to both federal radiolocation stations and amateur stations.

In other respects the ARRL Petition for Reconsideration was denied, as were petitions filed by individuals. While the FCC agreed that "there were possible inconsistencies between particular readings in the test data" submitted by ReconRobotics, the Commission found that the data "nonetheless demonstrated the particular suitability of the 420-450 MHz band" relative to higher-frequency bands. With regard to concerns that the devices will incur interference from amateur operations, the Commission continues to adhere to the view that "the possibility of the device incurring interference in some instances did not present a compelling reason to prohibit its use in all instances…. ReconRobotics has accepted that it may receive interference from amateur operations, and the Order specifies that the Recon Scout must accept interference from licensed users."

Revised Spread Spectrum Rules to Go Into Effect April 29, 2011

The revisions to the FCC rules affecting Spread Spectrum transmissions will go into effect April 29, 2011. The Report and Order was published in the March 30 Federal Register.

Adopted February 22 and released March 4, 2011, the Report and Order eliminates the requirement that amateur stations transmitting Spread Spectrum use Automatic Power Control (APC) to reduce transmitter power. The Commission also reduced the maximum power of a Spread Spectrum emission from 100 W to 10 W PEP.

The Question Pool Committee of the National Council of Volunteer Examiner Coordinators has removed a related question, E1F13, from the Amateur Extra Class Question Pool.

Solder Spot News!

The first meeting of the "Solder Spot", (A project building group created by Paul VE2 OFH), will take place on Saturday April 30th, 2011 at 09:30. The address is Knox Crescent Kensington and First Presbyterian Church, 6225 Godfrey NDG.

The first project is a "Fold-up J-Pole" for 2 meters and the project should take about 3 hours to complete.

Future projects are in the process of planning and your input would be greatly appreciated. If you have any ideas or suggestions, please contact Paul at the following address SolderSpot@marc.ca