BARC
Newsletter

Issue # 2007-1
February

Barrie Amateur Radio Club Newsletter

Welcome to what I hope will be a resurrection of the BARC Newsletter. I am not sure if it will be possible to make it a monthly publication, but I hope it will be.
One section I want to add to each issue is a reprint of some of the articles from old issues of the BARC Newsletter. Quite a few really good articles were written in the BARC's "golden years" of the 1980's and 1990's by members of the club. So check out the **QSM** section – maybe you will see your name there. By the way, QSM is a "Q" signal that means to "repeat the message".

If you have anything to include in future issues of the newsletter, please email them to me.
Temporary Editor – Al Duncan VE3RRD

Barrie Amateur Radio Club Year 2007 Officers

President	**Harry Gauthier**	**VE3SXH**
Vice-President	**Alex McGuire**	**VE3PKA**
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If you wish to email one of the executive members listed above, click on the appropriate email link, or for general inquiries, use this email address:

HamRadio@barriearc.com

Be sure to visit the Barrie Amateur Radio Club webpage at:

http://www.barriearc.com/

Next Club Meeting

The next BARC meeting will be on Tuesday, 13 February 2007. Start time is 7pm and the location is upstairs in the Zehrs Community room at the corner of Big Bay Point Rd and Yonge St.
You do not need to be a club member to attend the BARC meetings. Everyone is welcome.

Minutes of all meetings back to November 2004 can be found by clicking on the BARC Minutes of Monthly Meetings link found on the club webpage.

If you would like to do a presentation or a "show and tell" at one of the BARC meetings, please contact someone on the executive. Come and show off your latest ham project.

Other Events

Don't forget the regular Monday evening ARES net at 7:30pm on the VE3RAG (147.000+) repeater. Net control is Dave VE3ILA

Guides On The Air (GOTA) – 17 February 2007
Basic Amateur Radio Course – March 2007 (looking for more potential Hams wanting to take this course)
Field Day – June 2007
Ride for Literacy – July 2007
Hamfest – September 2007
Jamboree On The Air (JOTA) – October 2007
If you can help out with any of the above events, please contact the club executive.

From the Virtual Bookshelf

RDF and Hidden Transmitter Hunting - http://www3.sympatico.ca/alduncan/ham/RDFing.pdf

Amateur Radio FM Repeater Basics - http://www3.sympatico.ca/alduncan/ham/Repeater_Basics.pdf

My Search for the Ultimate VHF/UHF Station - http://www3.sympatico.ca/alduncan/ham/Ultimate_VHF_UHF_station.pdf

Care and Feeding of Gel Cell Batteries - http://www3.sympatico.ca/alduncan/ham/Gel_Cell_Batteries.pdf

Where to Shop for Electronic and Amateur Radio Parts and Equipment - http://www3.sympatico.ca/alduncan/ham/parts_stores.htm

QSM

From the February 1993 issue of the **BARC Newsletter**:

On Grounding and Safety

By: VE3FWE "VAN" (Van Winckel)

This is a discussion on the proper grounding of station equipment and antenna systems.

A good ground is essential for safe and proper operation of your rig, and helps prevent RF in the shack. This is a big factor in eliminating RFI in TV's and stereos.

Good grounding begins in the shack. All radios, power supplies, and antenna tuners need to be grounded. If you read the manuals that come with each piece of equipment, you will likely find a paragraph that says to connect a ground wire to the terminal marked GROUND. This is not to hang your microphone from.

Ground rods should be used. 8 foot ones are standard, but you can get by with the 4 ft ones from Radio Shack if your earth is moist all of the time.

A minimum of four ground rods is recommended. They should be driven into the ground about 12 inches apart, and joined with ½" copper braid. Drive the rods down until only an inch or two is showing. Then, run the braid into the shack through a wall or window.

Inside the shack, the braid should be soldered to a pie e of copper plumbing pipe long enough to run behind all of your equipment. To the pipe, solder enough lengths of #12 wire to attach to each piece of gear.

The ground can be checked by using a multimeter set to the AC VOLTS range. Connect one lead to the pipe, and the other to the neutral side of your AC wall receptacle. If the ground is a good one, you should read around 120V. After ensuring a good ground, connect your equipment to it.

Antennas, tower mounted, roof mounted, and ground mounted; require a good ground to operate efficiently and safely. There are two reasons for this:

1) To lower the angle of attack on radiated energy and
2) To channel energy to ground in case of a lightning strike.

Even towers set in the ground should have a ground system. Usually, they are only buried about three feet or so, and as such don't constitute a good ground. Each section of tower should be connected electrically with copper braid. To do this, clean the metal first, and use hose clamps. A ground rod driven six or so inches away from the base of the antenna should suffice for a ground when attached to the tower with copper braid.

Some verticals require the use of radials to operate within the manufacturers specifications. Ground rods are not always suitable grounds at RF. If you have installed ground rods and are not getting out the way you think you should, then try radials.

For those who cannot drive ground rods for whatever reason, try the cold water pipes in your residence as a source of ground. Test the pipes in the same manner as before with a multimeter. You can use #8 wire as a ground bus attached to the baseboard if aesthetics are a problem.

Good luck with your grounding projects.

The Technical Corner

In the "The Technical Corner", subjects of a more technical nature relating to Amateur Radio and electronics will be covered. This will include the reprinting of technical submissions from other newsletters. Please send any submissions that you wish included to me, this includes any good articles you have from old newsletters from other clubs.

Editor: Al Duncan VE3RRD

From the Jan/Feb 1997 issue of **Radio Adventure**:

Height, Radiation Angles, and HF DX For Horizontal Antennas over Earth Ground

(no author given)

Horizontal dipole antennas at heights of less than ¼ wave above ground have little or no horizontal directivity and in fact attenuate radiation at the lower angles needed for DX. This means that they will work very well for short-haul, all-round (literally) communication. Except under abnormally favorable band conditions, low horizontal antennas will be poor for DX work.

The reason may be visualized by analogy to a bullet from a gun. Shot straight up, it falls straight back down. At some critical angle, the bullet or radio wave will travel the greatest distance. With radio waves, generally the lower that angle of take off, the better your signal at DX, a reality that many ignore!

Antenna height over ground determines the vertical radiation pattern of a simple horizontal dipole as illustrated by Figure 1. Pay particular attention to the 1st lobe up from the horizon. This lobe is called the main lobe. Notice that the main lobe is the only lobe a low heights, and that it starts off going straight up. As height increases, the lobe divides, and troughs or nulls appear between the lobes. Also, the main or first lobe takes off at a progressively lower angle, approaching the horizon.

Figure 1 diagrams presume an effective reflecting plane at ground level. In practice, the real reflecting plane may be below the ground surface, and lossy. Additionally, an effect of placing an antenna over real earth is to fill in the nulls between the lobes at the expense of reduced gain in the lobes. That the nulls fill in is not necessarily a disadvantage since amateur communications require a wide rang of radiation angles over various paths and distances.

Cost-Effective Height

Some years ago DJ2NN in some well reported and documented experiments, concluded that for frequencies between 14 and 28 MHz a cost-effective antenna height is 18.5 meters (60 ft). Below this height the level of DX communication effectiveness decreased rapidly, above this height it increased slowly. Over flat terrain and allowing for some extra "real earth height" a 60 foot tower would place a horizontal antenna up approximately 1 wavelength on 20 meters or 2 wavelengths on 10 meters. Figure 2 plots the arrival angle of sky-wave signals versus frequency. The upper line represents the highest useful angle of arrival for DX work. The center line represents the median angle of arrival, and the bottom line represents the lowest angle of arrival. For any frequency, the chart suggests the range of angles that will be useful for general, all-round effective DX communication under various conditions of propagation.

Look up the DJ2NN height (1 wavelength for 14 MHz, 2 wavelengths for 28 MHz) in Figure 2. Read the main lobe radiation angle. Compare each with the favored angles for the respective bands as shown in Figure 2. The corresponding angles of radiation for 20 and 10 meters at those heights fall in the 50% region for both bands. Allowing for null filling between the antenna radiation lobes existing at such heights, the data support DJ2NN's conclusions. They also suggest why the 60-ft height has become typical for amateur HF towers. The 60-ft height permits a wide range of useful DX angles to be effectively radiated.

Notice also that 60 ft is also quite an acceptable DX height for the other bands down to and including 40 meters. But it is theoretically useless for 80 meter DX.

Higher horizontal antennas can of course provide radiation at lower angles, potentially opening and closing bands under marginal conditions, as well as providing a more optimum radiation pattern for very long distances. But the cost per unit of improvement rises radically.

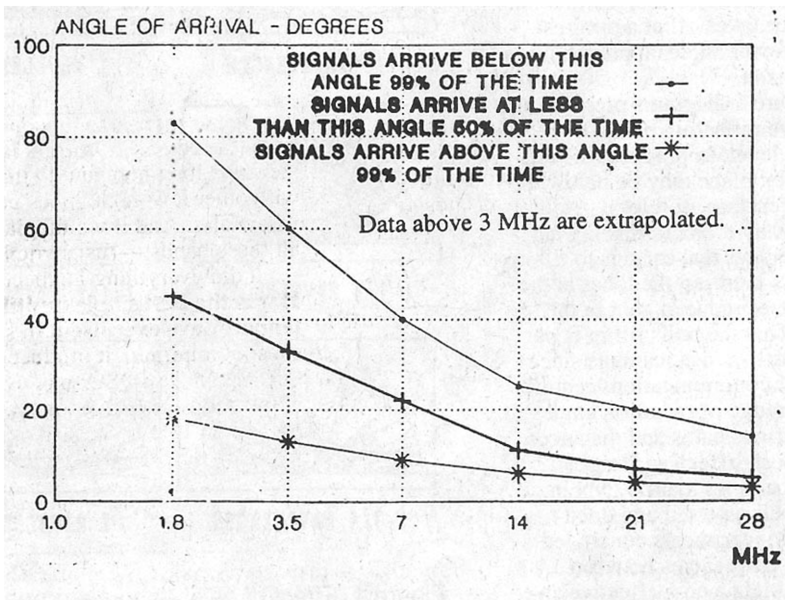

Figure 2. Vertical arrival angle of skywave signals from 1.8 to 30 MHz. Angle is measured up from the horizon.

DX on 80 Meters

The case of the 80 meter DX is particularly interesting. Returning to Figure 2, a close comparison of patterns for dipoles at heights from 1/8 to ½ wave above ground shows a rapid decrease in radiation angle as height is increased. From Figure 2 we read that a range of angles between about 13 and 60 degrees is desired for general DX work at 3.5 MHz. If the actual height is 60 ft (1/4 wave) it can be seen from Figure 2 that the main lobe will be at 90 degrees, advantageously placed for local reception and transmission. Radiation in the DX range of 60 to 13 degrees will exist, but will be down progressively from 1 dB (negligible) to 8 dB (significant) relative to the main vertical lobe. Additionally, DX reception suffers considerable due to QRM from the enhanced local high angle signals.

Moving the antenna only 1/8 wave higher relative to its effective ground, whether by increasing physical height or thanks to additional "real earth depth" can increase significantly the proportion of energy radiated at useful DX angles. At a height of 3/8 wavelength (90 ft), the main lobe is now at 40 degrees – right in Figure 2's 50% area – and radiation at the DX limits is down only 1 to 4 dB from the main lobe.

So comparatively small height increases, whether due to ground effects or physical changes can dramatically improve the DX capability of 80 meter dipoles. Nevertheless for suburban 80 meter operation, given appropriate ground conditions and terrain, a vertically polarized signal as from a half square, vertical, inverted-vee, sloping dipole, delta loop, or loaded tower may be the best DX option.

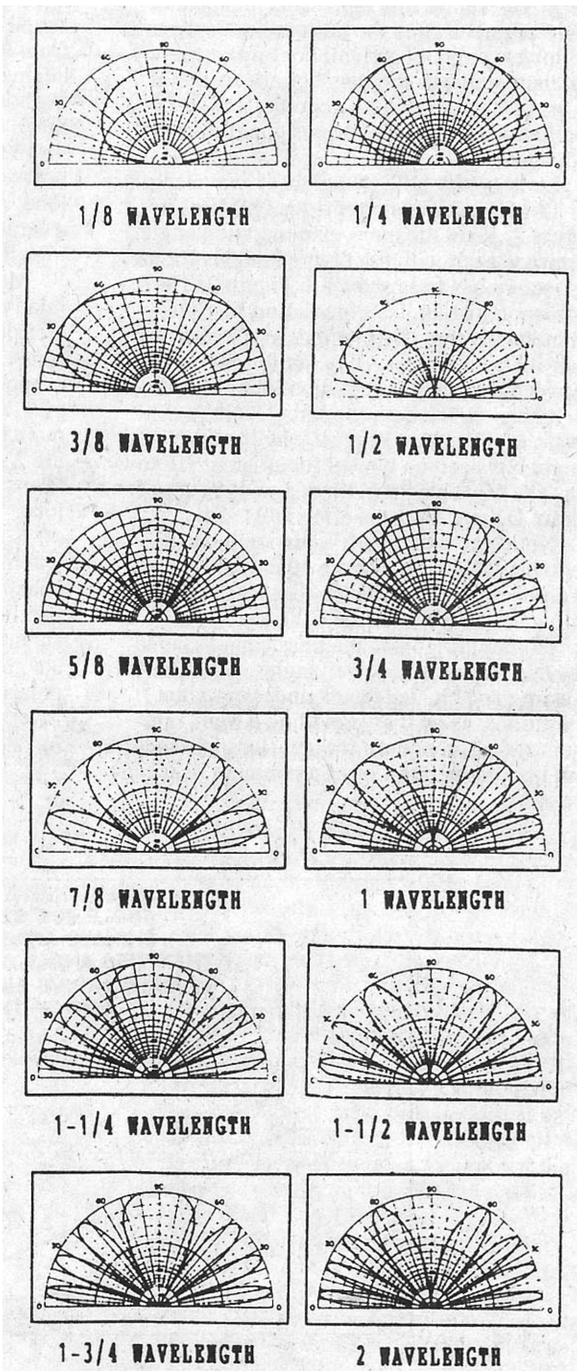

Figure 1. Effect of height abouve ground on the radiation pattern of a horizontal dipole. Perfectly reflective ground is assumed. See discussion in text.

From the January 1991 issue of **QST Canada**

Picking up an Extra dB

Here's a neat idea from the French journal "Megahertz". Many amateurs go to great lengths to pick up an extra dB transmit and receive. According to Megahertz, the magic length is 30 metres – 30 metres of low-loss open wire line to replace 30 metres of coax to a 20/15/10-metre beam.

Why 30 metres? On a transmission line, impedances repeat every half wavelength. 30 metres is three half wavelengths on 20, four half wavelengths on 15 and six half wavelengths on 10.

What impedance should the open wire line be? It doesn't matter. Just be sure to compensate for the velocity factor of the line. Typical velocity factor for open wire line is 0.95 – 0.975, bringing the actual length down to 28.5 – 29 metres. When you get the length right, your beam should load up just as before. – VE3GRO

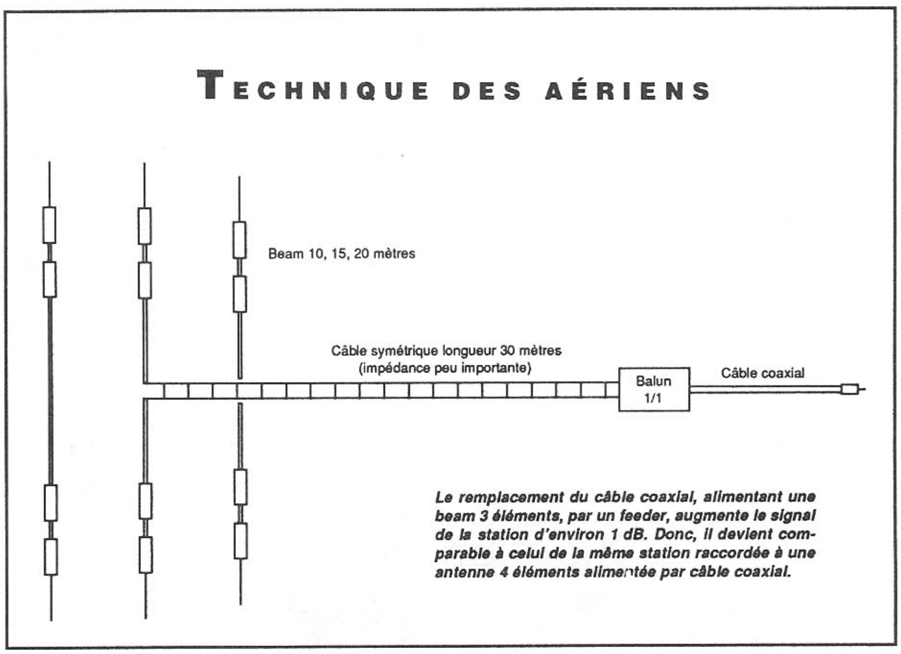

Fig 1—Replacing 30 metres of coax with 30 metres of open wire line will pick a dB or so.

Have you considered saving money on sending QSL cards by using the eQSL service.
You will also receive QSL cards more quickly from other hams using the service.
Find it at: http://www.eqsl.cc

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73 – VE3RRD