marcOgram

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

Volume 66, Number 5 **March 2020**

NEXT MEETINGS

Tuesday 31 March 2020
and
Tuesday 28 April 2020

CANCELLED

See the President's announcement page 4.

From the Editor's Desk

Several major news items this month; please check any information before attending any event.

Item 1: Speaking of **GREEN**, St. Patrick's Day is upcoming, but the Montreal parade has been **postponed**.

Item 2: The 2020 MARC hamfest has been **cancelled**. Never fear, it will be back in 2021, but we still need an appropriate space in which to hold it next April. Anyone with ideas please contact Jim, VE2VE.

Item 3: The March and April monthly meetings have been **cancelled**. St. Ignatius Church has closed in accordance with other meeting venues, due to the COVID-19 virus hazard. See p. 4 for further info.

73 de Nora, VA2NH

-...-

Call for Volunteers!

St. Patrick's Day Parade

Due to the containment restrictions imposed by COVID-19 virus, the 197th St. Patrick's Day Parade has been **postponed**, for the safety and health of everyone attending. I am still looking for amateurs to assist with certain communications; three people to walk with the parade to provide position information, and others to assist me at parade headquarters.
Please contact me if you would like to help.

73 de Jim, VE2VE

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.

Annual fees are:

General Members	... ...	$30.00
Family Members (per family)	...	$35.00
Postal delivery of MARCogram	…	$ 5.00

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

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.

Directors

President:	Marc-André Gingras, VE2EVN… ve2evn@marc.ca
Vice President:	Leo Nikkinen, VE2SI………..…. ve2si@marc.ca
Secretary-Treasurer:	James R. Hay, VE2VE………..…. ve2ve@marc.ca
Directors:	Sheldon Werner, VA2SH… ……...va2sh@marc.ca
	Nora Hague, VA2NH……..….........va2nh@marc.ca
	George Hedrei, VE2NGH
	Eamon Egan, VE2EGN……...…...ve2egn@marc.ca
	Mario Piacitelli, VA2TMP………..va2tmp@marc.ca

Club Call Sign: VE2ARC

Club Website: http://www.marc.qc.ca

Repeaters

VE2BG 147.06 MHz (+)

Owned and operated by the Montreal Amateur Radio Club. Currently OFF AIR, looking for a new location..

VE2RED 147.27 MHz (+) 103.5

On the air from Ridgewood Ave. in Montreal; CTCSS tone of 103.5 Hz for access. Thanks to Claude Everton, the VE2RMP group and Metrocom for making this possible.

The repeaters are open to all amateurs.

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 Tuesday of the month (Aug to June) at 19:30 in the Wardens' Room, St. Ignatius of Loyola Parish, 4455 West Broadway. 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.

Club Activities

Monthly Meetings

(last Tuesday of the month)

Mar 31 - Cancelled. Go to VE2RED @ 20:00 (01:00Z)
Apr 28 - Cancelled.
May 26 - Show and Tell

Radio Classes

A basic level course is held starting in January of each year. If you know of anyone interested in taking the course they should send a message to: classes@marc.ca

MARC Hamfest

The 2020 MARC flea market has been cancelled.
It will be back next year but we still need a good location. Any ideas? Please contact any of the board members.

Ideas are welcome!

Go to http://www.marc.ca/fest/fest.html for more information as it happens.

Incoming QSL card service

As has been mentioned in previous MARCograms, we are resuming the club's service of having incoming QSL cards sent to the club for members to pick up at meetings. This is a service which we are offering to our members which both saves the individual members money as well as makes more efficient use of our collective resources.
If you would like to avail yourself of this service please send an e-mail to qsl@marc.ca and we will add you to the list of cards that the incoming bureau sends to the club and bring them to the monthly meetings.

CW Classes

By Leo VE2SI

Some members have expressed an interest in learning what is now called the International Morse Code and adding CW to their operating capabilities.
If you're interested send an email to VE2ARC@marc.ca and indicate your level of interest.

SolderSpot

Group build Power Supply Project - By Leo VE2SI

If you're interested and even if you've spoken with me before, please send an email to VE2ARC@marc.ca and indicate your level of interest.
Participation is open to everyone and MARC membership is not a requirement. .

Upcoming Fleas/Events

2020

What: HamEx 2020
Who: Peel and Mississauga AR Clubs
When: **CANCELLED**
(Saturday, 28 Mar, 2020)
Where: Brampton/Caledon, ON

What: Iroquois ARC Fleamarket
Who: Iroquois Amateur Radio Club
When: **POSTPONED TO 2021**
(Saturday, 4 Apr 2020)
Where: Iroquois ON

What: Laval-Laurentide hamfest
Who: Club RA Laval-Laurentides
When: **POSTPONED**
(Samedi, 4 Avr 2020)
Where: Académie Lafontaine,
St. Jerome, QC

What: 44th Annual Durham Hamfest
Who: North Shore ARC & South Pickering ARC
When: Saturday, 25 Apr 2020
Where: Pickering, ON

What: NEAR-Fest XXVII
Who: New England Amateur Festival, Inc.
When: Fri & Sat, 1 & 2 May, 2020
FINAL DECISION 24 APRIL; CHECK WEB SITE
Where: Deerfield Fairgrounds
Deerfield, NH

What: WIARC Amateur Radio Auction
Who: West Island AR Club
When: Saturday, 9 May, 2020
Where: Lakeside Heights Baptist
Pointe-Claire, QC

Test Equipment: The Basics and Beyond

By Leo Nikkinen, VE2SI
leo49@videotron.ca

Part 2: Early Test Equipment.

In this installment on test equipment we'll discuss some basic measurements. We'll go back to earlier measurement technology and some of the most basic circuit parameters that can be measured: voltage and current. This earlier technology used basic physical forces, those created by interacting magnetic fields and electric fields. While not providing the sensitivity, accuracy and precision of modern test equipment, looking at these early measuring instruments is instructive and illustrates some of the problems associated with electrical measurements.

This step back in time will go somewhat farther back than the Avometer [Fig. 1] and Simpson 260 multimeter [Fig. 2] that many probably remember.

Figure 1

Figure 2

We'll look at the instruments used in the first, very early, investigations into the nature of electricity in the latter half of the 18th century. The history is interesting, and it provides some perspective on the modern instruments that are now so readily available.

The operating parameters of DC circuits are defined by Ohm's law V=IR and we can use this equation as a guide to our starting point. We need to measure voltage, current and resistance. How can we make these measurements and can some of these parameters be measured directly?

(Continued on page 6)

MESSAGE FROM THE PRESIDENT

In view of the latest directive from the Quebec government regarding COVID-19, the MARC has taken the decision to **CANCEL** both the March and April general meetings that were scheduled on March 31st and April 28th.

The March and April presentations will be re-scheduled at later dates, and we will keep you informed as to the status of the May Show and Tell meeting.

Instead of the meetings, we propose to hold a net on the VE2RED repeater on March 31st at 8pm, 01:00Z.

We would need a volunteer to act as Net Operator for the evening, preferably someone with a 2m base station, or a mobile setup if you don't mind running a net from your vehicle for a few hours. Please contact me at ve2evn@marc.ca if you would be interested in operating this net.

To all members, please join us for this event on VE2RED on 2m output frequency of 147.270 MHz (+600 kHz input offset)
Note: the repeater uses a CTCSS tone of 103.5 Hz for access.

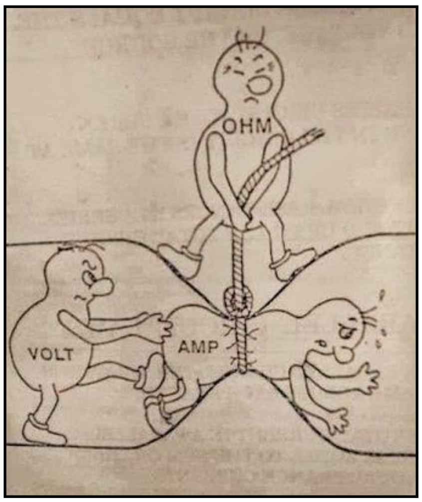
Please be safe, and stay healthy.

Marc-Andre, VE2EVN

CONGRATULATIONS!

Congratulations to the following new hams who wrote the exam on Saturday after taking the course:

VE2FSE Frank Scully, Basic w Honours
VA2LEQ Leo Godbout, Basic
VE2MXN Martin Rodriquez, Basic

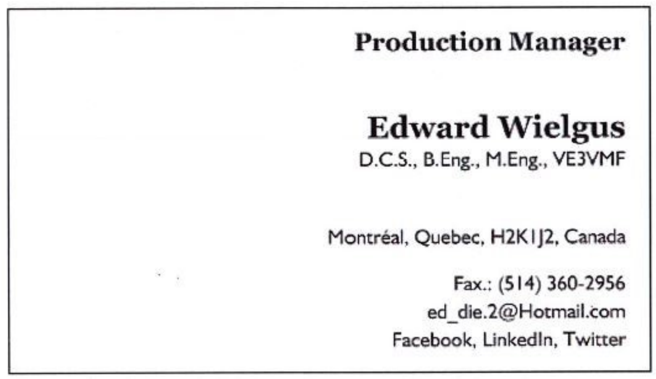


FOR SALE:

From the Estate of Pierre Lafortune, VE2ANH SK

Kenwood TS-820s transceiver.

With manual. In quite good condition as Pierre was very meticulous. Contact Jim, VE2VE.


Production Manager

Edward Wielgus
D.C.S., B.Eng., M.Eng., VE3VMF

Montréal, Quebec, H2K1J2, Canada

Fax.: (514) 360-2956
ed_die.2@Hotmail.com
Facebook, LinkedIn, Twitter

FOR SALE:

For the antenna builder I have an Archer analogue VHF/UHF television antenna still in the box. It was bought from Radio Shack many years ago but never used. Contact me at ve2ve@marc.ca if you would like some parts for your next antenna project.

Jim, VE2VE

Cartoon courtesy of Dick, W9CBT

(Continued from page 3)

A practical starting point is the measurement of voltage. Early electrical investigations centred around lightning, static electricity and electrochemical cells (making up a multi-cell battery), and the properties of the electricity that they produced. One of the effects of the static electricity produced when shuffling across a carpet in winter is the basis for the earliest and simplest voltmeter. With a sufficiently large static charge, the attractive mechanical force created by the electric field is sufficient to pick up small pieces of paper or cause objects to repel each other; attraction or repulsion depending on the polarity (like or unlike) charges on the objects. This force depends on the voltage of the charged object and is the basis of the electrostatic voltmeter, a device that measures a voltage and does so without drawing any current for the voltage source.

The electrostatic voltmeter [Fig. 3] (invented in 1887 by Sir William Thomson, Lord Kelvin), along with pith ball [Fig. 4] and gold foil electroscopes [Fig. 5] of the mid-1700s, were the test instruments of early electrical researchers.

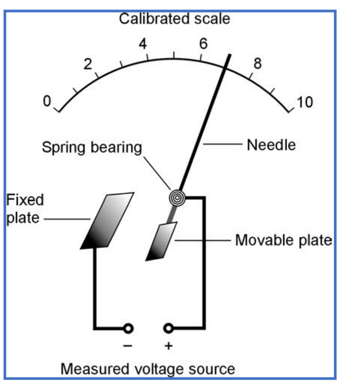


Figure 3

Figure 4

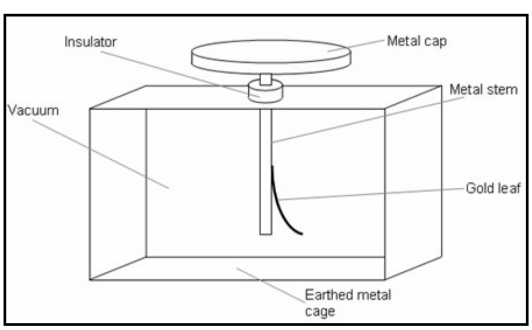


Figure 5

The instrument that's illustrated is somewhat different from Lord Kelvin's voltmeter, but the principle of operation is the same. A voltage applied to the voltmeter produces an attractive force between two plates and that force causes the spring-loaded needle to deflect. With proper attention to the mechanical details, it's possible to calibrate the meter to read volts. Electrostatic voltmeters are better at measuring high voltages, say above 1000 volts, but Lord Kelvin's voltmeter was able to measure down to 50 volts. The low voltage limit is set by the very weak forces developed at voltages below a few hundred volts. While better at measuring a steady DC voltage, the electrostatic voltmeter can also measure an AC voltage.

What advantage does the electrostatic voltmeter have over modern voltmeters? There is no direct connection between the plates, so there is no current drawn by this voltmeter. There will be a brief transient current drawn as the metal plates (essentially a capacitor) become charged, but there is no steady current drain to disturb the operation of the external circuitry. The goal of measuring a voltage without disturbing the operation of the circuit being investigated is a desirable feature of all measuring instruments and it can be achieved in all practical respects by modern instruments but the electrostatic voltmeter is the only instrument that, by design, does not load, or draw a continuous current from, the circuit being measured.

Although electrical charge (measured in coulombs) isn't a commonly measured quantity, understanding the relationship between charge, voltage and capacitance was an important factor in developing an understanding of electricity. The electricity generated by shuffling across a carpet in the winter appears as a static electrical charge. As we all know static electricity can be used to attract small piece of paper or make a balloon stick to the ceiling. The mechanical force produced by that static charge was the basis for early instruments that were used to explore the nature of electricity and resulted in the development of various forms of electroscopes.

(Continued on page 7)

(Continued from page 6)

The pith ball and gold leaf electroscopes rely on the repulsive forces between like charges (the same polarity) and these devices can also be used as voltmeters. It might seem a little strange to think of these devices as research instruments rather than scientific novelty items, but nothing else was available at the time and the effects produced by static electric charges were understood, at least at a phenomenological level. Both electroscopes rely on the repulsion produced by like charges, either both positive or negative, on the pith balls or between the foil and stationary plate of a gold leaf electroscope. While electroscopes react to the total electrical charge on an object, the amount of that charge is a function of the voltage on the charged object (and its capacitance) and these devices can be used to indicate voltage. As with Lord Kelvin's electrostatic voltmeter, a voltage measurement can be made by connecting the metal cap on the gold leaf electroscope to voltage source. There will be a brief flow of current as the gold leaf and all the other connected conducting parts of the electroscope are charged by the voltage source. Once charged, the gold foil and facing metal electrode will experience a repulsive force and the foil will deflect, the degree of foil deflection being determined by the voltage on the foil/plate assembly.

The pith ball electroscope operates on a similar principle, except the electrically conducting plate and foil are replaced by insulated pith (from the centre of a tree) balls that are suspended by an insulated string. Initially the pith balls are uncharged and in contact. When either ball is connected to a voltage source each ball becomes charged and they repel each other. With the appropriate voltage source, the amount of separation is dependent on the source voltage. Again, these forces are minute and thousand or tens-of-thousand of volts are required to produce a measurable deflection of the gold foil or separation of the pith balls. These instruments are not without their difficulties, particularly the pith ball electroscope, because of its delicate mechanical arrangement. Because of its limitations the pith ball electroscope is more useful as a demonstration tool rather than a serious scientific instrument. However, though simple, the gold leaf electroscope was an important and widely used instrument in early physics research and in advancing our understanding of the nature of electricity.

While still used to demonstrate electrical forces, electroscopes have been replaced by their modern equivalent, the electrometer, which will be discussed in a future chapter.

Fortunately, when needed, there are other near-ideal instruments that can perform measurements without loading the circuit under test. A more involved measurement technique, using a null voltmeter, can achieve performance approaching that of an electrostatic voltmeter and does so over a wide range of voltages. More on the null voltmeter method of measuring voltages in a future installment.
What about measuring an electrical current? Is there a way to measure electrical current directly? The answer to this question leads to one of the most useful measuring instruments in electronics, the D'Arsonal meter [Fig. 6], shown in a simplified form.

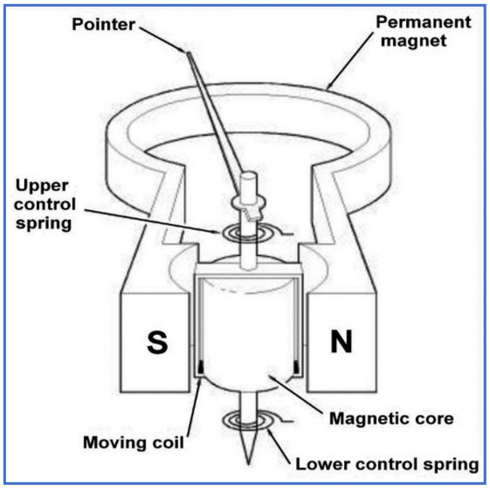


Figure 6

The D'Arsonval meter uses the interaction of the magnetic field from a permanent magnet and the magnetic field from a coil to create a torque that deflects a needle or pointer. The magnitude of the

(Continued on page 8)

(Continued from page 7)
magnetic field produced by the coil is directly related to the current flowing through the coil and the number of turns of wire in the coil. Using a torque that varies with the coil current allows the D'Arsonval movement to measure an electrical current directly. In the ideal meter the resistance of the wire in the coil is made as low as possible in order to reduce the voltage drop produced by the coil.

Modern analogue voltmeters use precision resistors in series with a D'Arsonval current meter. The current drawn by the resistor and meter is described by Ohm's law, V=I/R, so it's possible to calibrate the meter in voltage but the actual quantity being measured is current. This is an indirect way to measure voltage but it's easier than the electrostatic voltmeter and can measure much lower voltages. Modern digital voltmeters use a voltage divider to scale the input voltages to the range of the instrument's analogue/digital converter (more on that in a later installment), but these instruments all draw some current from the circuity being measured.

In our examination of the most basic form of voltage and current measuring instruments, we saw that both voltage and current can create measurable mechanical forces. This allows us to construct instruments that measure voltage and current directly. What about resistance? There is no physical phenomenon that is directly related to resistance, however we do have Ohm's Law. Resistance can be measured by either applying a known voltage to a resistor and measuring the current, or by passing a known current through the resistor and measuring the resulting voltage, and then using Ohm's law R=V/I to give the resistance. In practice most multimeters use a more complex circuit to allow a wide range of resistance to be measured, but the basic method reduces to voltage, current and a meter that's calibrated to read the measured current or voltage as resistance. A modern digital instrument works in a similar manner but a microprocessor is used to perform the Ohm's Law calculation.

What can we learn from the very early, basic, electrical measuring instruments described above? First, some electrical parameters, such as voltage and current, can be measured in a direct manner. Other parameters (resistance is only one example) cannot be measured directly. Early instruments, though limited in their measuring capabilities, did perform their measurements in a near-ideal fashion. Except for a brief charging current, electrostatic voltmeters do not load the circuit under test. The current measuring capability of a D'Arsonval meter can be used in more complex circuits to produce instruments with a wide range of measuring capabilities. This is the basis of all analogue-reading multimeters.

In the next issue of MarcOgram we'll leave behind the 17th century and introduce some recognizable instrumentation.

Sources of illustrations:

Figure 1, Avometer:
https://www.ebay.ca/i/362343268274

Figure 2, Simpson 260:
https://www.simpson260.com/260-5/simpson_260-5.htm

Figure 3, Electrostatic voltmeter:
https://www.elprocus.com/digital-voltmeter-electronic-circuit-diagram-and-video-explanation/

Figure 4, Pith Ball electroscope:
https://sales.paxpat.com/pith-ball-electroscope.html

Figure 5, Gold Leaf electroscope:
https://commons.wikimedia.org/wiki/File:Gold_leaf_electroscope_diagram.jpg