The Dummy Load

Official Bulletin of The Cambridge Amateur Radio Club (SWARC Inc)

Serving the community since 1964

Club Executive and Volunteers

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VE3SWA
Bob Kernohan VE3MF
VE3SWR
Tom Franks VE3MAH

Web Master
Club Contest Coordinator
Steve Nyul VE3USP
http://www.cambridgeham.ca

Club Net
Every Wednesday on VE3SWR at 9 pm. Local time.
All comers are welcome.
VE3SWR is an open repeater
146.790 MHz –600 KHz offset

VE3SWA
DXCC HONOR ROLL
(335/335)
WAZ, WAC, WAS.

Next Meetings

Second Monday of the month
Preston Arena Boardroom at
7:30pm
January 9, 2017
February 13, 2017
March 13, 2017
April 10, 2017 AGM
May 8, 2017
June 12, 2017
Visitors are always welcome

Editor's Column

Well – it is official – as passed at the December meeting, club meetings will officially begin at 12:30 Zulu; 07:30 local.

This past week (December 28th) saw the first of three scheduled times for our club to promote amateur radio in our community. This is being done through the 'Taco Stand' project hosted by the Idea Exchange (Cambridge Public Library). The next opportunities scheduled are January 11th, 1 to 3 pm and February 1st, 5 to 7 pm. If you can help out with this important effort; please let Bob VE3MF know as soon as possible. All demonstrations take place at the Queens Square branch on Grand Avenue in Cambridge. To aid in the demonstrations, Bob has set up a remote link via Skype with an HF station in Hamilton.

I understand that the team of Bob, VE3MF, Steve VE3USP and Robin VE3OAV made a respectable showing in the RAC Winter Contest on behalf of the club. In the few hours that I operated on Saturday afternoon, 20 meters was hopping, but before 80 meters fully opened, the dinner with guests call came. Surprisingly enough, in the 3 or so hours on the air I managed to rack up 5000 points. How did you do? It would be interesting to know how many club members got into the contest.

Our club needs a new QSL card design. What would you like our card to look like/ Suggestions suggest it could contain Canada's new national bird the grey jay. Submit your design to Bob VE3MF at the next meeting. I suggest that the winning design needs to be recognised somehow – perhaps a line on the card "designed by *name call*"

January is the time to submit your entry for the club member awards. Entries should be submitted to Bob VE3MF. See the file attachments in the email for the rules.

Tom ve3mah@bell.net

Cambridge Amateur Radio Club Meeting 12th December 2016

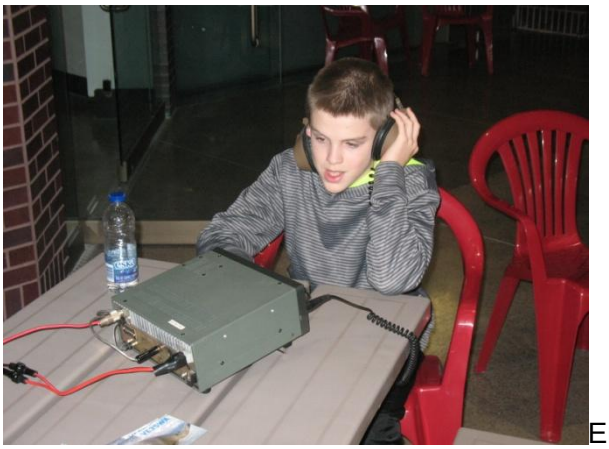
The December minutes were not available at time of publication

From the President:

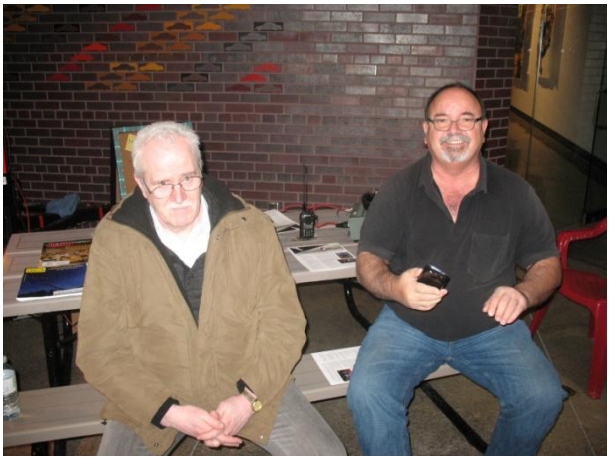
Agenda items for the January meeting:

1. Connection with Georgian Bay website
2. ARES Update – Scott Mitchell
3. TACO Stand Update
4. Update on first day of Advanced course
5. Club Facebook page- Question asked by Scott Mitchell
6. Recognition of Tony van Roon (VA3AVR) web site on Cambridge club web site
7. Fraser Cooper Memorial committee formation

Taco Stand – the first evening



Eric



On Wednesday December 28th, Bob VE3MF, his grandson Eric, Steve VE3USP and Joseph VE3JGO set up at the Idea Exchange Queens Square to promote amateur radio and our club. Thanks to the 'loan' of the use of a remote station via Skype, they were able to demonstrate HF.

Steve and Joseph

News:

A recent announcement from the government of Canada changed the now familiar Industry Canada ministry name to **Innovation, Science and Economic Development Canada**. So – you no longer talk to IC for amateur related information but rather ISED. I wonder what this cost taxpayers? – new stationary and all that --

It is interesting to note that the first radio license issued to yours truly was from the Department of Transport October 30, 1967 for a fee of $3.00. I am not sure when the name changed to Department of Communications but a further license issued February 12, 1974 had this new name on the top.

ISEC has issued a revised version of *RIC-3, Information on the Amateur Radio Service*. Most notably are changes to the wording to clarify the operating privileges granted to holders of the Basic qualification. While a amateur with Advanced certification is allowed to make modifications to a commercial transceiver to operate in the amateur bands, an amateur with Basic certification may now make those modifications that can be accomplished by programming changes*. "re-programming of radio equipment to operate in the Amateur Bands if this can be done by a computer program.* ***Note:*** *No physical modifications to the circuitry of the radio are permitted."*

RAC is still working on having ISEC relax the regulation of allowing only an amateur with Advanced certificate to operate a remote control station.
A careful read of the new RIC-3 is necessary to realise all of the subtle changes that have been made.

As we are all aware, as licensed amateurs we should have available to us the 'Radio Information Circulars' and 'Radio Branch Regulations' provided by IC/ISEC. Following is a list of those circulars that provide all/most of the licensing and regulatory information we may need to responsibly operate our stations.

RIC-1 — Guide for Examiners Accredited to Conduct Examinations for Amateur Radio Operator Certificates Issue 6, February 2009

RIC-3 — Information on the Amateur Radio Service Issue 4 December 2016

RIC-9 — Call Sign Policy and Special Event Prefixes Issue 2 (Provisional), October 2005

RBR-3 — Technical Requirements Respecting Identification of Radio Stations Issue 1, September 2007

RBR-4 — Standards for the Operation of Radio Stations in the Amateur Radio Service Issue 2 January 2014

http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf05478.html

Canada 150 Callsign Use:
To help celebrate Canada's 150th birthday (sesquicentennial) amateurs in Canada may use a special prefix for the period January 1, 2017 to December 31, 2017. Those of us in Ontario may use CG3 in place of VE3 and CF3 in place of VA3. The most interesting call I expect to hear will be from Clarence CF3CF! For all the details see the September 2016 Dummy Load pg. 7.

From the minutes/ discussion at the last meeting:

As many members are aware, from time to time, there are donations of used amateur equipment to our club. A club member who has become a silent key may have willed his station equipment to the club or the widow of a sk may decide to donate to the club or a non amateur may be in possession of equipment they do not want. Some of this equipment is old, some repairable some not worth repair or relatively new. No matter how the club receives it, there needs to be a policy in place as to how we will deal with it. In my experience from past donations – they just seem to evaporate. I'm sure this is not what the donor wished or expected. All donors should be made aware of whatever policy we come up with before they make the donation.

Under our current constitution, the Vice President is *to "maintain a list of club property and donations and make it available to the executive and membership as requested."*

Some of the suggestions that came up for discussion are:

- Make it available to club members as a long term loan.
- Save it all for the day we will have a Club station.
- Raffle it off at a club meeting.
- Set a fair market value on it and offer it first to club members then place it for sale.
- Have it evaluated and repaired and then sell it for the value of the repair to club members in need.

Another question comes up when the family of a sk wants help in disposing of a station and lifetime collection. Does the club want to get involved in this exercise? (it is very time consuming – inventorying, sorting and storing, cleaning, testing, setting a value that is ok and within the expectations of the family, repair as needed, advertising, selling, shipping or hauling to a flea market ...)

Bring your ideas/suggestions to the next meeting so we can discuss the possibilities and start to develop a policy.

Fraser Cooper Memorial: (VE3FC)

The Cambridge Amateur Radio Club remembers Fraser's dedication and willingness to share his knowledge and talents with Amateur Radio operators, specifically members of the Cambridge Amateur Radio Club. This award is presented yearly by the Cambridge Amateur Radio Club in recognition of the recipient's dedication to the operation and success of the Cambridge Amateur Radio Club.

At the January meeting a committee of 3 will be struck to consider the award criteria and make a recommendation to the club president as to a recipient for 2017. As 2016 recipient, Hugh VE3IHM will be one of the 3 committee members.

A Filler:

DON'T MESS WITH US OLD GUYS!

An older gentleman had an appointment to see the urologist who shared an office with several other doctors. The waiting room was filled with patients. As he approached the receptionist desk he noticed that the receptionist was a large, unfriendly looking woman who looked like a Sumo wrestler. He told her his name.

In a very loud voice, the receptionist said, "YES, I HAVE YOUR NAME HERE; YOU WANT TO SEE THE DOCTOR ABOUT IMPOTENCE, RIGHT?"

The patients in the waiting room snapped their heads around to look at the very embarrassed man. He recovered quickly, and in an equally loud voice replied, "NO, I'VE COME TO INQUIRE ABOUT A SEX CHANGE OPERATION, BUT I DON'T WANT THE SAME DOCTOR THAT DID YOURS!

DON'T MESS WITH US OLD GUYS!

To Go Digital or Not To Go Digital – that could be the question --

by Tom VE3MAH

At the urging of a few club members here is a short 'primer' on the emerging but not so new trend to move from analog to digital audio and control at VHF and UHF frequencies.

I will try to answer some of the questions that arise when talking about digital voice and data above 50 MHz "Does a digital transmission travel further than an analog signal?" The simple answer is NO. "But I can hear a digital signal further than an Analog signal!" Can an Icom radio talk to a Yaesu radio? Why not? ...

Frequency modulation is probably the most commonly used analog modulation technique above 50 MHz in both commercial and amateur communications. The main advantage over other types of modulation is the absence of noise in the received signal – well almost noise free. FM does suffer from multipath distortion, fading and phase noise. Even the best receivers cannot compensate for these problems.

Digitizing the audio and modulating a carrier – with forward error correction – could solve these deficiencies. A digital transceiver then digitizes the audio input using an A/D (analog to digital) converter, processes it through a vocoder (voice encoder) to compress the data and add forward error correction and modulates the transmitter with uniform packets of data in a serial fashion. The receiver upon detecting this data, reverses the process. The quality of the audio is set by the number of bits in the A/D and D/A converters and vocoder. Header data added to each packet provides sync bits, routing instructions and user identity. It is possible to interleave or substitute the voice information with text, pictures or other types of files.

Basic information for analog FM:

- Region 1/ Canadian regulations allow up to 30 KHz bandwidth in the 2 meter band and 12 MHz bandwidth in the 70 cm band.
- Currently amateur use in the 2 meter band is a 15KHz channel. (12.5 KHz for the modulated signal and 1.25 KHz each side of the information as a guard band)
- The modulation index is kept low to reduce the number of sidebands.
  (mi = deviation/frequency of modulation)
- A low modulation index will give very good quality speech.

Modulating an FM or PM carrier with a digital signal:

In order to modulate an FM carrier with digital information, the simplest is **FSK** (frequency shift keying) where we use two frequency shifts – one to represent a '1' and another to represent a '0' or sometimes referred to as 'mark' and 'space'. The result of this method however is the large bandwidth produced by the number of resulting sidebands as the data rate to be transmitted increases. BW = data rate (baud) + (2 X deviation X 1.2). For a 15KZ channel, the maximum baud rate will be too low for quality speech.

MSK (minimum shift keying) is the narrowest feasible FSK implementation. Two data bits per frequency shift where the shift in frequency is equal to ½ the data rate. This method will allow for a data rate high enough to allow speech, though it will be very low quality.

GMSK (2-GMSK two level gmsk) (Gaussian Minimum Shift Keying) By passing the MSK signal through a Gaussian filter prior to being passed into a phase modulated transmitter, the number of sidebands are reduced and therefore the bandwidth. Remember – phase modulation shifts the phase of the carrier rather than the frequency of the carrier. For a bandwidth of 6.25KHz and a modulation index of 0.5, the speech quality is almost as good as an analog signal using twice the bandwidth. This is efficient use of the available spectrum.

4-FSK (four level frequency shift keying) Information bits in this system are transmitted in pairs. Each pair is then assigned to a frequency shift. The transition between one pair of bits and the next pair are smoothed by a filter in order to reduce the high frequency components and therefore the number of sidebands and the bandwidth. The transmitted audio is of the same quality as an analog signal.

C4FM (compatible/continuous four level frequency shift keying) Very similar to and compatible with 4-FSK but uses different shift frequencies.

While there are other methods of modulating an FM or PM carrier, these are the ones chosen by the commercial and amateur users for digital voice.

In order to modulate a carrier with more than one bit at a time, a method of multiplexing is required to transmit the bits in pairs as stated above. Either TDMA (time division multiple access) or FDMA (frequency division multiple access) may be used.

FDMA is the simplest multiple access method and has been used for decades by the broadcast industry for multiple channel analog FM broadcast (stereo) and television. Each signal that will modulate the carrier is assigned a portion of the available frequency spectrum on a full time basis. Assume the bandwidth available is 6.25 KHz. Bits 1 and 3 could be assigned to the first 3.125 KHz segment and bits 2 and 4 assigned to the second 3.125 KHz segment.

TDMA allows 2 bits to use the entire bandwidth but for only a portion of the time available. While this method of multiplexing allows for more data in a period of time (as does FDMA) the available bandwidth must be increased.

In Ontario there are 473 repeaters listed in the 2 meter and 70 cm bands. Of this number, 106 are some form of digital configuration. This represents 22% of Ontario repeaters as being fully digital or having digital capability. (according to Repeater Book) https://www.repeaterbook.com/repeaters/index.php?state_id=CA08

So with this many choices, which one should I try? I ask this question because the different systems are not compatible with each other and therefore a new radio will be required for each system I want to use. It should be noted however, that System Fusion repeaters will also function in analog mode with automatic switching between modes.

Different systems available:

- **APCO P-25** – This is the oldest system that remains in use. Primarily found in commercial use but Ontario has 8 VHF or UHF repeaters using this technology.
- **DMR** – Digital Mobile Radio has been adapted from commercial use for use by amateurs. There are 26 VHF or UHF repeaters in Ontario using this technology.
- **NXDN** – This is also a commercial technology adapted for amateur use with few repeaters available.
- **D-STAR** -- This is the first digital system designed for amateur use. It is a non proprietary system developed in Japan by the JARL (Japan Amateur Radio League). There are 37 D-Star VHF or UHF repeaters listed for Ontario.
- **System Fusion** – Developed by Yaesu for the amateur user is a modification of a C4FM commercial technology. There are 32 Fusion VHF or UHF repeaters listed for Ontario.

Comparison of the most common systems available to amateurs:

	D-STAR	**FUSION**	**DMR**
Manufacturer	Icom	Yaesu	Motorola, Vertex + others
Availability	Many models Amateur Dealers	Few models Amateur Dealers	Most models Commercial Dealers
Dual band available	Yes	Yes	Yes
Cost range	$400 to $800	$250 to $700	$150 to $1000
Analog FM Capable	Yes	Yes	No
Display	Multifunction	Multifunction	Minimal

Programming	Front Panel + Software	Front Panel + Software	Software only
Vocoder technology	AMBE+	AMBE+2	AMBE+2
Forward Error Correction	Voice Only	Voice Only	Voice Only
Modulation	GMSK	C4FM	4FSK
Multiplex Method	FDMA	FDMA	TDMA
Transmission Rate	4.8 kbps	9.6 kbps	4.8 kbps x 2
Bandwidth	6.25 kHz	12.5 kHz	12.5 kHz
Registration required?	Yes	No	Yes
User identity	Call Sign	Call Sign	Subscriber ID
Other text display options	4 characters 20 characters	None yet	None
Capable of text/pictures	Yes	Coming?	Limited to text
Adequate for Identification*****	Yes	Yes	No
Talk locally (simplex)	Yes	Yes	Yes
Link to another repeater	Yes	No	No
Multi-repeater connection	Reflectors	Wires-X Rooms	Talk Groups
Selection method	UR Entry	Room Name	Channel Dial
Route to another ham	Yes	No	No
Echo test	Yes	No	No
Request a link status	Yes	No	No
Operating mode selection (Analog or Digital)	Key Press	Key press or automatic when accessing repeater	Fixed by programming
Voice naturalness	Good	Narrow – Good Wide – Very Good	Good
Signal noise (digital mode)	None	None	None
Sync robustness ******	Fair	Good	Good
Sync recoverability *******	Poor	Best	Best

***** Identifying by voice is still the preferred method.
******Sync robustness is the tendency to fall out of sync
*******Sync recoverability is the ability to recover sync quickly

Some of the above comparison is subjective. I have tried to get as many user comments as I can find.

So – did I answer the questions I posed at the beginning of this article?
"Does a digital transmission travel further than an analog signal?" The answer is still no.

BUT

Digital audio transmission has several features that analog transmission does not. The most useful is the ability to forward error correct. The data transmitted is encoded in a redundant way using an error correcting code. This way the receiver can 'correct' most of a transmission packet affected by channel noise, multipath distortion, fading and phase noise.

And no – Icom and Yaesu radios cannot talk to each other except in analog mode.
Maybe someday!

If your appetite was -- or has now -- been whetted towards digital radio in our VHF and UHF bands the proceeding might help as a start to understanding the differences and similarities between brands/systems. Choosing what system to try will depend on many factors but I suspect many hams have more than one system available to them. As always – we as amateurs like to experiment.

Upcoming Events:

Mark your calendar in advance:

Winter Field Day January 28/29, 2017
Winter Field Day Association (WFDA) is a dedicated group of Amateur Radio Operators who believe that emergency communications in a winter environment is just as important as the preparations and practice that is done each summer but with some additional unique operational concerns.
We believe as do those entities of ARRL Organizations like ARES & RACES that maintaining your operational skills should not be limited to fair weather scenarios. The addition of a Winter Field Day will enhance those already important skills of those that who generously volunteer their time and equipment to these organizations. This is why WFDA is open to all licensed amateur radio operators worldwide.

For complete rules see: http://www.winterfieldday.com/rules/

Saturday, February 4, 2017; Niagara Peninsula Amateur Radio Club, Inc., Merriton Community Centre 7 Park Ave. St. Catharines, Ontario. Open to the Public at 9:00 AM and at 7:00 AM for Vendors. Admission: $7.00 per person. http://www.nparc.on.ca/content/bigevent/directions.html

Saturday, February 25, 2017; Burlington Amateur Radio Club, 828 Legion Rd Burlington, ON L7S. Vendors 8AM General Public 9AM; Tables $15.00 plus Entry Fee $8.00. http://barc.ca

Saturday, March 18, 2017; Peel ARC and Mississauga ARC, Brampton Fall Fairgrounds, 12942 Heart Lake Road. Vendors: 7 am, Exhibit Hall and Demonstrations: 8 am, Flea Market: 9 am. General admission: $7. http://www.ham-ex.ca

DX News:

Rather than list some of the events coming, here are some sources that I find quite complete.

For DXpedition news: http://www.dx-world.net/

For special events: http://www.ng3k.com/Misc/adxo.html

Islands on the air: https://www.rsgbiota.org/index.php

For Sale / Swap / Free

The intention of this section of the bulletin is to provide a space where **members** can advertise items of a ham related nature to other members of the club. It is not intended as competition to the many on air and internet based swap shops.

Free: I have several recent years of QST and RAC magazines for any one that wants them.
Ernie VE3OU 653-9743

Free: (to club members) 440 ohm Ladder line. About 66 feet available – enough for 2 G5RV's. Tom VE3MAH

Free: (to club members) Cushcraft A3S TriBand beam. Needs new hardware. Tom VE3MAH

Free: (to club members) CDE AR-44 rotor unit only. Working when removed from VE3FC's tower.
Tom VE3MAH

Real Swap Sites:

KWARC Swap Shop -- one of the best around. http://www.kwarc.org/swapshop/index.htm

Maritime Swap Shop -- http://www.ve1pjs.com/swap.html

ONTARS Marketplace -- http://www.ontars.com/cgi-bin/classifieds/classifieds.cgi?session_key=&search_and_display_db_button=on&results_format=headlines&query=browse

Membership / Information update form: Membership in the Cambridge Amateur Radio Club is $20 per calendar year. Please help the Treasurer by printing this page, filling in your information and giving it to him. If mailing, please use the address listed.

Cambridge Amateur Radio Club
% Tom Franks Treasurer
264 Fearnwood Street
Cambridge, Ontario
N3C 3W9

***First Name:** _____ ***Last Name:** _____ *** Call Sign:** _____

***Address:**
_____

***Email Address:** _____ **Telephone Number:** _____

Full membership $20 ☐ **Renewal** ☐ **New Member**
Associate member $5 ☐ **Renewal** ☐ **New**

*required – your information will not be shared with third parties.