The
Communicator

SARC
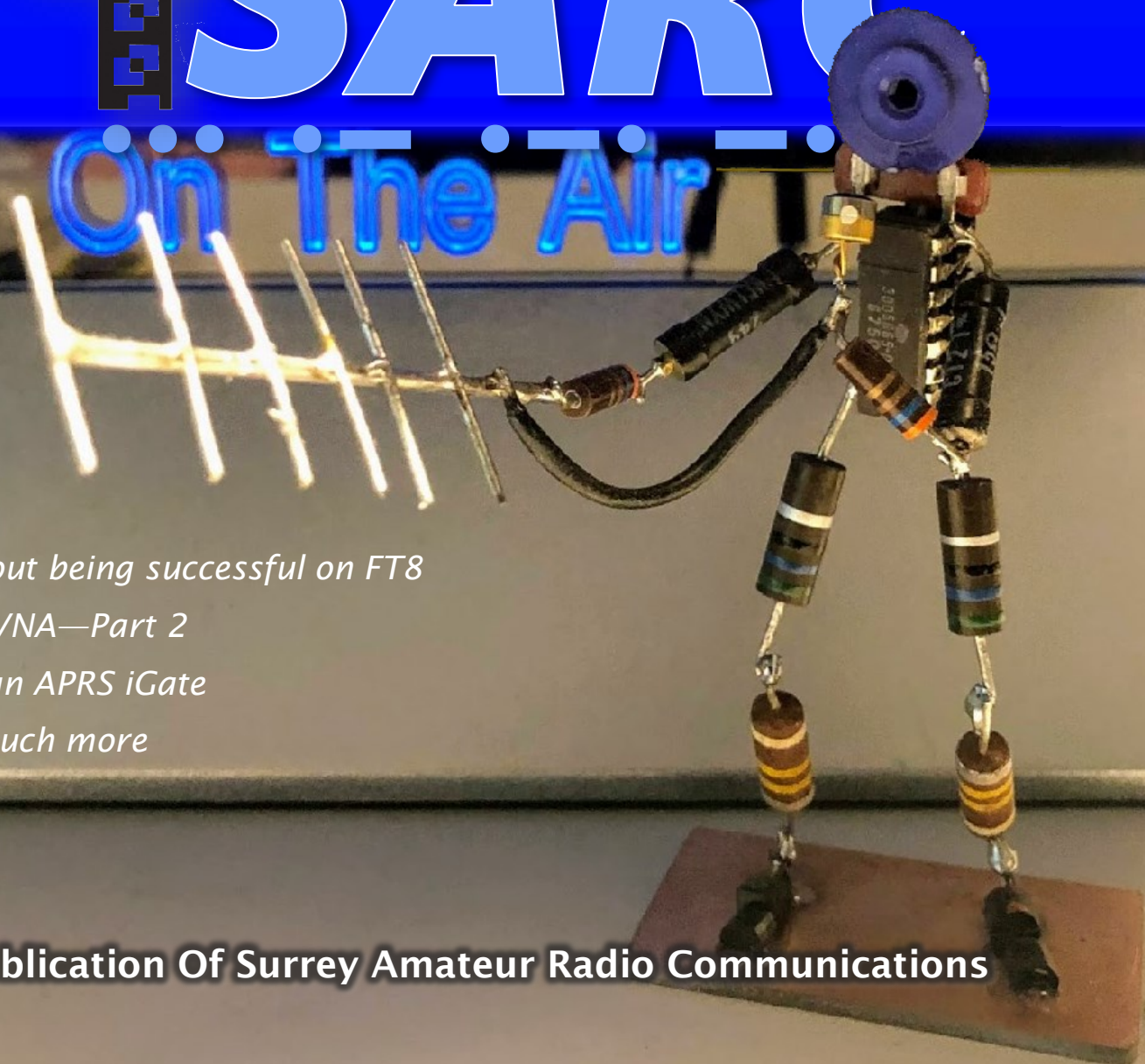
On The Air

- *All about being successful on FT8*
- *Nano-VNA—Part 2*
- *Build an APRS iGate*
- *...and much more*

The Communicator is a publication of Surrey Amateur Radio Communications.

It appears bi-monthly, on odd-numbered months, for area Amateur Radio operators and beyond, to enhance the exchange of information and to promote ham radio activity.

During non-publication months we encourage you to visit the Digital Communicator at ve7sar.blogspot.ca, which includes recent news, past issues of The Communicator, our history, photos, videos and other information.

To subscribe, unsubscribe or change your address for e-mail delivery of this newsletter, notify communicator @ ve7sar.net
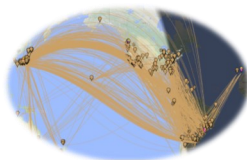
Regular readers who are not SARC members are invited to contribute a $5 annual donation towards our Field Day fund via PayPal.

SARC maintains a website at **www.ve7sar.net**

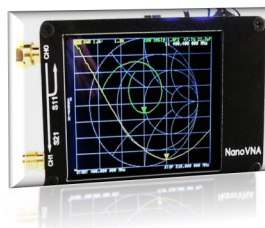## DEPARTMENTS

IN THIS ISSUE

Radio Ramblings—Kevin writes all about successful FT8 use

APRS iGate with Raspberry Pi

Measurements with the NanoVNA

QRM ━━·━ ·━· ━━

...from the Editor's Shack

Do you have a photo or bit of Ham news to share? An Interesting link?

Something to sell or something you are looking for?
eMail it to communicator at ve7sar.net for inclusion in this publication.

Here is another issue of The Communicator. First, I'd like to thank you for your feedback. Your comments are appreciated and suggestions are considered for future issues. Some of the recent suggestions:

- Call it a magazine, it's much more than a newsletter.

- Can you increase the font size?

- Can you decrease the font size so you can include more content?

- Can I get printed copies?

- How long have you been publishing The Communicator, can I get back issues?

We call it a newsletter because this is a club non-profit publication. It started as a simple couple of pages for our members but has grown as more content has been offered. Although we try to generate as much original material as we can, we now have offers from several authors and clubs wishing to include their material and, as editor, I do solicit writers and articles I think worthy of a greater audience.

As for font size, we have tried several formats and the current one seems to be the most readable. The font can be enlarged for reading with Ctrl+ on your keypad. Keep clicking until the magnification is at the desired level. The Communicator is meant for on-line reading, which makes the 'hot' links very accessible, although some say they print the entire issue. No, we cannot send you a printed copy, the costs are prohibitive.

I've been the editor since 2010 and back issues are available, see the links on page 60 of this issue.

In closing, I'd like to thank Daniel Romila VE7LCG for the many issues in which he contributed his prolific technical content. He has decided to direct his talents to other projects going forward.

This issue should again bring you some interesting content. Please enjoy it and keep the feedback coming.

~ John VE7TI, Editor
communicator@ve7sar.net

This Month's Issue...

Where to start? More Amateur Radio related news from everywhere.

Of all of our inventions for mass communication,
pictures still speak the most universally understood language—*Walt Disney*

The Rest Of The Story…

André-Marie Ampère

About his 'current' work

André-Marie Ampère

André-Marie Ampère French; 20 January 1775 – 10 June 1836) was a French physicist and mathematician who was one of the founders of the science of classical electromagnetism, which he referred to as "electrodynamics". He is also the inventor of numerous applications, such as the solenoid (a term coined by him) and the electrical telegraph. An autodidact, Ampère was a member of the French Academy of Sciences and professor at the École polytechnique and the Collège de France.

The SI unit of measurement of electric current, the ampere, is named after him. His name is also one of the 72 names inscribed on the Eiffel Tower.

Early life

André-Marie Ampère was born on 20 January 1775 to Jean-Jacques Ampère a prosperous businessman, and Jeanne Antoinette Desutières-Sarcey Ampère, during the height of the French Enlightenment. He spent his childhood and adolescence at the family property at Poleymieux-au-Mont-d'Or near Lyon. Jean-Jacques Ampère, a successful merchant, was

an admirer of the philosophy of Jean-Jacques Rousseau, whose theories of education (as outlined in his treatise Émile) were the basis of Ampère's education. Rousseau believed that young boys should avoid formal schooling and pursue instead an "education direct from nature." Ampère's father actualized this ideal by allowing his son to educate himself within the walls of his well-stocked library. French Enlightenment masterpieces such as Georges-Louis Leclerc, comte de Buffon's Histoire naturelle, générale et particulière (begun in 1749) and Denis Diderot and Jean le Rond d'Alembert's Encyclopédie (volumes added between 1751 and 1772) thus became Ampère's schoolmasters. need The young Ampère, however, soon resumed his Latin lessons, which enabled him to master the works of Leonhard Euler and Daniel Bernoulli.

French Revolution

In addition, Ampère used his access to the latest books to begin teaching himself advanced mathematics at age 12. In later life Ampère claimed that he knew as much about mathematics and science when he was eighteen as ever he knew, but as a polymath, his reading embraced history, travels,

poetry, philosophy, and the natural sciences. His mother was a devout Catholic, so Ampère was also initiated into the Catholic faith along with Enlightenment science. The French Revolution (1789–99) that began during his youth was also influential: Ampère's father was called into public service by the new revolutionary government, becoming a justice of the peace in a small town near Lyon. When the Jacobin faction seized control of the Revolutionary government in 1792, his father Jean-Jacques Ampère resisted the new political tides, and he was guillotined on 24 November 1793, as part of the Jacobin purges of the period.

In 1796 Ampère met Julie Carron, and in 1799 they were married. André-Marie Ampère took his first regular job in 1799 as a mathematics teacher, which gave him the financial security to marry Carron and father his first child, Jean-Jacques (named after his father), the next year. (Jean-Jacques Ampère eventually achieved his own fame as a scholar of languages.) Ampère's maturation corresponded with the transition to the Napoleonic regime in France, and the young father and teacher found new opportunities for success within the technocratic structures favoured by the new French First Consul. In 1802 Ampère was appointed a professor of physics and chemistry at the École Centrale in Bourg-en-Bresse, leaving his ailing wife and infant son Jean-Jacques Antoine Ampère in Lyon. He used his time in Bourg to research mathematics,

producing Considérations sur la théorie mathématique de jeu (1802; "Considerations on the Mathematical Theory of Games"), a treatise on mathematical probability that he sent to the Paris Academy of Sciences in 1803.

Teaching career

After the death of his wife in July 1803, Ampère moved to Paris, where he began a tutoring post at the new École Polytechnique in 1804. Despite his lack of formal qualifications, Ampère was appointed a professor of mathematics at the school in 1809. As well as holding positions at this school until 1828, in 1819 and 1820 Ampère offered courses in philosophy and astronomy, respectively, at the University of Paris, and in 1824 he was elected to the prestigious chair in experimental physics at the Collège de France. In 1814 Ampère was invited to join the class of mathematicians in the new Institut Impérial, the umbrella under which the reformed state Academy of Sciences would sit.

Ampère engaged in a diverse array of scientific inquiries during the years leading up to his election to the academy—writing papers and engaging in topics from mathematics and philosophy to chemistry and astronomy, which was customary among the leading scientific intellectuals of the day. Ampère claimed that "at eighteen years he found three culminating points in his life, his First Communion, the reading of
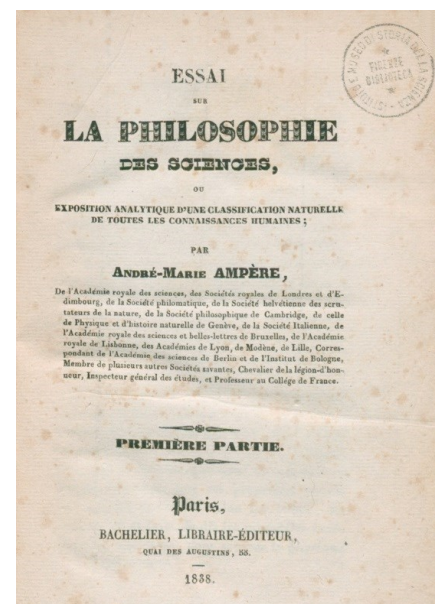
Antoine Leonard Thomas's "Eulogy of Descartes", and the Taking of the Bastille. On the day of his wife's death he wrote two verses from the Psalms, and the prayer, 'O Lord, God of Mercy, unite me in Heaven with those whom you have permitted me to love on earth.' In times of duress he would take refuge in the reading of the Bible and the Fathers of the Church."

For a time he took into his family the young student Frédéric Ozanam (1813–1853), one of the founders of the Conference of Charity, later known as the Society of Saint Vincent de Paul. Through Ampère, Ozanam had contact with leaders of the neo-Catholic movement, such as François-René de Chateaubriand, Jean-Baptiste Henri Lacordaire, and Charles Forbes René de Montalembert. Ozanam was beatified by Pope John Paul II in 1998.

Work in electromagnetism

In September 1820, Ampère's friend and eventual eulogist François Arago showed the members of the French Academy of Sciences the surprising discovery of Danish physicist Hans Christian Ørsted that a magnetic needle is deflected by an adjacent electric current. Ampère began developing a mathematical and physical theory to understand the relationship between electricity and magnetism. Furthering Ørsted's experimental work, Ampère showed that two parallel wires carrying electric currents attract or repel each other, depending on whether the currents flow in the same or opposite directions, respectively - this laid the foundation of electrodynamics. He also applied mathematics in generalizing physical laws from these experimental results. The most important of these was the principle that came to be called Ampère's law, which states that the mutual action of two lengths of current-carrying wire is proportional to their lengths and to the intensities of their currents. Ampère also applied this same principle to magnetism, showing the harmony between his law and French physicist Charles Augustin de Coulomb's law of magnetic action. Ampère's devotion to, and skill with, experimental techniques anchored his science within the emerging fields of experimental physics.

Ampère also provided a physical understanding of the electromagnetic relationship, theorizing the existence of an "electrodynamic molecule" (the forerunner of the idea of the electron) that served as the component element of both electricity and magnetism. Using this physical explanation of electromagnetic motion, Ampère developed a physical account of electromagnetic phenomena that was both empirically demonstrable and mathematically predictive. In 1827 Ampère published his magnum opus, Mémoire sur la théorie mathématique des phénomènes électrodynamiques uniquement déduite de l'experience (Memoir on the Mathematical Theory of Electrodynamic Phenomena, Uniquely Deduced from Experience), the work that coined the name of his new science, electrodynamics, and became known ever after as its founding treatise.

In 1827 Ampère was elected a Foreign Member of the Royal Society and in 1828, a foreign member of the Royal Swedish Academy of Science.

Honours

8.10.1825: Member of the Royal Academy of Science, Letters and Fine Arts of Belgium.

Legacy

In recognition of his contribution to the creation of modern electrical science, an international convention, signed at the 1881 International Exposition of Electricity, established the ampere as a standard unit of electrical measurement, along with the coulomb, volt, ohm, and watt, which are named, respectively, after Ampère's contemporaries Charles-Augustin de Coulomb of France, Alessandro Volta of Italy, Georg Ohm of Germany, and James Watt of Scotland. Ampère's name is one of the 72 names inscribed on the Eiffel Tower.

Several items are named after Ampère; many streets and squares, schools, a Lyon metro station, microarchitecture, a mountain on the moon and an electric ferry in Norway.

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Maxwell's original circuital law

In 1820 Danish physicist Hans Christian Ørsted discovered that an electric current creates a magnetic field around it, when he noticed that the needle of a compass next to a wire carrying current turned so that the needle was perpendicular to the wire. He investigated and discovered the rules which govern the field around a straight current-carrying wire:

- The magnetic field lines encircle the current-carrying wire.

- The magnetic field lines lie in a plane perpendicular to the wire.

- If the direction of the current is reversed, the direction of the magnetic field reverses.

- The strength of the field is directly proportional to the magnitude of the current.

- The strength of the field at any point is inversely proportional to the distance of the point from the wire.

This sparked a great deal of research into the relation between electricity and magnetism. André-Marie Ampère investigated the magnetic force between two current-carrying wires, discovering Ampère's force law. In the 1850s Scottish mathematical physicist James Clerk Maxwell generalized these results and others into a single mathematical law. The original form of Maxwell's circuital law, which he derived as early as 1855 in his paper "On Faraday's Lines of Force" based on an analogy to hydrodynamics, relates magnetic fields to electric currents that produce them. It determines the magnetic field associated with a given current, or the current associated with a given magnetic field.

The original circuital law only applies to a magnetostatic situation, to continuous steady currents flowing in a closed circuit. For systems with electric fields that change over time, the original law must be modified to include a term known as Maxwell's correction.

A look back into the time web's time machine...

RADIATION FALLOUT MONITOR

on one side of the board and (in most cases) their leads are passed, through convenient perforations, to the other side. Here, the actual wiring is carried out; make all connections point to point and cover bare leads with spaghetti wherever necessary.

In some cases, the author ran component leads through brass eyelets installed on the board, rather than directly through the perforations. The eyelets make convenient junction points and, if all leads passing through are soldered in place, provide an extra-rigid mounting.

Thyratron *V2* is mounted horizontally, its socket being installed on a home-made aluminum "L" bracket. The exact dimensions of the bracket are not important, but see that the socket is high enough...

component positions shown in the photographs is required.

The author installed his completed circuit board in a wooden box which originally contained "Christmas" after-shave lotion. The speaker opening on top of the box was covered with black screen wire and decorated with the familiar radiation warning symbol (cut from a scrap of sheet aluminum). Flashes from the neon lamp are visible through a piece of Lucite glued into the end of the box near *I1*.

A set of rubber feet was installed on the box bottom—giving enough clearance for ventilating air to pass through several holes drilled there. An exit for the heated air is provided by the speaker opening.

The housing for the board isn't critical, of course, and you can adapt any metal, plastic, or wooden box which appeals to you. Just be sure to make adequate provisions for ventilation.

RADIATION FALLOUT MONITOR

the least expensive Geiger-Mueller tubes available, the unit will give you a good idea of the natural radiation density—and any deviations will be immediately apparent. Using little current, it can be left operating continually to serve as a round-the-clock monitor.

This monitor, however, is to be considered only as an extra household precaution. The most reliable source of emergency information continues to be your local Civil Defense office. They'll know if the radiation from fallout has reached a dangerous level, and will advise you of the necessary protective measures to take.

About the Circuit. The approximately 800 volts required for the operation of the Geiger-Mueller tube (*V1*) is developed by a voltage-multiplier circuit consisting of diodes *D1-D6* and capacitors *C1-C6*. Resistor *R1* and capacitor *C7* act as a filter network, and load resistor *R2* tends to prevent excessive voltage fluctuation.

Don't attempt to check the supply voltage with a VOM, incidentally. You won't get a correct reading because even the high resistance of this instrument is enough to cause an overload. A VTVM with a high-voltage probe must be used.

The output of the supply is fed to *V1* through current-limiting resistor *R4*. Ordinarily, this voltage is not enough to cause *V1* to conduct. But when the glass

42   ELECTRONIC EXPERIMENTER'S HANDBOOK

1963 was the year after the October 1962 Cuban missile crisis. It's hard to imagine now, but it was a time when fallout shelters were well-marked and nuclear war seemed imminent. The electronic experimenter's Handbook came out with this radiation fallout monitor project in 1963.
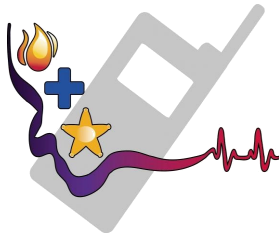
Emergency Comms

Ham Radio Making A Difference

A look around the globe

In times of crisis and natural disasters, amateur radio is often used as a means of emergency communication when wireline, cell phones and other conventional means of communications fail.

Unlike commercial systems, Amateur radio is usually independent of terrestrial facilities that can fail. It is dispersed throughout a community without "choke points" such as cellular telephone sites that can be overloaded.

Amateur radio operators are experienced in improvising antennas and power sources and most equipment today can be powered by an automobile battery. Annual "Field Days" are held in many countries to practice these emergency improvisational skills. Amateur radio operators can use hundreds of frequencies and can quickly establish networks tying disparate agencies together to enhance interoperability.

Prominent examples include the September 11 attacks on the World Trade Center in Manhattan in 2001, the 2003 North America blackout and Hurricane Katrina in September 2005, where amateur radio was used to coordinate disaster relief activities when other systems failed. In 2017, the Red Cross requested 50 amateur radio operators be dispatched to Puerto Rico to provide communications services in the wake of Hurricane Maria.

On September 2, 2004, ham radio was used to inform weather forecasters with information on Hurricane Frances live from the Bahamas. On December 26, 2004, an earthquake and resulting tsunami across the Indian Ocean wiped out all communications with the Andaman Islands, except for a DX-pedition that provided a means to coordinate relief efforts.

Recently, Amateur Radio operators in the People's Republic of China provided emergency communications after the 2008 Sichuan earthquake and U.S. hams did similar work following Hurricane Ike. Amateur radio operators provided communications in the aftermath of the Boston Marathon bombing when cellphone systems became overloaded.

The largest disaster response by amateur radio operators was during Hurricane Katrina which first made landfall as a Category 1 hurricane went through Miami, Florida on August 25, 2005, eventually strengthening to

In Canada

Category 5. More than a thousand ham operators from all over the U.S. converged on the Gulf Coast in an effort to provide emergency communications assistance. Subsequent Congressional hearings highlighted the Amateur Radio response as one of the few examples of what went right in the disaster relief effort.

International

The Global Amateur Radio Emergency Communications Conference (GAREC) is held in a new location yearly by the International Amateur Radio Union (IARU), hosting discussion and coordination of large-scale and cross-border amateur radio emergency response.

Australia

In Australia, the Wireless Institute Civil Emergency Network (WICEN) operates in each state & territory as an autonomous body under the relevant disaster plan.

Austria

In Austria, Amateur Radio Emergency Network Austria (ARENA) - The Amateur Radio Emergency Network Austria is a national voluntary service that is provided to the community by licensed radio amateurs. ARENA is part of the OEVSV and IARU - the national and international amateur radio associations. Our focus is to support the public in the event of crises when conventional communication systems fail. Many of our members are volunteers in organizations such as the Austrian Red Cross, Civil Defense, fire brigades, military and related institutions. Unique EmComm support is provided by use of the HF, VHF and UHF frequency spectrums and many operating modes for voice and data communications. Besides usual point-to-point communications, we rely on repeaters, international networks such as Winlink, Echolink, APRS and HAMNET. For instance, one of the 5 mirror-redundant Winlink common message servers is located in Vienna. To increase the skill level of our members in being first responders, exercise and training is done regularly, and ongoing contact with government and non-government organizations is also maintained.

Canada

In Canada, Amateur Radio Emergency Service (ARES) is sponsored by the Radio Amateurs of Canada. Often other less formal networks of volunteer radio operators are also used and organized by the local emergency response agencies in conjunction with local ham radio operators. The Amateur Radio Emergency Service (ARES) is composed of certified Radio Amateurs who have voluntarily registered their qualifications and equipment for communications duty in the public service when disaster strikes.

Every certified Radio Amateur, whether or not a member of RAC or any other local or regional organization, is eligible for membership in the Amateur Radio Emergency Service (ARES). The only qualification is a sincere desire to serve. The possession of emergency-powered equipment is desirable but not a requirement. Applicants will be required to provide personal information that will allow a background check to be done which may include a criminal records check.

As in the United States, Radio Amateurs of Canada has memoranda of understanding with numerous agencies expected to receive services, including the Canadian Red Cross and Salvation Army.

RAC Intro to ARES (186 kB)

Chile

In Chile, Servicio de Emergencia de Radioaficionados (CE3SER) is sponsored by Radio Club de Chile (CE3AA) and associated clubs around the country, and maintain active Agreements of Cooperation with the National Emergency Office (ONEMI), Air Force, Army, and the Navy branch in charge of the maritime territory. It operates daily the national emergency network (Red Chilena NorAustral de Servicios, RECNA) in HF, and locally in VHF-UHF. These exercises are performed on 80, 40, 20, 15 meters, as also locally in the main cities on VHF and UHF. The nets are open to all Chilean amateurs, whether or not members of RCCH, and also to international amateurs. Radio amateurs' involvement and cooperation in earthquakes and other national emergencies has been publicly acknowledged and thanked by the President of the Republic, several times during the last years Radio Club de Chile has cooperated with other countries' amateurs—notably those of Nicaragua—in the organization and operation of emergency communications via ham radio. At the beginning of July 2018, CE3SER, The former Station of Servicio de Emergencias de Radioaficionados begun doing its exercises in the BrandMeister digital network also. They operate in the TG 730911 with this novel initiative in DMR digital communications.

Ireland

In the Republic of Ireland, the Amateur Radio Emergency Network (AREN), co-ordinates emergency communications activities on behalf of the Irish Radio Transmitters Society (IRTS). AREN membership is, however, open to all amateur radio operators, whether members of IRTS or not.

Malaysia

In Malaysia, the Malaysian Amateur Radio Emergency Service Society (MARES) is a registered organization under the Malaysian Registrar of Societies (RoS). It also a member of Malaysian Amateur Radio League (MARL). MARES provide voluntary emergency communications during disaster. Besides coordinating emergency communication, MARES also conducting classes and other common radio amateur activities such competition, fox hunting, flea market, eye-ball meet etc.

Netherlands

The Dutch Amateur Radio Emergency Service (DARES) was founded in 2003 as a result of the World Radio Conference 2003, where it was decided that licensed Dutch radio amateurs were allowed to offer their services to third parties when there is an emergency. DARES is recognized by the State Department of The Netherlands and supported by the two largest national radio amateur organisations: VERON and VRZA.

DARES consists of a group of radio amateurs and shortwave listeners who offer their knowledge and radio equipment during a disaster or major incident. The organisation is built upon the 25 safety regions defined by Dutch authorities.

DARES has been represented at the Global Amateur Radio Emergency Communications Conference (GAREC) since 2005.

New Zealand

In New Zealand the New Zealand Association of Radio Transmitters provides the AREC - Amateur Radio Emergency Communications (formerly Amateur Radio Emergency Corps) in the role. They won the New Zealand National Search and Rescue award in 2001 for their long commitment to Search and Rescue in NZ.

Spain

In Spain, REMER (Red Radio de Emergencia, Emergency Radio Network) is a national HF/VHF network formed by volunteer ham radio operators, and it is co-ordinated by the local Civil defense groups, which are dependent from the local government authority. It was founded on 1982.

Russia

The volunteer organization called RAS formed in 1988, and at the end of 2012, the Union of Russian Radio amateurs established a committee dedicated to emergency communications and even entered into an agreement with MChS, Emergency Situations Ministry.

Trinidad and Tobago

In Trinidad and Tobago, The Trinidad and Tobago Amateur Radio Society (T.T.A.R.S), the officially recognized body for amateur radio in Trinidad and Tobago, manages the emergency communications arm of the group often referred to as EmComms. EmComms have, in the past, not only been active in Trinidad and Tobago, but throughout the Caribbean. The Office of Disaster Preparedness Management (ODPM) is actively involved in amateur radio and maintains an active amateur radio station and five repeaters.

United Kingdom

In the United Kingdom Radio Amateurs Emergency Network (RAYNET) provides the organizational backbone of their amateur radio emergency communications groups along with the Radio Society of Great Britain (RSGB). It was formed in 1953 in the aftermath of the North Sea flood of that year.

United States

In the United States, there are two major methods of organizing amateur radio emergency communications: the Amateur Radio Emergency Service (ARES), an organization of amateur operators sponsored by the American Radio Relay League (ARRL); and the Radio Amateur Civil Emergency Service (RACES), a standby replacement radio service regulated by the Federal Communications Commission. Operations under the RACES rules requires preregistration with a local civil defense organization, to allow continued operation under Part 97.407 of the FCC regulations

in the event the Amateur Radio Service is ever shut down by presidential order. Thus ARES and RACES involvement within the same area are usually intertwined, with many governments requiring membership and service in that locale's ARES organization to allow operations within the Amateur Radio Service as well. Many government Emergency Operations Centers, Red Cross Chapters and National Weather Service facilities have permanent Amateur Radio stations installed for such operations.

Radio clubs independent of the ARRL and ARES also participate in emergency communications activities in some areas, and some non-radio organizations have their own amateur arm. The Department of Defense sponsors the Military Auxiliary Radio System (MARS) program which utilizes Amateur Radio operators for emergency communication using military radio frequencies. The National Weather Service Skywarn weather-spotter program has a strong amateur radio contingent. And amateurs dedicated to the Salvation Army are organized under their Salvation Army Team Emergency Radio Network program.

Emergency communications and disaster assistance is usually done in conjunction with volunteer disaster relief organizations such as the American Red Cross, the Salvation Army, local government emergency management agencies, as well as volunteer fire departments and ambulance corps.

The ARRL has memoranda of understanding with numerous agencies expected to receive services, including the American Red Cross and Salvation Army and is a partner in the Citizen Corps program of the Federal Emergency Management Agency (FEMA). The ARRL also is a member of the National Voluntary Organizations Active in Disaster (NVOAD) and conducts emergency communications certification courses for interested Amateur Radio operators.

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Page 13-News You Can Lose

The Lighter Side of Amateur Radio

Mass protest planned over dues increase

The recently announced increase to the North Fraser Amateur Radio Club's (NFARC) annual membership fee has sparked outrage amongst a radical group within the membership. For the last two years, dues have been held steady at $0.00 per year (tax included) but at last month's meeting the executive passed a motion increasing them by 5000%.

"This was done without consulting any of the members," said a disgruntled member, "I'm no mathematician, but I know a big number when I see it and 5000% is a lot."

Another club member, wearing a MAGA hat (*Make Amateur Great Again*) was overheard at a local Pizza Gate restaurant discussing a planned protest on 146.520 MHz. According to the parents of one protestor, their son was told to meet on 6.52 next Wednesday and wait for instructions. It is suspected that the group's leader will then encourage them all to QSY to 147.420 and storm the frequency. If the storming of 7.42 succeeds, this will be only the second time that frequency has been stormed since the founding of the 2 meter band.

Reached for comment, an NFARC exec member said, "This is the sort of crazy behavior we have seen from this group from time to time. They get all their information from loud mouths on the FOX repeater and never question any of it."

But what is the truth? The investigative news program 60 Meters caught up with the club's President of Keeping the Money, who confessed the group had made some mistakes. "Look," he said, "2020 was a tough year for everyone, especially our club. The worse was that we got sold on supporting this crazy Canada Hub idea. It sounded great at first.

There was mention of Raspberry Pies for each province, who wouldn't vote for that? But then we found out how big Canada actually is. Who knew? Running that much Ethernet cable was well beyond our budget."

In anticipation of the mass protest, police are now monitoring 2 meters and making anyone within 500 kHz of 7.42 QSY. They may even impose radio silence at sundown.

Trying to strike a reconciliatory mood, NFARC Presidential candidate Adrian VE7NZ declared: "We are better than this. We cannot let a few radicals destroy our hobby. We cannot let fringe groups desecrate the hallowed frequencies of 6.52 and 7.42. We must unite under one band plan. We must represent all amateur operators, even the robots on DMR." If elected, he promises to reduce next year's dues by at least 100%. Meanwhile, MAGA has proactively declared that the election is rigged.

~ Adrian VE7NZ

Note: Adrian VE7NZ is already a President of North Fraser ARC despite being impeached twice, however failing to be convicted by the required 2/3 vote in the NFARC Senate on both occasions. - Scott VA7SL

Radio Ramblings

Kevin McQuiggin VE7ZD/KN7Q

Success with FT8

This month I'd like to talk about my experience in running the relatively new digital mode FT8 on the HF and VHF bands. FT8 has revolutionized HF operation and now accounts for the largest percentage on contacts on HF, and a significant percentage of QSOs on VHF as well.

Since getting back into amateur radio in December 2018 I have focused on digital mode operations. I have made 4,836 QSOs since my return to the ham radio fold, and of those, 4,344 were using FT8. This month I would like to offer some operating tips for those just getting started with the mode, or those contemplating getting WSJT-X set up on their shack computers.

Background

FT8 was developed primarily by Dr. Joe Taylor, K1JT, a physics professor at Princeton University in New Jersey. The mode is one of a number of digital modes available through the open source "WSJT-X" software package.

WSJT-X focuses on weak signal communications: it is able to detect the very weakest signals in a receiver's audio passband. Due to some very sophisticated digital signal processing, WSJT-X (and modes like FT8) can detect signals that (amazingly) are BELOW the "noise floor" of your receiver. What this means is that the program

Figure 1 – Weak FT8 Signals Circled in Red, Stronger Ones in Green

can detect and decode signals that you cannot even hear above the "hiss" of the audio passband on your radio. It is pretty amazing!

The program accomplishes this by integrating (think "adding") the receiver audio over a period of time (15 seconds for FT8) and then running very sophisticated search and decode algorithms on the summed signal. Properly designed digital modes will be detectable over a longer reception period (as stated above, 15 seconds for FT8, but up to 120 or even 300 seconds for other more sensitive modes).

WSJT-X is freely available at K1JT's web site (see https://physics.princeton.edu/pulsar/k1jt/wsjtx.html) with versions available for Windows, MacOS, and Linux. The program will also run on the Raspberry PI and some other smaller systems. A very good user's guide is also provided.

Today we will be focusing on FT8, the most popular of the twelve modes currently available in the WSJT-X package.

Benefits

The benefits of FT8 are many. During low activity periods of the sunspot cycle, the weak signal capabilities of FT8 brought life back into HF operation for many thousands of amateur radio operators. "Dead" bands which could not support SSB or even CW operation were able to support millions of FT8 QSOs. Operators flocked to the mode as it re-engaged award hunting and contesting.

An FT8 signal's bandwidth (the amount of spectrum occupied by a signal) is only 50 Hz. See Figure 2. This extremely narrow bandwidth means that 50 or 60 FT8 signals can occupy the bandwidth used by a single SSB

Figure 2 – FT8 Signal Bandwidth
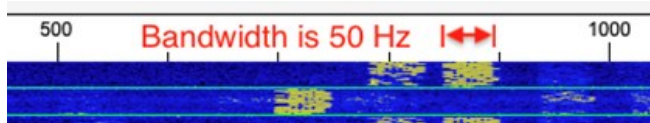
signal. See Figure 1. This is extremely efficient and has the benefit of consuming only a very small percentage of each amateur band.

Award Hunting

FT8 is an excellent mode for DXing and award hunting. Starting from scratch in December 2018 on the supposedly "dead" HF bands, I completed WAS (Worked All States) in 18 days using FT8, and reached 50 countries worked in about three months, all without being "glued to the radio". I was running 5-7 watts into a tuned longwire antenna. It took me just under a year of casual operation to reach 100 countries worked and qualify for the DXCC award, although I had added a 50-watt amplifier (the excellent "Hardrock 50", reviewed in 2019 in this column) after about six months of QRP operation.

I have since completed WAS on five bands and am close to completing it on 6 metres as well. My DXCC total is currently 159, and I am two zones from the "Worked All Zones" award.
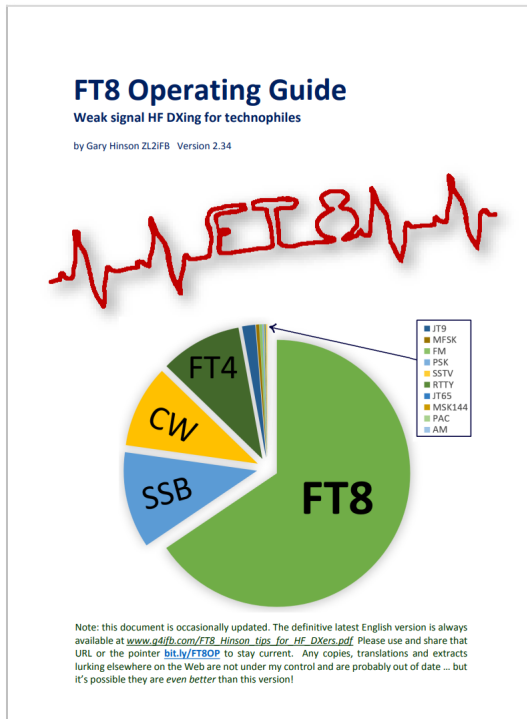
My goals for this summer are to complete WAS on 6 metres (I am currently stalled at 41 states confirmed), and to work the needed two zones to complete WAZ.

If you are a "DX Hound" then I would highly recommend FT8 as hundreds of nations are on the air and FT8 outperforms any of the traditional modes, allowing you to log the new country.

Antenna and Power Requirements

FT8 and its cousins (FT4 and others) are weak signal modes, not low power modes. The distinction is important! FT8 is superb and picking up signals out of the noise (in fact, even below the noise, as described above), but this does not mean that the mode is intended to be used only for QRP operation.

Figure 3 – ZL2IFB's Excellent Operating Guide to FT8

FT8 Operating Guide

Weak signal HF DXing for technophiles

by Gary Hinson ZL2IFB   Version 2.34

Note: this document is occasionally updated. The definitive latest English version is always available at *www.g4ifb.com/FT8_Hinson_tips_for_HF_DXers.pdf* Please use and share that URL or the pointer bit.ly/FT8OP to stay current. Any copies, translations and extracts lurking elsewhere on the Web are not under my control and are probably out of date … but it's possible they are *even better* than this version!

The first challenge of course for any amateur is to be able to hear the other station. Good antennas will outperform poor antennas, so put up the best antenna you can build or obtain. I started with a tuned longwire but later replaced it with a multiband "fan" dipole between a couple of trees here in Burnaby that works reasonably well on 80, 40, 20, 15 and 10 metres. SWR is bad on 80 and 10, but I just live with it. I put up a separate dipole for 30 metres.

As to power, once you are hearing stations then (as always) the best advice is to use the minimum power necessary to be heard by the other station. As it is a weak signal mode, FT8 can usually detect a meagre signal, but adding power will help. I had reasonable success with 5-7 watts, but then moved to 50 watts, then 100. You will find that the average home transceiver in the 100-watt class will easily be enough to work the world.

Overview of Operation

My intent here is not to provide a primer for FT8, but rather to present some tips which will help you make and complete FT8 contacts. A great free introductory guide for the new FT8 user has been written by Gary Hinson, ZL2IFB and is

available at: https://www.g4ifb.com/FT8_Hinson_tips_for_HF_DXers.pdf. See Figure 3.

Rig Setup

Follow the instructions in the WSJT-Z User's Guide to set up your computer and radio. You will want to ensure that you get the PTT connection working so that WSJT-X can properly communicate with and key your rig. This is often a picky process but there is lots of help available through the WSJT-X mailing list. See the user's Guide for how to sign up.

While the documentation recommends use of a "DATA" mode for FT8 if your transceiver has it, I have had better success by setting my rig to USB and widening the receive passband as much as possible, to its widest setting. See Figure 4. DATA modes often restrict the received audio spectrum. FT8 can decode many signals at once all across the audio passband, so you should set the passband to its widest possible setting.

Turn on your ALC if you rig has it. Strong signals will limit your radio's ability to hear weak ones, and ALC will help balance out strong and weak FT8 signals so that you "see" more stations both on the FT8 waterfall, and in your decode window.

A very common error for new FT8 users is to set the audio input from your computer into the rig's "line in" or "external mic" input too high. This will degrade your transmitted signal and generate a broad series of images in your transmitted output. These images will be received by other stations, who will not be happy with your sloppy setup because your spurious signal will likely be interfering with other weak signals (such as rare DX) that the other operators are hoping to work. Follow the guide's instructions, and also review Gary ZL2IFB's recommendations as

Figure 4 – Rig Setup

to how to set your audio output level. "Louder" is not better!

On my rig (an Elecraft KX3), mic gain goes from 0 to 80, and on FT8 I find that a gain setting of about 4 or 5 is fine.

Your goal once you have your computer and rig set up, and WSJT-X working, should be to make a couple of local contacts in order to get used to the "sequencing" that FT8 enforces for every QSO. The sequence will generate lots of confusion for you at first, but after a few contacts you will see what is happening. When you receive a packet directed to your station, it will appear red in the decode window. Auto sequencing will take care of the rest, and that is why I would recommend leaving this feature on for your first FT8 contacts.

Auto Sequencing Does Not Imply "Automatic Operations"

Critics of FT8 often rely on disinformation that describes FT8 as an "automatic" mode where no human intervention or skill is required in order to make contacts. They use this "fact" to denigrate FT8 and digital modes in general, implying that no skill is required to operate FT8 because "the robot does everything".

This is absolutely not true: as a former contester and avid DXer myself, I can unequivocally state that FT8 operation and successful completion of contacts requires exactly the same skill set as that of an experienced SSB or CW contester or DXer. To be successful with FT8 you have to know how to call, when to call, and where to call.

The auto sequence feature of FT8 helps the new operator stay on track through the four phases of a standard FT8 QSO. See Figure 5. When you are new it is easy to forget what transmission comes next, and what to do if (say) you miss a decode from the other station, or if he misses a decode from you. Auto sequencing helps you out. Leave it on!

"Tail ending" stations who are just completing a QSO with another station is a good DXing technique. The DX station will see you calling before they go back to calling CQ and may decide instead to respond to you immediately.

It is very poor form however to call a DX station continuously, even during QSOs he may be having with other stations. Many poor operators do this. It ties up valuable spots in the waterfall and annoys all hams who may be listening and vying for the contact. Call the DX station after she has sent RR73 or 73 to the last station, or when she next calls CQ.

It is worth noting that many DX stations make note of those operators who "call and call and call and call and call" and decide to NEVER respond to them, even if the DX operator hears them clearly. The worst of these I have seen is an op who called a DX station continuously for over an hour with no reply. This particular operator also had his mic gain far too high: his signal had splatter and spurious emissions throughout half the passband. Unprofessional, and it gives you a reputation as a "lid".

Figure 5 – Turn on Auto Sequencing

Choosing the Correct Sequence ("1st" or "2nd")

FT8 usually uses 15-second transmit and receive sequences. For the first 15 seconds of each minute, one station will transmit, and the other station will receive. From 15 to 30 seconds, the second station will transmit, whilst the first station will receive. Then at 30 seconds, the first station will transmit again, and the second station will receive. This sequencing continues at 15 second intervals. At the top of the next minute, the first station will transmit again.

The station transmitting from 0 to 15 seconds; and from 30 to 45 seconds past each minute is said to be on the "first" sequence. To be on "second" means that you transmit at 15, and then 45 seconds past each minute.

A full QSO requires five 15-second periods to be considered complete. In table 1 *[below]* is an example.

Where to Listen

There are designated FT8 (and FT4) frequencies on just about every amateur band, and on all HF and VHF bands. In general, the best band for FT8 operation is 20 metres, specifically on 14.074 MHz. 40 metres (7.074) and 80 metres (3.573 MHz) are good in the evenings, and I have noted that with the start of Solar Cycle 26 that 15 metres (21.074 MHz) is now open most afternoons as well. I jumped on 15m when the band started opening up last fall and now need just Wyoming and Delaware to complete WAS on that band.

Table 1 – Typical FT8 QSO Sequencing (See Also Figure 10)

| Seconds of Each Minute	Action	FT8 Message
0-15	VE7ZD sends CQ and grid square	CQ VE7ZD CN89
15-30	KN7Q responds with grid square	VE7ZD KN7Q CN85
30-45	VE7ZD replies with signal report	KN7Q VE7ZD −15
45-60	KN7Q replies with VE7ZD's signal report	VE7ZD KN7Q R−08
0-15 of the next minute	VE7ZD sends "received; 73"	KN7Q VE7ZD RR73
15-30 of the next minute	KN7Q sends "73"	VE7ZD KN7Q 73
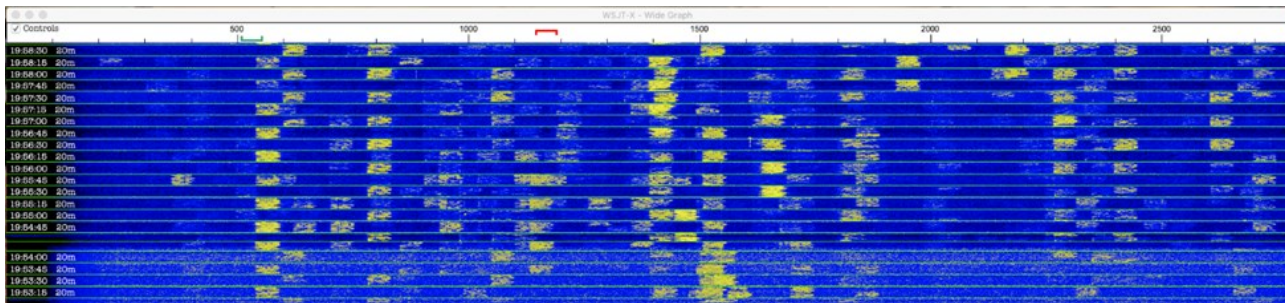
Figure 6 – Lots of 20m QSOs in Progress

The WSJT-X application is pre-configured to contain all the common FT8 frequencies.

My recommendation would be to start your FT8 operations on 20 metres at 14.074 MHz, as there are lots of stations on there for many hours each day.

Choose a Clear Offset

Once you select 20 metres in WSJT-X's band select dropdown box, your rig will tune automatically to 14.074 MHz. You should be in USB mode. Use the "Tune" button on the righthand side of the WSJT-X window to key your transmitter briefly and trigger your autotuner to get the rig set up for the band and frequency. If you do not have an autotuner, then tune up on 14.074 MHz. Use a dummy load if you have it.

Watch the WSJT-X waterfall and let it build for a minute or so. This gives you "the lay of the land" and you can see who's on the air and what the callsigns and DX looks like. See Figure 6 *[above]*.

The numbers 0-500-1000…-3000 across the top of the waterfall window indicate the AUDIO frequency within the passband at which you will transmit. This is called your "offset". Any FT8 signal in the passband will still be at 14.074 MHz (in our example), but the audio offset of each signal is determined by the position of the signal in the audio passband. Each FT8 signal is only 50 Hz wide.

A single SSB frequency can support 60 simultaneous FT8 QSOs (since 3000 Hz/50 Hz gives 60). You will likely see several 50 Hz wide FT8 signals on the waterfall. These will alternate between a set of senders and receivers every 15 seconds, because the standard FT8 transmit/receive interval is 15 seconds.

Figure 7 – Thirty-one 20m Decodes from a Single 15-Second Sequence
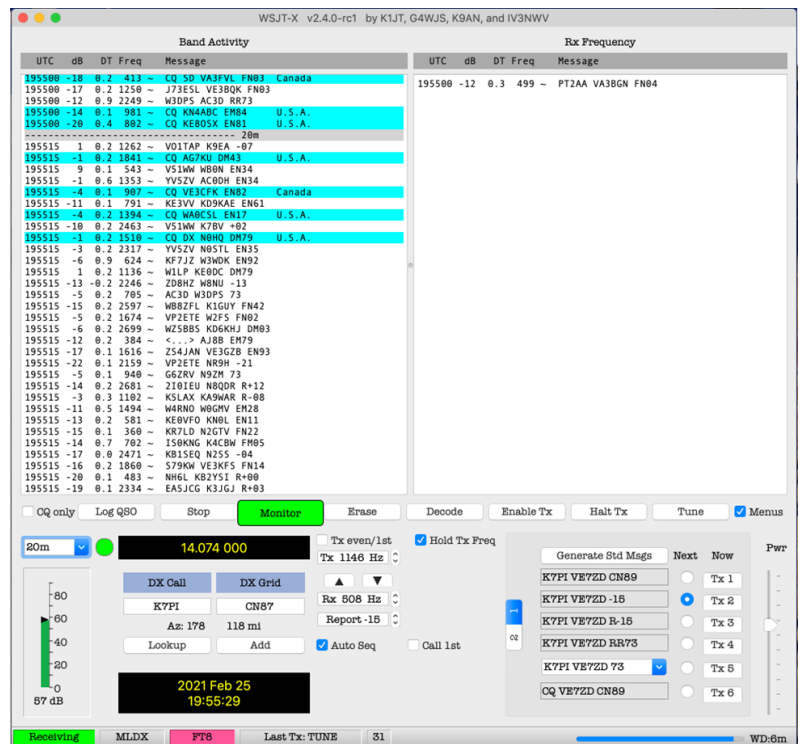
You should select a clear 50 Hz wide spot on the waterfall and place your transmit signal there. See Figure 8. To move your transmit signal to a clear spot, move your mouse to the clear spot and right click (Windows) or shift-click on a Mac. You will note that the red inverted "U" at the top of the waterfall moves to the position where you clicked the mouse.
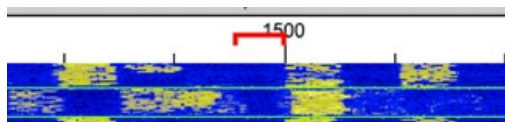
Figure 8 – Positioning Your TX Offset (Red Inverted "U") Between Two Other Stations

You should select a clear TX frequency 1) so that your signal does not interfere with another QSO, and 2) so that it maximizes your chances of being heard by another station. Remember that you will be transmitting only every second sequence. If there is another station on your transmit offset during the two receive portions of the minute, then you will not interfere with one another.

Set "Hold TX Frequency"

Once you have chosen a TX offset, select the "Hold TX Freq" checkbox. See Figure 9. This will ensure that when you start a QSO with another station that your TX offset does not automatically move to the same offset as

the other station. This type of "split" operation is more efficient and is an operating standard on FT8. It is considered
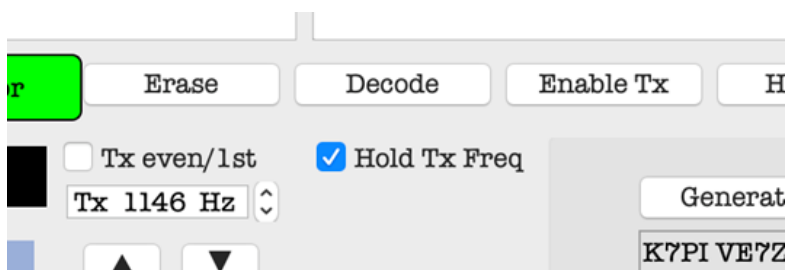
Figure 9 – Setting "Hold TX Freq"

poor form to continually move your TX offset around as you call other stations. When you start chasing DX you will rely on the DX station's offset "staying put" so that you can track propagation changes and time your calls to the DX effectively.
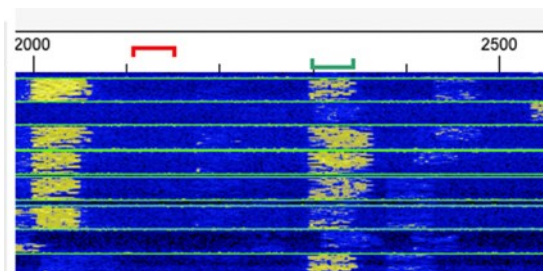
Figure 10 – Typical FT8 QSO (Decodes and Waterfall)

Working DX or Other Needed Stations: Listen and Pounce

I do not generally call CQ unless the band is weak or there are no interesting stations around. It is far more productive to listen for others, particularly a needed state or province, or a new country, and then 1) find a good clear offset; and 2) start calling the target strategically. Your mileage may vary, but this technique is also generally used by CW and SSB DXers, who incidentally also find CQs a less effective approach towards making contacts with "new ones".

FT8 is full of pileups, and DX stations often have over a dozen callers clearly visible in the passband. In these cases, it is sometimes difficult to find a clear spot for your TX frequency, but do the best you can. WSJT-X is able to decode two stations which

overlap at the same offset (through the "magic" of DSP) but you will have better results if your signal is easily decodable on the first pass.

Call the DX station on the opposite sequence from when he is transmitting. If the DX is transmitting 0-15 and 30-45 seconds, make sure you are set to transmit on the opposite sequences: 15-30 and 45-60 seconds of each minute. You can adjust which sequence you are transmitting on using the "TX even/1st" checkbox. See Figure 11. "TX even" means that you will transmit at 0-15 seconds, and at 45-60 seconds. Uncheck the box to transmit on "second" (15-30 and 45-60 seconds).
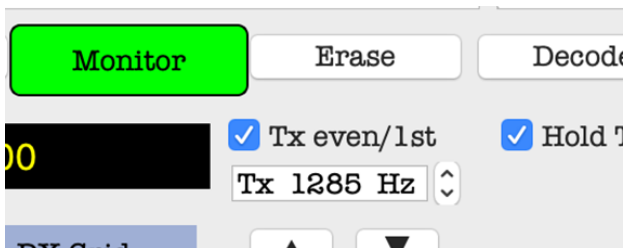
Figure 11 – Selecting First or Second Sequence for Transmitting

When you're chasing DX or a needed station, if your first chosen offset does not work you may find it helpful to move your TX offset around to try other parts of the passband where the target station may have a better chance of hearing you. It is possible that your "clear spot" is actually being used by other stations that the target station can hear.

For success working DX it is not uncommon to have to move your TX offset around quite a bit, maybe five to ten times, before you achieve the QSO. Patience is the name of the game. It may take an hour or more to get that reply, especially if you are running QRP. I chased Pitcairn Island (VP6) for several days before making a full QSO.

For challenging conditions where nothing else has worked, I will sometimes call the target station at his own offset, despite it being frowned upon, just to see if it works. The target station may be a new FT8 operator who listens primarily to only his own offset frequency. If you achieve a QSO in this manner, however, it is very poor form to leave your TX offset on the target's offset and start calling CQ or calling another station. You will not technically interfere with the target station as you are both on the opposite sequence (alternate 15-second periods) but nonetheless it is still regarded as poor operating by the FT8 community.

PSK Reporter et al

One of the great things about digital modes like FT8 is that usage depends upon computers, and these computers are often connected to the Internet. This allows the applications like WSJT-X to report stations heard and stations worked to online services such as PSK Reporter. Operators can monitor the map displays and logged reports on these sites to assess levels of activity on one or more bands, and almost as importantly, to see how their own signal is being received by others.

I am sure that most of you have used PSK Reporter, HamAlert, or other online services, but for those who haven't I would highly recommend integration of these services with your digital operations.

PSK Reporter is at https://pskreporter.info. Figure 12 shows a screenshot of recently reported activity on the 15m band. I use the map display in real time to assess propagation and to see how my signal is getting out. I am very active on the 6 metre band: at VHF and higher propagation is inconsistent; therefore, services such as these are very helpful to see what band conditions are like and who else is on the air.

Figure 12 – PSK Reporter
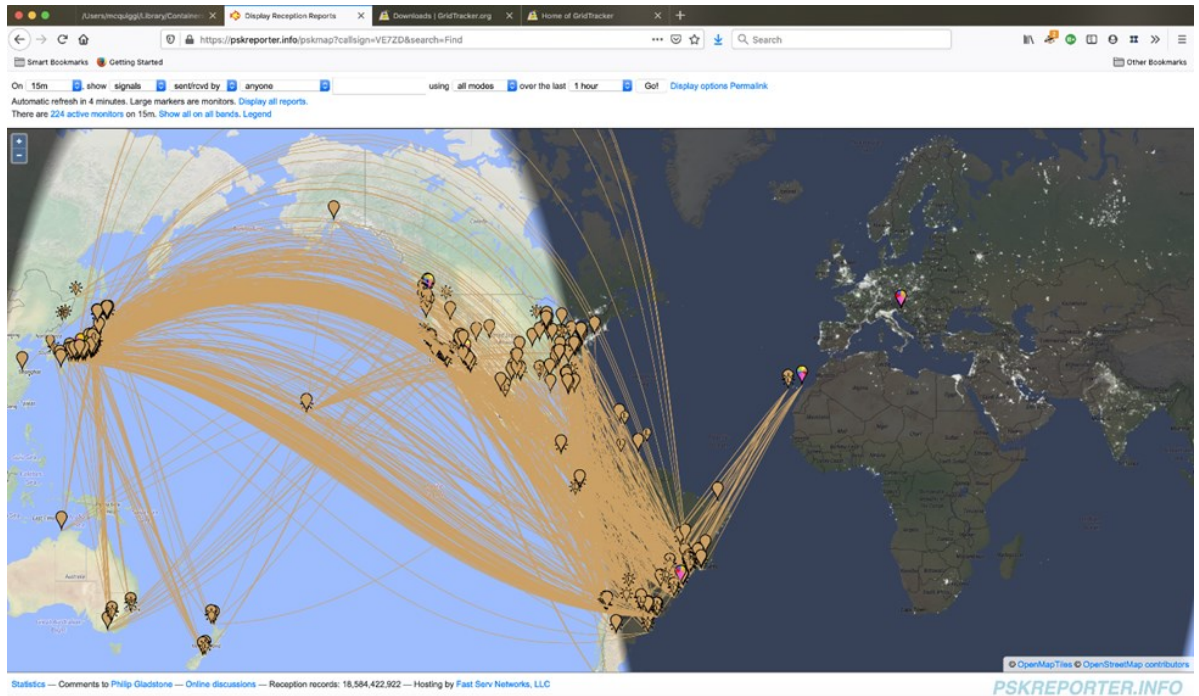
I have also recommended WSJT-X add-on applications like GridTracker here in The Communicator before. GridTracker (see Figure 13) shows FT8 (and other digital mode) decodes in real time on a world map. QSOs is progress are shown as dotted lines between the stations' grid squares. This is an extremely handy tool for gauging propagation and even looking for that needed DXCC entity or US state.

GridTracker integrates easily with WSJT-X and can also work with popular logging programs such as N1MM and MacLoggerDX. I use GridTracker all the time on HF as its real time updates improve situational awareness over PSK Reporter.

GridTracker is available at no charge from https://gridtracker.org/.

Figure 13 – Grid-Tracker's Real Time Map Display
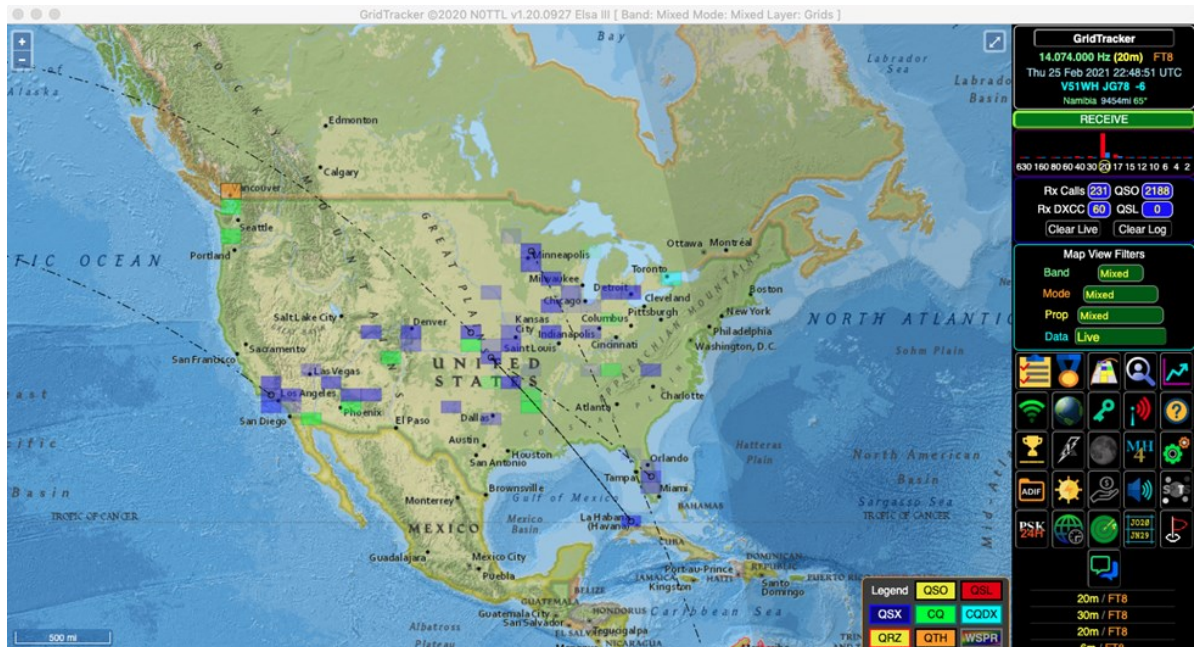
FT8 on VHF and Above

FT8 is a popular mode on the 6 metre and 2m bands as well. I have used it on 6m and 2m. There is significant activity on 6m, at 50.313 MHz, and during periods of good E scatter and tropospheric propagation, the band opens and it is possible to have contacts with stations thousands of miles away.

My best FT8 DX on 6 metres is JH6CDI, Nagasaki Japan at 8,399 kilometers distant.

Most modern transceivers cover the 6m band, so I would encourage readers to put up a (very short) 6m dipole and give the band a try on FT8, especially over the summer months!

Summary

I hope that you have found something of interest in this article. While the mode is not suited to ragchewing, when HF propagation is poor it allows us amateurs to still make fantastic DX contacts and interact with our colleagues in the hobby all over the world. It is amazing to see WSJT-X decode signals which we cannot hear, and which are barely even visible on the waterfall display.

Critics of FT8 often have not given the mode enough of a test run in their shacks. It is not a "robotic" or "automatic" mode. The competitive nature of DXing continues with FT8, and considerable operator skill is required to have success with rare stations and those great distances away. As a former dedicated DXer myself, I can attest to the skills required and state that they are the same types of skills required for successful SSB or CW DXing. FT8 will enable the QSO when the band is dead to SSB, and even to CW. Having success and making the contact is always fun!

Comments are always welcome. Feedback on this article can be directed to the Editor, or directly to me at mcquiggi@sfu.ca.

73,

~ Kevin VE7ZD / KN7Q
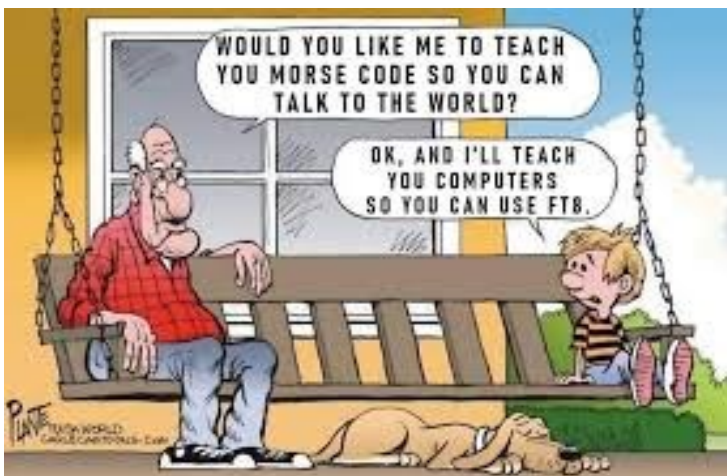
Kevin will be presenting FT8 at the March 10th SARC Meeting via Zoom at 7pm Pacific time.

SARC members should receive an invitation a day or two beforehand. Guests can request an access code by emailing president@ve7sar.net

I'm Listening…

Peter Vogel VE7AFV

Software-defined radio tuning in the new world of broadcasting

Peter joins us from Coquitlam, B.C.

He is a tech journalist, and retired teacher of ICT/Physics.

In addition to Ham Radio, Peter enjoys astronomy, meteorology and cybersecurity.

He is the recipient of the Prime Minister's and Premier's SciTech awards.

About two years ago a friend handed me a small blue device that plugs into the USB port of a computer. As he handed it to me he said it would completely change the way I thought of radio.

I grew up in a household where radio was important. It enabled my immigrant parents, who had left western Europe for the Antipodes in the wake of the Second World War, to listen over shortwave to broadcasts from their home country.

As such, radio and antennas were commonplace to me, and I remember building crystal sets to pull in whatever signals I could. Eventually that led me to getting my amateur radio operator certificate in Canada.

However, as many can no doubt relate, along came a career, a family of my own, and other demands. The passion for radio ebbed, but always remained back of mind. A career heavily centered on internet technologies supplanted radio. After all, the internet was a sort of radio without the antennas.

As I neared retirement, two events reawakened my interest in radio signals. First was the gift of a small blue device made by a company called NooElec, and second was another gift, a small handheld transceiver made by a company called Baofeng. More about the latter in a subsequent column.

I was mystified by both. Clearly during my almost four-decade absence from amateur and shortwave radio there had been a major upheaval in the hobby, as I recognized neither name.

The parts for the blue NooElec device are fairly basic. First is the software-defined radio – actually a thumb drive or stick originally made for TV channel conversion in the UK following the move from analogue to digital transmission. Radio enthusiasts discovered that these sticks had amazing properties for tuning radio signals. The rest is history and these devices now sell for around $25.

The other part is an antenna. In my case, for the image you see above, I used an old set of TV rabbit ears.

My primary piece of software is called SDR#, pronounced "SDR sharp." It is basically the software equivalent of a radio. The satellites I monitor broadcast around 137 MHz – a little beyond Rock 101 for instance, which broadcasts at 101.1 MHz.

There is additional software I use to keep track of the satellite and to start the tuner program when it is overhead. In addition there is software to turn the captured signal into an image, and yet more software to turn the rough image into what you see here.

Essentially my NooElec device is a radio on a chip, but not just any radio mind you. It's not an FM radio. It's not an aircraft band radio. It's not a weather alert radio. It can be all of these, and more. Because it's a radio defined by software, it can be multi-faceted – many radios in one if you will.

I can just as easily tune in a Vancouver FM station as I can the positioning signal from aircraft as far away as Oregon, or pull in an image transmission from the International Space Station as it passes overhead. (I can even pull in signals from neighbourhood backyard weather stations, but don't tell anyone.)

Initially I could not grasp the capabilities of the sub-$30 device I held in my hands. After all, I thought, how could a device so small and so inexpensive take the place of the table-sized radios my father used in the 1960s.

Of course the answer lies in miniaturization and in the power of our modern computers. It all comes down to mathematics and being able to represent signals as waveforms that can be manipulated with software. Therein lies the secret to SDR, software-defined radios.

My experimentation with SDRs is really just beginning. I now have several units, some little bigger than a thumbnail. One is dedicated to aircraft position monitoring (my

data is shared to an international consortium), another to ship tracking.

Two others are dedicated to weather satellite image data, capturing eight passes a day from both Russian and American meteorological satellites.

A fifth, more expensive, form of SDR, made by a company called SDRplay, is used mostly for so-called HF bands – high frequencies from 3 to 30 MHz , essentially taking the place of that shortwave set my father used to listen to Radio Nederland all those years ago.

Follow me on Facebook (facebook.com/PeterVogelCA), on Twitter (@PeterVogel), or on Instagram (@plvogel)

~ *Peter VE7AFV*
  pvogel@outlook.com

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https://bccatholic.ca/voices/peter-vogel/software-defined-radio-tuning-in-new-world-of-broadcasting
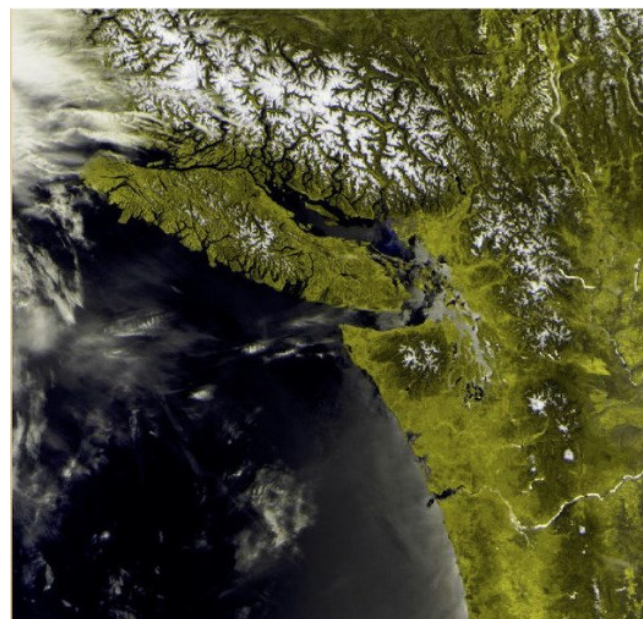
Tech Topics

Reg Natarajan VA7ZEB

Create a receive-only APRS iGate on a Raspberry Pi

Use a cheap SDR dongle and a Raspberry Pi to make a receive-only APRS iGate in an hour

What will you get if you follow these steps?

You will get one of these...

Why build an iGate?

APRS is a useful system, especially in emergencies in which the cellular system fails or when you're out of range of cellular service (or if you lose/break your phone for that matter). In such cases, APRS lets you send out emails, SMS texts and direct messages using ham radios. APRS also provides a location-reporting service that shows your position on some excellent web-based map front-ends like aprs.fi and aprsdirect.com. This could save your rear-end in an emergency where rescue people need to be sent to your exact location.

The challenge we have with APRS is that, for it to work, there need to be iGates everywhere and there aren't right now.   In this document, I'm hoping to show people how to easily build and configure a cheap iGate that will contribute to the APRS system's infrastructure. If even a tiny percentage of ham radio operators did this, APRS would have remarkable coverage just about everywhere.

It's a fully self-contained APRS receive-only iGate that will accept beacons from anyone on the standard APRS frequency of 144.390 and send them to APRS-IS where they will be displayed on pretty maps on Internet front-ends like aprs.fi and aprsdirect.com. It will also receive encoded APRS messages on 144.390 and relay them to APRS-IS so people in your area can use their radios to send emails and SMS texts to anyone.

It won't be huge or ugly. The only wiring it will have is the power cord, and you will be able to hide it just about anywhere. I'm going to hide mine in a flower pot on the balcony with the power cord nicely hidden along the railing. Obviously I'll need to get a bit creative to make sure water stays out but that's for another how-to that I doubt I'll ever write.

What you won't get is a bidirectional iGate that will send messages back to the radios in the field. While what would be nice, this is still 99% as useful and is vastly simpler, easier and cheaper to build and configure. Let us not make perfect the enemy of good.

Our approach

Being frugal, we're going to make this happen using an inexpensive Raspberry Pi, an inexpensive SDR, an inexpensive antenna and a bunch of free software. We're going to build a Pi, install Raspbian (now called Raspberry Pi OS), then install Direwolf and the Linux drivers for the RTL-SDR. We're not going to use any other software at all. We're going to configure Direwolf to relay APRS beacons and messages to APRS-IS and to beacon the iGate itself at regular intervals. We're going to configure the iGate to be accessed from your home computer via VNC so that, after you hide it wherever you're going to hide it, you can still get to it and control it from your main PC. We're going to set it up so that it survives reboots and resumes operation without requiring any human action. We're going to set it up to update itself nightly with any new software upgrades and/or security patches and to reboot itself nightly to keep itself fresh. We'll even do a bit of hacker-proofing. It should take about an hour or two to do all of this (including the build of the Pi).

What you'll need to buy

These are the parts I purchased and used for this project in Feb of 2021. You can substitute equivalents for any or all of them. Please note that my links are to Amazon Canada because, obviously, I'm in Canada. All of these parts are easy to purchase in most countries.

You'll also need a reasonably fast Micro SD card and reader which most of us have lying around so I haven't bothered listing them below. You will obviously also need a monitor, keyboard and mouse, but you can just temporarily steal those from your home computer while working on this project. You won't need them for long.

Note that you don't need to do this on a Pi. While I haven't tried it, I see no reason this approach wouldn't work on any Debian-based Linux including Ubuntu or Mint. If you have an old computer lying around, use it. Keep in mind it probably won't hide as well as a Pi.

Build your Raspberry Pi

I'm not going to cover this part other than to say if it takes you more than 10 minutes, you're doing it wrong. Using the parts I listed above, I unscrewed the case (four screws), plopped the Raspberry Pi motherboard in, re-screwed the case, connected the fan and that was it. If you're not sure how to connect the fan, there's a good image here. If you have issues, YouTube is your friend.

Let's assume you've got yourself an assembled (but not booted) Raspberry Pi. Make sure your SDR dongle is plugged in to a USB slot on the Pi and your antenna is connected to the SMA female connector on the SDR dongle.

Create a Raspbian Micro-SD card and boot your Pi

I know, I know, it's called Raspberry Pi OS, now. How catchy. I'll come around eventually. Whatever you choose to call it, you're going to need it.
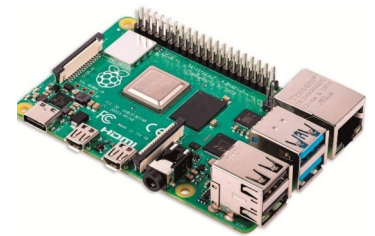
Raspberry Pi

The 8 gb Raspberry Pi 4 I bought for this project was $135 Canadian on Amazon. You would do fine with the 4 gb version. I'm not sure I'd try the 2Gb version.

Raspberry Pi Case

There are a million different Pi cases out there. Mine was $26 Canadian on Amazon. Some say aluminum interferes with wifi. I've had no issues.

USB-C Power Supply

You'll need a USB-C power supply rated at 3 amps or better. I just bought the official Raspberry Pi unit on Amazon for $18 Canadian. Any 3 amp supply will do.

MicroHDMI to HDMI

New Pis come with irritating MicroHDMI plugs. I bought this converter on Amazon for $11 Canadian (for 2). Obviously buy what you need for your monitor.

RTL-SDR Dongle

The SDR dongle I used was a Nooelec NESDR Smart v4 which cost me $43 Canadian dollars on Amazon. Any RTL-SDR should work fine, however.

SMA Male Antenna

The Antenna I used was an HYS-772. $14 Canadian dollars on Amazon. Any SMA Male antenna should work fine as long as it's tuned to the VHF ham band.

To get it you're going to have to download and install the **Raspberry Pi Imager** on your home PC (preferably Windows) from [this page](#). Choose **Raspberry Pi OS** (still 32 bit sadly), choose your SD card and hit **Write**. It's slow. Be patient.

When you're done, put your Micro SD card in your Pi, connect a monitor, keyboard and mouse, then give it power. Your Pi will boot up and you can start on the software part of your project.

IMPORTANT: For the next few steps, if you only have one monitor you're going to need it for your Pi so you might have trouble following the steps of this document.   Not to worry.   I have formatted this document so it works on most phones. Just load it on your phone and you can follow the next few steps from there.

Configure your Pi on first boot
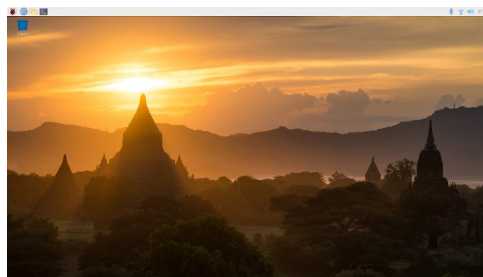
When your Pi boots for the first time, it's going to ask you a bunch of questions.   Your country, your language, etc.   If you don't know those things, perhaps building an iGate shouldn't be your top priority. Choose a password you'll remember. Get it connected to Wifi. Let it do

its software update. Let it restart. When it comes back, you should see a desktop that looks roughly like this.

Set-up your Pi for remote access

Don't skip this part.   I know it's tempting to but you'll regret it. The whole idea of a tiny little iGate is that you can hide it somewhere and let it run headless (no monitor, keyboard or mouse). Well, if it ever needs attention (which it will, computers being what they are), it'll be much easier to fix whatever went wrong if you can just do it from your home PC rather than digging the Pi out of wherever you've hidden it, connecting a monitor, keyboard and mouse, only to click "ok" on whatever error is on the screen.

First, get your local IP address. There are many ways to do that but this is the method I generally use. If you prefer a different way, do that. If not, click on the terminal and then type **ifconfig** (and enter of course) in the black window that pops up.
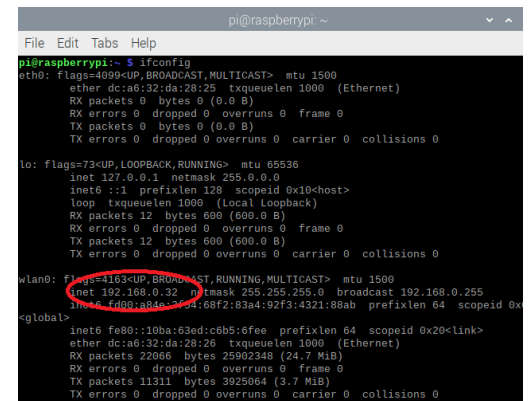
The information displayed by **ifconfig** will contain your IP address. It will probably start with 192.168. It is definitely not the 127.0.0.1 loopback address. Jot your address down or remember it for future reference. You will need it shortly (and later every time you need to tend to your iGate so save it however you save things).

Note 1: You need your local IP, not your public IP. Don't use sites like whatismyip.com as those return your public IP.

Note 2: Technically this address could change since it's DHCP at this point. If you're worried about that, Google how to assign a static IP to a Raspberry Pi and do that. Personally, I find small DHCP networks to be quite stable when it comes to unnecessarily changing IP addresses and I just leave it as is.
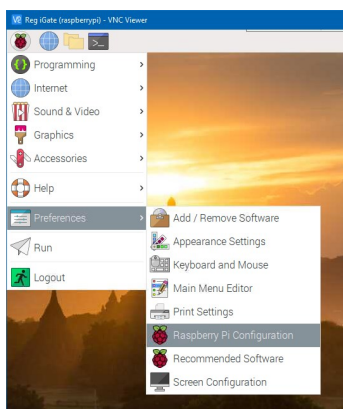
Now tell your Pi to accept connections on VNC. Click the **Raspberry** at the top left, then **Preferences**, then **Raspberry Pi Configuration**.
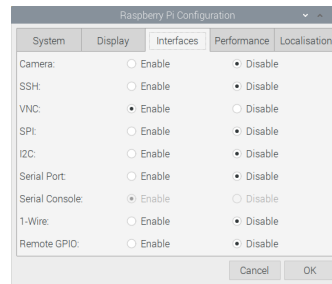
On the resulting pop-up window, click **Interfaces** and put a tick in **Enable** on **VNC**. While you're in here, you might want to click **System** and change the computer name to something that suits you.

Click **OK** when you're done but don't reboot.
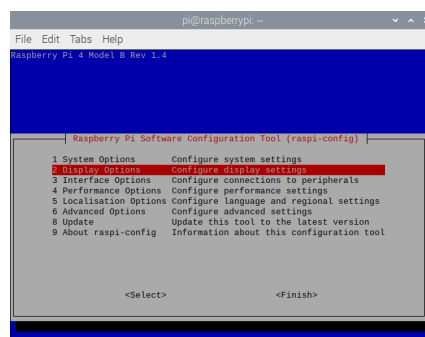
Now we need to specify a screen resolution. Normally your Pi will just detect the resolution of whatever monitor you have plugged in, but we want to run it without a monitor so if you don't specify a resolution, it will default to an unusably tiny rectangle to save resources.

Load up another terminal and type **sudo raspi-config** (and enter). Chose **Display Options**, then Resolution and choose something that suits you. I like to set it to 1280x1024 so that it is a nice usable window on my 1920x1080 screen but choose

whatever you're comfortable with. Be sure you see the confirmation message that your resolution has been changed. Choose **Finish** but do not reboot.

Now it's time to put your Pi in its permanent home. Don't skip this as VNC will look funny if you leave your monitor connected (the monitor's native resolution will override whatever you set in the step above). You also need to be sure your Pi won't have issues running headless. We'll do the rest of the steps in this document from your home PC using the VNC you just configured. In your terminal window, type **shutdown -h** now and hit enter. Wait a minute and your Pi will shut down. Now, unplug the USB power from your Pi. With the power unplugged, now unplug the monitor, keyboard and mouse, and then move the Pi to wherever you plan to keep it permanently. Finally, plug only the USB power back in. At this point, your Pi is operating "headless", without a keyboard, mouse or monitor.
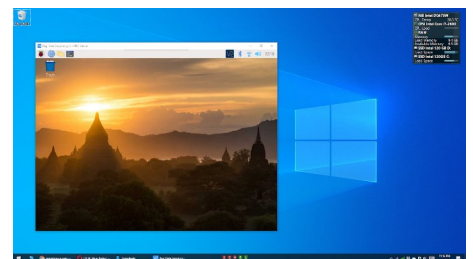
Finally, we need to go to your home PC and download/install **VNC Viewer** which you'll find on [this page](#). Once installed, run it and create a **New Connection**. Enter the IP address you jotted down a few steps ago, give the

connection a nice name, click **OK** and then double click it to connect. You'll be prompted for a user/password. Enter **pi** as the user and whatever password you entered on initial setup. If you click "save password", you won't be prompted again on subsequent connections to your Pi.

You should now see your Pi as a window on your main computer's screen. From now on, whenever you need to work on your Pi, just load up VNC Viewer and double click the connection you saved. Again, all the remaining steps in this document will be done from inside a VNC window.

IMPORTANT: Your home PC needs to be on the same network as your Pi for this to work, otherwise you're going to have to get into forwarding ports on your router and opening ports on your firewall.

Install Direwolf and the Linux SDR drivers

At this point, things will be easiest if you load this document in the web browser on your home PC as you will be copying/pasting a lot. Always use ctrl-shift-v to paste instead of just ctrl-v because the shift lets you paste into terminal windows.

Load up another terminal and copy/paste the following lines one at a time. Yes, it's tedious to do this one line at a time. Just do it that way or it might fail. Pasting in multiple lines at a time is always hit and miss.

sudo apt update

sudo apt upgrade -y

sudo apt install cmake build-essential libusb-1.0-0-dev libasound2-dev libudev-dev -y

cd /usr/src

sudo git clone https://www.github.com/wb2osz/direwolf

cd direwolf

sudo mkdir build && cd build

sudo cmake -DUNITTEST=1 ..

sudo make -j4

sudo make test

sudo make install

cd /usr/src

sudo git clone git://git.osmocom.org/rtl-sdr.git

cd rtl-sdr

sudo mkdir build && cd build

sudo cmake ../ -DINSTALL_UDEV_RULES=ON -DDETACH_KERNEL_DRIVER=ON

sudo make

sudo make install

sudo ldconfig

sudo rtl_test

You should see your SDR dongle listed as in the image at the bottom of this page.

Don't worry if you see a few lost bytes when you first run it. It should stabilize quickly and not show any more lost bytes. If you keep seeing significant numbers of lost bytes pop up on your screen after the first few seconds, you may have bad hardware. Once you're satisfied, type **ctrl-c** to terminate the program.

```
pi@raspberrypi:/usr/src/rtl-sdr/build $ sudo rtl_test
Found 1 device(s):
  0:  Realtek, RTL2838UHIDIR, SN: 00000001
```

Configure your iGate

Copy/Paste the following command into a terminal window.

nano ~/igate.conf

Copy/Paste the following brown text into the Nano editor. Note that lines starting with # are just comments that don't affect anything. You can paste them safely. They won't harm anything.

IMPORTANT: Change **YOURCALLSIGN** to your actual call sign. Change **YOURPASSCODE** to your actual passcode. If you don't have a passcode, get one here. Change your latitude and longitude to your actual coordinates (just right click on any point in Google Maps and it'll tell you the lat/long). If you're not in North America, change the **IGSERVER** to one of the alternatives listed below.

\# Set the sound card to null

ADEVICE null null

CHANNEL 0

\# Put your callsign here. It is common to add "-10" to the end.

MYCALL ~~YOURCALLSIGN~~-10

\# Enter your callsign (no "-10" this time) and your passcode.

\# If you don't have one, get your passcode at http://apps.magicbug.co.uk/passcode/

IGLOGIN ~~YOURCALLSIGN YOURPASSCODE~~

\# The IGSERVER defaults to North America.

\# If you prefer a different server, use one of these:

\#   noam.aprs2.net - North America

\#   soam.aprs2.net - South America

\#   euro.aprs2.net - Europe and Africa

\#   asia.aprs2.net - Asia

\#   aunz.aprs2.net - Oceania

IGSERVER noam.aprs2.net

\# Set your iGate up to beacon itself every 60 minutes.

\#IMPORTANT: Change your latitude/longitude to your own coordinates.

PBEACON sendto=IG delay=0:30 every=60:00 symbol="igate" overlay=R lat=~~42^37.14N~~ long=~~071^20.83W~~

When you're done with your changes, type ctrl-x to exit and then **y** to save. Hit enter when it asks you to confirm the file name.

Create a script to run your iGate

Copy/Paste the following command into a terminal window.

nano ~/igate.sh

Copy/Paste the following brown text into the Nano editor.

IMPORTANT: If you are in Europe, change 144.39 to 144.80. Obviously if you wish to use APRS on any other frequency, there's nothing to stop you from doing that but I encourage you to stay within the conventions of your area.

```
#!/bin/bash

export DISPLAY=":0"

DWCMD="bash -c 'rtl_fm -f 144.39M - |
direwolf -c /home/pi/igate.conf -r 24000
-D 1 -'"

sleep 30

/usr/bin/lxterminal -t "iGate" -e
"$DWCMD"
```

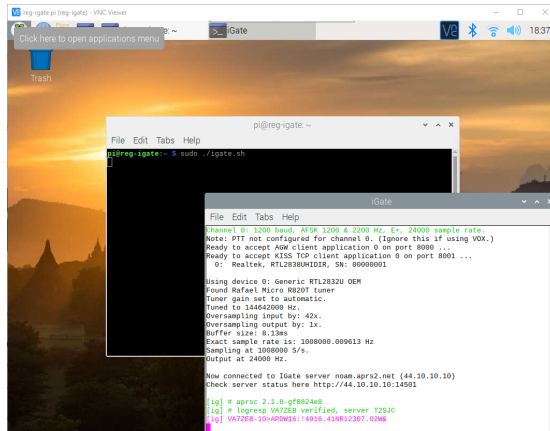Type **ctrl-x** to exit and then **y** to save. Hit enter when it asks you to confirm the file name.

You also need to make the file executable. Copy/Paste the following command into your terminal.

chmod +x ~/igate.sh

Now, finally, you get to run your iGate! Copy/Paste the following command into your terminal.

sudo ~/igate.sh

After a 30 second pause, you should see this.

Test your iGate by beaconing some APRS with any APRS-capable radio. You should immediately see the packets in your iGate window. They should also show up almost immediately on aprs.fi.

Autostart your iGate whenever your Pi boots

There are different ways to do this. To be frank, I find most of the common ones (such as throwing a dw-start.sh into a cron) to be overly complicated and prone to failure. I'm just going to use the Raspberry Pi desktop to autostart the iGate 30 seconds after it loads.

Copy/Paste the following lines into a terminal window.

mkdir ~/.config/autostart

nano ~/.config/autostart/igate.desktop

Copy/Paste the following brown text into the Nano editor:

[Desktop Entry]

Type=Application

Name=iGate

Exec=sh -c "sudo /home/pi/igate.sh"

Type **ctrl-x** to exit and then **y** to save. Hit enter when it asks you to confirm the file name.

Test it. Reboot your Pi by typing **reboot** into your terminal window. VNC will disconnect, of course, but it should reconnect automatically as your Pi boots and your iGate should run automatically after 30 seconds.

Configure automatic software updates

Automatic updates should not be a controversial idea. They'll keep your Pi up to date with the latest security patches, bug fixes and so on. Some people worry about the risk that an update in the future may break the stack of software programs and configurations that make up your iGate. To me, the risk of old and stagnant software being compromised is far greater than the risk of an upgrade making your stack fail. It's worth setting your Pi up to auto-update itself.

Copy/Paste the following commands one at a time into a terminal window. It will not work if you try to paste both lines at once.

sudo apt install -y unattended-upgrades apt-listchanges

sudo dpkg-reconfigure -plow unattended-upgrades

Every few weeks (or months), you should try to remember to log in to your Pi and just do a **sudo apt update && sudo apt upgrade** to see that it's working. There should be (almost) no updates found if automatic updates are working correctly.

Configure automatic nightly reboots (optional)

Nightly reboots are something each sysadmin has to decide on (and you're now a sysadmin, even if it's for just one system). If your software stack hangs and you don't happen to notice, a nightly reboot will keep your downtime to less than a day. I choose to do automatic nightly reboots but you'll have to decide for yourself. If you want to proceed, do the following.

Copy/Paste the following command into a terminal window.

sudo crontab -e

Choose 1 for Nano and copy/paste the following brown text into a new line at the bottom of the file. Note, this will reboot your Pi every night at 4 am. The first number is minutes, the second is hours. If you want a different time, just change those two numbers.

```
0   4   *   *   *
/sbin/shutdown –r now
```

Type **ctrl-x** to exit and then **y** to save. It should say "crontab: installing new crontab".

Protect against hackers with FAIL2BAN (optional)

Fail2ban is a well known and well regarded hacker-protection program that just bans IP addresses temporarily if they try to log in with the wrong user/pw too often or too fast. I always install it. You can decide for yourself. If you want to proceed, do the following.

Copy/Paste the following commands one at a time into a terminal window. It will not work if you try to paste both lines at once.

sudo apt install fail2ban -y

sudo systemctl enable fail2ban

That's it.

Install a hardware information widget (optional)

This is totally optional but I believe it's worth doing. Seeing your CPU temperature, available memory, CPU usage and other such details always on your desktop just makes it more likely you'll find and fix problems before they occur.

Copy/Paste the following lines one at a time into a terminal window.

sudo apt install conky -y

nano ~/.conkyrc

Copy/Paste the following brown text into the Nano editor:

```
background yes

use_xft yes

xftfont 123:size=8

xftalpha 0.1

update_interval 0.5

total_run_times 0

own_window yes

own_window_type normal

own_window_transparent yes

own_window_hints
undecorated,below,sticky,skip_
taskbar,skip_pager

double_buffer yes

minimum_size 250 5

maximum_width 400

draw_shades no

draw_outline no

draw_borders no

draw_graph_borders no

default_color gray

default_shade_color red

default_outline_color green

alignment top_right

gap_x 10

gap_y 10

no_buffers yes

uppercase no

cpu_avg_samples 2

net_avg_samples 1

override_utf8_locale no

use_spacer right

TEXT

${font Arial:size=20}${color
Tan1}APRS${color Ivory}iGate

${voffset –90}

${color DimGray}

${font}

${font
Arial:bold:size=10}${color
Tan1}SYSTEM ${color
DarkSlateGray} ${hr 2}

$font${color DimGray}$sysname
$kernel $alignr $machine

Frequency $alignr${freq_g
cpu0}Ghz
```

```
Uptime $alignr${uptime}

File System $alignr${fs_type}

${font
Arial:bold:size=10}${color
Tan1}CPU ${color
DarkSlateGray}${hr 2}

$font${color DimGray}Temp:
$alignr ${exec
/opt/vc/bin/vcgencmd
measure_temp | cut -c6-9} C

$font${color DimGray}CPU1
${cpu cpu1}% ${cpubar cpu1}

CPU2  ${cpu cpu2}% ${cpubar
cpu2}

CPU3  ${cpu cpu3}% ${cpubar
cpu3}

CPU4  ${cpu cpu4}% ${cpubar
cpu4}

${cpugraph DimGray
DarkSlateGray} $color

${font
Arial:bold:size=10}${color
Tan1}MEMORY ${color
DarkSlateGray}${hr 2}

$font${color DimGray}MEM
$alignc $mem / $memmax $alignr
$memperc%

$membar

$font${color DimGray}SWAP
$alignc $swap / $swapmax
$alignr $swapperc%

$swapbar

${font
Arial:bold:size=10}${color
Tan1}HDD ${color
DarkSlateGray}${hr 2}
```

```
$font${color DimGray}/home
$alignc ${fs_used /home} /
${fs_size /home} $alignr
${fs_free_perc /home}%

${fs_bar /home}

${font
Arial:bold:size=10}${color
Tan1}TOP PROCESSES ${color
DarkSlateGray}${hr 2}

${color DimGray}$font${top_mem
name 2}${alignr}${top mem 2} %

$font${top_mem name
3}${alignr}${top mem 3} %

$font${top_mem name
4}${alignr}${top mem 4} %

$font${top_mem name
5}${alignr}${top mem 5} %

${font
Arial:bold:size=10}${color
Tan2}NETWORK ${color
DarkSlateGray}${hr 2}

$font${color DimGray}IP on
wlan0 $alignr ${addr wlan0}

Down $alignr ${downspeed
wlan0} kb/s

Up $alignr ${upspeed wlan0}
kb/s

Downloaded: $alignr
${totaldown wlan0}

Uploaded: $alignr  ${totalup
wlan0}
```

Type **ctrl-x** to exit and then **y** to save. Hit enter when it asks you to confirm the file name.

Now to Autostart the widget, Copy/Paste the following lines into a terminal window.

nano ~/.config/autostart/conky.desktop

Copy/Paste the following brown text into the Nano editor:

```
[Desktop Entry]

Type=Application

Name=Conky

Exec=sh -c "sleep
4;/usr/bin/conky"
```

Type **ctrl-x** to exit and then **y** to save. Hit enter when it asks you to confirm the file name.

Test it. Reboot your Pi by typing **reboot** into your terminal window. VNC will disconnect, of course, but it should reconnect automatically as your Pi boots and your widget should display your system information. You iGate should run automatically after 30 seconds.

Congratulations!

You've done it. You've built, configured and tested your APRS receive-only iGate. Your final product should look like the image on the next page.

Put it somewhere safe with as much exposure for the antenna as you can manage, test that VNC still works, and boast to all your ham friends about how cool you are, because you really are. APRS only works if people like you deploy iGates and you've done your bit for the community today.

Link your ham friends to your iGate on aprs.fi and I bet they'll be jealous of you. If they do happen to be jealous, please consider sharing this document with them. Let's get as many iGates out there as we can. I'd prefer that you link to my site because I intend (ok, hope) to keep this document updated here as much as possible, but I release everything I post here to the Public Domain so use it as you see fit.

Error reports, typo reports and bug reports are very welcome. Please email them to me at reg@natarajan.ca.

I also belong to some of the large APRS and BC/Canada ham groups on Facebook. Those groups are great places to get individual advice and support from the community. You can find my FB profile here.

I hope this has helped you. Best,

~ Reg Natarajan VA7ZEB
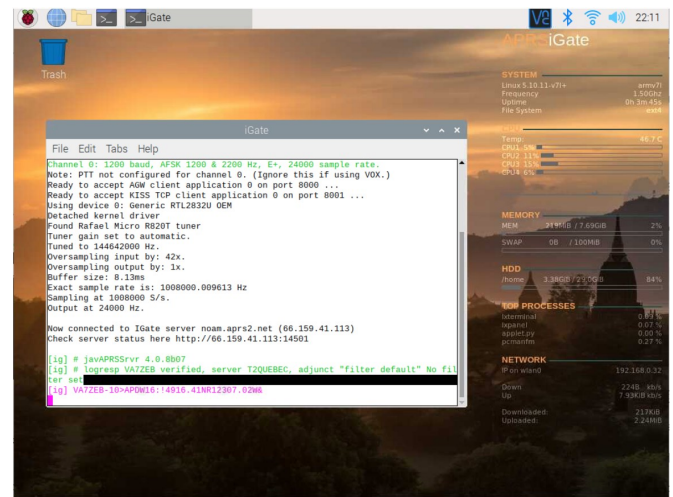
Reg is a SARC member. You will find his 'Radio-Active' profile in The Communicator, September-October 2020 issue. This article may also be found at Reg's blog at https://www.regnatarajan.com/radio/create-aprs-receive-only-igate-raspberry-pi

It's time to start thinking about what Field Day might look like this year.

Planning will start soon.

New Quantum Receiver

First to detect the entire radio frequency spectrum

...Waveguide-coupled Rydberg spectrum analyzer from 0 to 20 GigaHerz...

New quantum receiver the first to detect entire radio frequency spectrum by The Army Research Laboratory

A new quantum sensor can analyze the full spectrum of radio frequency and real-world signals, unleashing new potentials for soldier communications, spectrum awareness and electronic warfare.

Army researchers built the quantum sensor, which can sample the radio-frequency spectrum—from zero frequency up to 20 GHz—and detect AM and FM radio, Bluetooth, Wi-Fi and other communication signals.

The Rydberg sensor uses laser beams to create highly-excited Rydberg atoms directly above a microwave circuit, to boost and hone in on the portion of the spectrum being measured. The Rydberg atoms are sensitive to the circuit's voltage, enabling the device to be used as a sensitive probe for the wide range of signals in the RF spectrum.

"All previous demonstrations of Rydberg atomic sensors have only been able to sense small and specific regions of the RF spectrum, but our sensor now operates continuously over a wide frequency range for the first time," said Dr. Kevin Cox, a researcher at the U.S. Army Combat Capabilities Development Command, now known as DEVCOM, Army Research Laboratory. "This is a really important step toward proving that quantum sensors can provide a new, and dominant, set of capabilities for our Soldiers, who are operating in an increasingly complex electro-magnetic battlespace."

Researchers excite Rubidium atoms to high-energy Rydberg states. The atoms interact strongly with the circuit's electric fields, allowing detection and demodulation of any signal received into the circuit.

The Rydberg spectrum analyzer has the potential to surpass fundamental limitations of traditional electronics in sensitivity, bandwidth and frequency range. Because of this, the lab's Rydberg spectrum analyzer and other quantum sensors have the potential to unlock a new frontier of Army sensors for spectrum awareness, electronic warfare, sensing and communications — part of the Army's modernization strategy.

"Devices that are based on quantum constituents are one of the Army's top priorities to enable technical surprise in the competitive future battlespace," said Army researcher Dr. David Meyer. "Quantum sensors in

general, including the one demonstrated here, offer unparalleled sensitivity and accuracy to detect a wide range of mission-critical signals.

The peer-reviewed journal Physical Review Applied published the researchers' findings, Waveguide-coupled Rydberg spectrum analyzer from 0 to 20 GigaHerz, co-authored by Army researchers Drs. David Meyer, Paul Kunz, and Kevin Cox

Researchers use a Rydberg spectrum analyzer experimental apparatus at the DEVCOM Army Research Lab. Credit: U.S. Army

The researchers plan additional development to improve the signal sensitivity of the Rydberg spectrum analyzer, aiming to outperform existing state-of-the-art technology.

"Significant physics and engineering effort is still necessary before the Rydberg analyzer can integrate into a field-testable device," Cox said. "One of the first steps will be understanding how to retain and improve the device's performance as the sensor size is decreased. The Army has emerged as a leading developer of Rydberg sensors, and we expect more cutting-edge research to result as this futuristic technology concept quickly becomes a reality."

https://phys.org/news/2021-02-quantum-entire-radio-frequency-spectrum.html

~ *Southgate Amateur Radio and Stephen G7VFY*

…offer unparalleled sensitivity and accuracy to detect a wide range of mission-critical signals.

Bothered by excessive noise? Try…

The Isolator

The Isolator ensures total concentration by blocking external sounds and visual distractions, allowing the DXer, contester, or even the new ham to focus on the QSO and ensure correct copy. Don't let that new one get away!

Shown is our Director and Communicator editor VE7TI pulling the rare DX station RG8U (Coaxial Islands) out of the aether for a new DXCC entity.

~ *Kevin VE7ZD*

2 meters

Bob Witte K0NR

The 2-meter band: Much more than FM

Way back in the Wayback machine, when I was working on getting my Technician license (in the 20th century), I recall looking at the frequency bands available to Techs. Technicians had operating privileges for everything above 50 MHz, which looked like a lot of useful spectrum to me. The idea at the time was that Technicians were exploring the new frontier of amazingly high frequencies. Since then, the Technician license has morphed to be the entry level license.

ICOM has a good graphic that shows all of the ham bands and shows the common sub bands for various modes. I snipped out the portion that covers the most popular VHF/UHF bands (below). Wow, look at all the stuff you can do! Also, it is 4 MHz of spectrum, big enough to fit eleven 20 meter bands inside it. (Yeah, yeah, the propagation is a lot different.)

Speaking of bandwidth, take a look at the 70 cm band, with 30 MHz of spectrum. (Not shown is the 23 cm band, which spans 60 MHz.) The higher you go in frequency, the more spectrum there is.

Most people think of the 2-meter band as just FM and repeaters, but it is much more than that. I copied the 2-meter band graphic and added my own notation on the various uses of the band.

Much of the band is allocated to FM, which is consistent with the popularity of the mode. I didn't mark all of the FM segments, so refer to the color coding to see them. But there is much more than FM simplex and repeaters. Down on the low end is the CW-only segment and EME activity (Earth-Moon-Earth or moonbounce). The "weak-signal" enthusiasts tend to use the SSB portion, with the SSB calling frequency of 144.200 MHz. You may often hear CW in the SSB subband and radio hams flip back and

CW Only | EME | SSB | Meteor Scatter | APRS | Satellites | FM Simplex | FM Repeaters
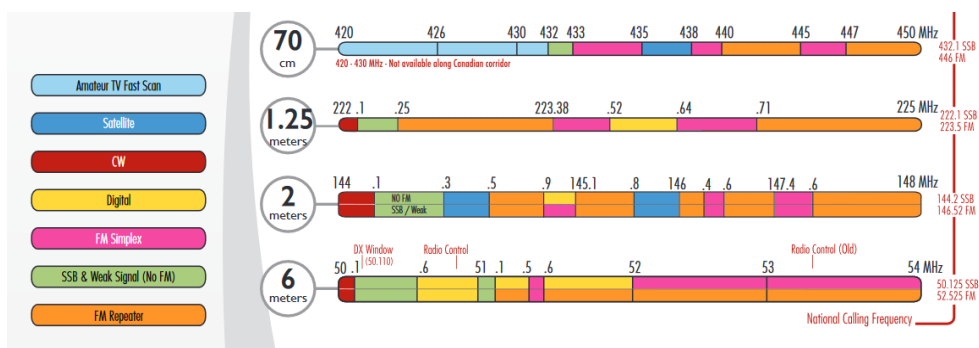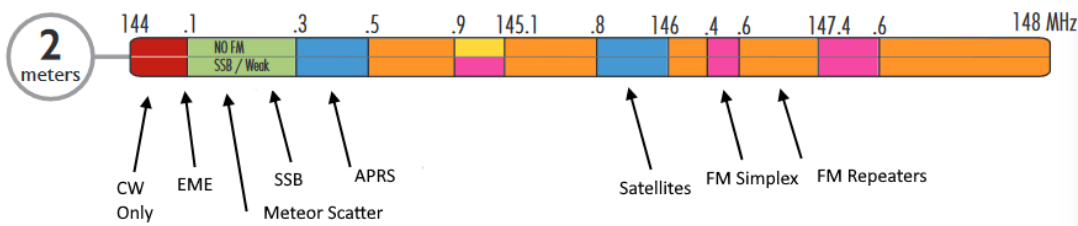
forth between the modes depending on propagation. Meteor scatter is mostly done via the WSJT-X mode of MSK144 around 144.140 MHz.

Automatic Packet Reported System (APRS) activity is mostly on 144.390 MHz, using FM-based 1200-baud packet radios. Other packet radio usage is not shown but is usually around 145.01 MHz. The 2m band is very attractive for satellite use, with VHF propagation properties and manageable doppler shift for Low Earth Orbit (LEO) satellites.

The downlink from the International Space Station (ISS) is usually 145.80 MHz.

Over time, I've used all of these 2m modes mentioned above, with the exception of EME. I am still working on that one and I hope to have a new 2m Yagi installed sometime this year that will enable it.

~ Bob KØNR

Bob Witte, KØNR, writes from Colorado, USA. Contact him at bob@k0nr.com.

This book is an easy-to-understand introduction to VHF/UHF ham radio, including practical tips for getting on the air and having fun messing around with radios. Learn about FM, SSB, repeaters, equipment, band plans, phonetics, portable operating, Summits On The Air (SOTA) activations and more.

2-meters in British Columbia

Notes:
1) This band plan applies only to southwestern BC, Vancouver Island and the adjacent mainland, and the BC interior west of the Rocky Mountains (wherever coordination with Alberta is not paramount).
2) For channelized sub-bands, unless otherwise stated the first frequency of a group is the carrier centre frequency of the first channel, and the last frequency of the group is the carrier centre frequency of the last channel.
3) For non-channelized sub-bands, operation anywhere in the sub-band, including band edges, is allowed.
4) The frequencies 146.400 MHz and 147.400 MHz are preferred as FM Simplex channels. In some cases, they may be coordinated as alternative inputs for repeaters with output on 147.000 MHz and 146.800 MHz.
5) Frequencies from 147.420 to 147.585 (15 kHz interval) have been classified for use by internet linked simplex operations. Operators are encouraged to use minimum output power, and to load the sub-band from the highest frequency down, recognizing that operation on adjacent 15 kHz channels may not be feasible in the same coverage area. Experimentation is limited to the SNP channels. Some digital (packet) operations have operated in this frequency range for many years, and may continue to operate here for a reasonable but limited period of time, after which they are expected to move to one of the ranges assigned to digital operation.
6) The use of frequencies in the range 144.300 – 144.500 MHz is subject to non interference with any active Amateur satellite (frequencies in that range used by active Amateur satellites will be posted on the BCARCC web site)
7) Users of frequencies in the range 145.500 – 145.800 MHz may experience conflict with "miscellaneous & experimental" users in Washington State, according to the WWARA 2m band plan.
https://www.wwara.org/WWARA_BAND_PLAN_2012_07_08.pdf

* The repeater channels transmitting on 145.130 MHz and 145.290 MHz are SNP (Shared, Non-Protected) channels. **Tone-coded squelch is mandatory for all SNP channels.**

This is the BC Amateur Radio Coordination Council 2-meter frequency plan.
https://bcarcc.org/2m%20Plan%20A%202014.pdf

Frequencies Allocated			
Repeater		**Simplex**	**Functional Allocation**
Output	**Input**		
		144.000 - 144.100	Moonbounce and Terrestrial CW
		144.100	National CW Calling Frequency
		144.100 - 144.200	CW/SSB Weak Signal
		144.200	National SSB Calling Frequency
		144.200 - 144.275	AM Narrow-band Modes, Exclusive (including CW SSB, ACSSB and other modes having bandwidth less than 3 kHz, e.g., FAX, SSTV, RTTY)
		144.275 - 144.300	Propagation Beacon Network, Exclusive (Note 6)
		144.340	National ATV Coordination Frequency (Note 6)
		144.370 -144.490	Digital, Group 1 (20 kHz interval) (bandwidth, ERP, coverage to be coordinated; operation on 144.310 MHz allowed if it does NOT interfere within propagation beacon sub-band) (Note 6)
		144.390	National APRS Frequency (Note 6)
145.110 - 145.190	144.510 - 144.590		Repeaters Group 1, (FM Repeaters Primary, Linear Translators Secondary) (-600, 20 kHz interval) *
145.210 - 145.490	144.610 - 144.890		Repeaters Group 2 (-600, 20 kHz interval) *
145.510 - 145.570	144.910 - 144.970		Digital Repeaters Group 2 (- 600, 20 kHz interval) (Note 7)
145.590	144.990		Low power APRS
145.010 - 145.090	145.610 - 145.690		Digital Repeaters, Group 1 (+600, 20 kHz interval) (Note 7)
145.110 - 145.190	144.510 - 144.590		Repeaters Group 1, (FM Repeaters Primary, Linear Translators Secondary) (-600, 20 kHz interval) *
145.210 - 145.490	144.610 - 144.890		Repeaters Group 2 (-600, 20 kHz interval) *
145.510 - 145.570	144.910 - 144.970		Digital Repeaters Group 2 (- 600, 20 kHz interval) (Note 7)
145.590	144.990		Low power APRS (Note 7)
145.010 - 145.090	145.610 - 145.690		Digital Repeaters, Group 1 (+600, 20 kHz interval) (Note 7)
		145.710 - 145.790	Digital, Group 3 (20 kHz interval)
		145.800 - 146.000	Amateur Satellite, Exclusive
146.620 - 146.980	146.020 - 146.380		Repeaters Group 3 (-600, 20 kHz interval)
(147.000)	(146.400)	146.400	FM Simplex, Orphan (alternate repeater input) (Note 4)
		146.415 - 146.595	FM Simplex, Group 1 (15 kHz interval)
		146.520	National FM Calling Frequency
146.620 - 146.980	146.020 - 146.380		Repeaters Group 3 (-600, 20 kHz interval)
147.000 - 147.380	147.600 - 147.980		Repeaters Group 4 (+600, 20 kHz interval)
(146.800)	(147.400)	147.400	FM Simplex, Orphan (alternate repeater input) (Note 4)
		147.420 & 147.435	Internet linked simplex, SNP (15 kHz interval) (Note 5)
		147.450 - 147.585	Internet linked simplex (15 kHz interval) (Note 5)
147.000 - 147.380	147.600 - 147.980		Repeaters Group 4 (+600, 20 kHz interval)

2 meters

...more

Bob Witte K0NR

A proposed new North America adventure frequency: 146.58 MHz

> I have previously written about the challenges of using 146.52

Recently, on the Nasota group, there was a discussion about designating an alternative 2m FM frequency for Summits On The Air (SOTA) use (instead of 146.52 MHz). The main driver for this is that 146.52 MHz can get busy with other radio traffic and/or a busy SOTA activation can tie up the calling frequency for a long time.

I have previously written about the challenges of using 146.52: The Use of 146.52 MHz

One important idea is to include the other "OTAs" in adopting this frequency, most notably Parks On The Air (POTA). Hence the name "Adventure Frequency," and not "SOTA Frequency." It is really about hams operating portable in an outdoor setting. Of course, like all amateur spectrum, this frequency must be shared with other users.

It may seem like a simple thing to choose a nationwide simplex frequency but VHF band plans are managed regionally. In particular, there is a mix of 15-kHz and 20-kHz channel spacings. (For more background on this see Simplex Channel Confusion on 2 Meters.)

Rex KE6MT (SOTA W6 Association Manager) kicked it off with:

*"A friend of mine, George KJ6VU, has been talking with me and several others about the idea of an FM "Adventure Frequency." It would be for more than just SOTA – other *OTA's could also use it. There are other ideas to layer on top of it, such as tone signaling so that you don't have to hear traffic you don't want to hear, and repeater infrastructure for announcing someone's on the frequency with a given tone, etc. But the core thing would be to decide on a frequency and really get it in use. The National Calling Frequency (146.52) can be great for a few contacts sometimes, but other times it's problematic either because it's being hogged or because nobody's listening. Of course, this Adventure Frequency could have the same issues present themselves differently, but would alleviate some and pave the path for future additions mentioned above."*

After some discussion, the group settled on 146.58 MHz. There was some dialog around using CTCSS for signaling but nothing specific surfaced.

Some key points:

- The NAAF is 146.58 MHz.

- This frequency is in addition to, not a replacement for, the National Simplex Calling Frequency 146.52 MHz.

- Local usage will likely vary depending on needs.

- Program 146.58 MHz as The Other Simplex Frequency in your radio.

What does this mean to you?

Program 146.58 MHz into your radio and have it available. If you are doing SOTA (or POTA) activations, consider using this frequency, especially if you are in an area where 146.52 is used a lot. (I've already started using this frequency for SOTA activations near urban areas.)

~ Bob K0NR

The post North America Adventure Frequency: 146.58 MHz appeared first on The K0NR Radio Site.

—————————

Curious about this subject, I contacted SARC member George Merchant VE7GM. He is also a member of the BC Amateur Radio Coordination Council, the group that manages frequency assignments in British Columbia. The following was George's reply: [-Ed]

I had not heard of the 146.58 MHz story. (Didn't it used to be known as "Walt Hendrickson's frequency" in the old days?)

BCARCC had created a list of simplex stations some years ago when every second person had, or wanted to have, an Echolink node on a particular frequency. Then there was the list of simplex frequencies to be used by emergency communications groups. But after many years, the list was completely obsolete, the registered users were long gone and BCARCC decided to just drop the coordination of simplex nodes.

More recently, emergency communications groups, particularly those on the Island using packet, wanted Hams to know about the use of their frequencies. I made it clear that, according to our laws and traditions, any Ham can use any simplex frequency any time that it is not in use and can therefore not be designated for any group's exclusive use.

That understood, it was decided to create a new Simplex list of registered, not coordinated, frequencies as information only. Hams, being aware of the intended use, would, hopefully, respect them.

So, we now have a published list, http://www.bcarcc.org/SimplexNodes.pdf which we are still tweaking but will complete shortly.

That was a long way to say that, if there is interest, we can list 146.58 as a Province-wide frequency and label it SOTA or whatever, with an explanation of your choice at the bottom of the list.

~ George VE7GM

Antenna Adventures
Robert Victor, VA2ERY (SK)

Dry your laundry or work DX. Could this be the first dual-purpose antenna?

Every once in a while, you run across an idea that seems so simple, so obvious, you can't believe it hasn't been done before. Surely (you say to yourself), you're not the first person in the universe to have thought of this… That's the case with the Clothesline antenna and me. While mulling over a variety of ideas for an antenna suited to my apartment, I started drawing some graphs of sine waves at various frequencies. One thing led to another and I wound up with a terrific solution for my antenna needs—and it was one that I haven't found any references to anywhere. As far as I'm concerned, I've invented the Clothesline. Still, I'm not going to be surprised if someone shows me that it's been done before!

But even if this antenna design has been around since hydrogen, it may still be new to you. And even if you have seen something similar to the Clothesline, this design may be worth a second look. For hams in a variety of situations, this could be just what the doctor ordered to cure your DX dilemma.

What It Is … And Isn't

I will tell you what the Clothesline is, but first I'll tell you what it is not. The Clothesline isn't some dubious trick for loading up an actual clothesline with 12 cubits of RG-213 looped four turns to the foot around your washing machine. This is an antenna, it works all the HF bands, and it gets great results. It doesn't need a tuner because it's dead-on resonant on the 160, 80, 40, 20, 15 and 10 meter bands. A tiny tweak will bring in 12 and 17 meters, too.

Given it's low height, this antenna will behave primarily as Near Vertical Incident Skywave (NVIS). It's remarkably easy to build. There are no traps, no stubs, no loading coils, no variable or fixed capacitors, no screws, no clamps, and you don't have to drill anything. This antenna is so simple to put up, it hurts. The Clothesline consists of little more than a piece of wire, a center insulator, some feed line, and a couple of $2 hardware-store fittings. Too good to be true, you say? What's the catch, you ask?

THAT LAST PAIR OF LONG JOHNS YOU REELED OUT MOVED MY FEEDPOINT
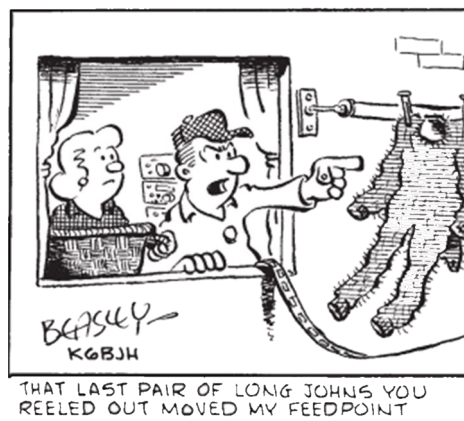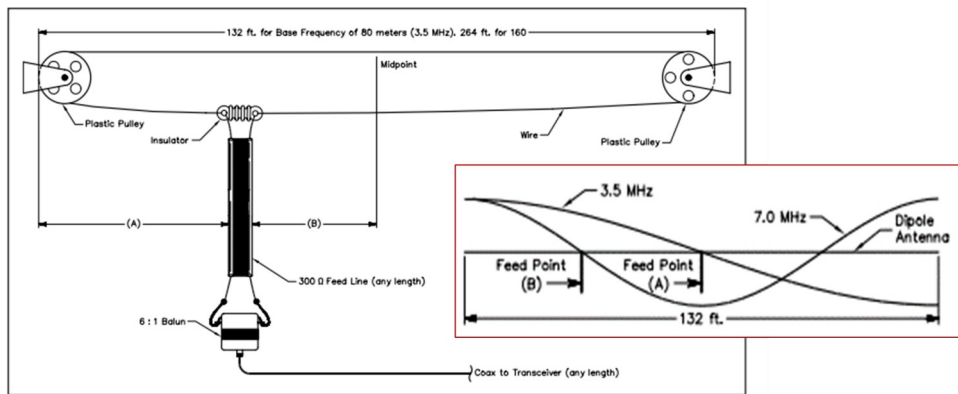
Well, you do have to adjust this antenna for most band changes. But before you get too excited by the word "adjust," I'm not talking about unwrapping yards of black tape to get at a loading coil, or tweaking the bare shaft (whoops, hot side—sorry!) of a 50-year-old fleamarket variable capacitor. No, the Clothesline makes band changes a piece of cake. When you see how easy it is, you're going to chuckle!

Kevin VE7ZD had used this concept with success. He writes:

"I have some on-air experience with a clothesline antenna. When I moved to my first house in 1981, my radio equipment came with me. I had left my tower and 6-element TH6 Yagi behind at my parents' house and would not have time to move it to the new place until later. I had planned to build a couple of dipoles to get myself on the air over the fall and winter.

The new house had a clothesline - the type with 6" rotating wheels at each end and a short piece of wooden dowel that connected the two ends of the clothesline wire together into about a 40-foot loop. The far end of the clothesline was on a 20-foot tall pole at one edge of the yard.

It dawned on me that the clothesline looked like a folded dipole. The feed point could be at the two ends of the wooden dowel where the two ends of the (electrical) loop were held together.

I didn't own any "ladder line", but with my youthful attitude of "anything will radiate" I thought that I should load up the clothesline and see if I could make any contacts using it.

I grabbed a roll of RG58/U coax, threw one end out the window and stripped the far end to expose about 18 inches of centre conductor and the shield.

Thanks Peter!

I used sandpaper to get the oxidation off of the two ends of the loop (at the dowel) as best as I could, and attached the shield and centre conductor to the loop with two of those little compression clamps that you tighten with a screwdriver. Gobs of silicon goop on the coax end and the connections, and my antenna was ready!

After the sealant had cured, I rotated the clothesline to put the "folded dipole's" feed point about in the centre, and then headed upstairs to try it out.

I didn't own a tuner at that time, but I did have an SWR meter. The SWR on 20 metres was pretty good (under 3 or 4 to 1; not bad given the circumstances), so I started calling CQ on 20 metres. A station came back in short order, and I had a working (if not optimal) antenna.

I used the clothesline antenna that fall, and into the spring of 1982 without "great" success, given its ad hoc and untuned nature, but I did make lots of North America and a fair number of DX contacts on it.

A spring wind storm brought the clothesline pole down as it had been in place for probably 30 years and was quite rotten at the base, so getting back on the air had to wait for the re-erection of my tower in the fall of 1982.—*Kevin VE7ZD*"

If you are interested enough in this antenna to read the remainder of the article, please click on the link:

http://www.w1npp.org/events/2010/2010-F~1/ANTENNAS/WIRE/980705~1.PDF

– QST July 1998
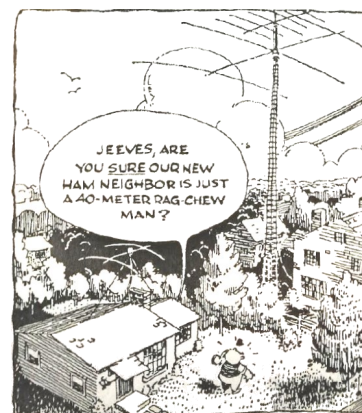
Re-printed with permission from QST [ARRL]

It's a... DOOZY

USB data cable

Doozy

DSTAR:
- DPLUS
- DEXTRA
- DCS
- XLX
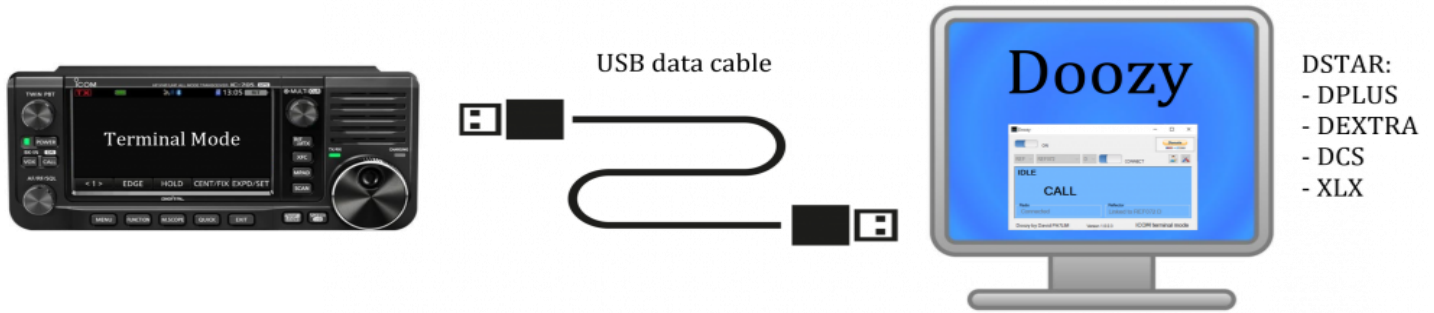
With Doozy for Windows you can make QSO's via your Windows PC on DSTAR (DPLUS, DEXTRA, DCS and XLX). There is no need for a hotspot. Just connect your ICOM IC-705, ICOM 9700, ICOM ID-51 or ICOM 31 to your Windows PC with an USB data cable and connect it to your favorite DSTAR reflector/repeater.

The software is still experimental and under development! It is getting better every day.

Download Doozy from the link: http://software.pa7lim.nl/Doozy/

Download and install the ICOM serial drivers from the ICOM website (important!).

Install Doozy on your Windows 10 machine and go to the setup. Enter your call and select the correct COM port.

~

SOLDER SPLATTER

David Gallois VA3DGA

A power selector switch project

This project was submitted to The Communicator by Mike VE3MKX with the author's permission.

This is a useful switch to select between your 12v DC power supply, battery and supply, or battery only. The charger keeps the battery topped up. The cam switch is available on Amazon.
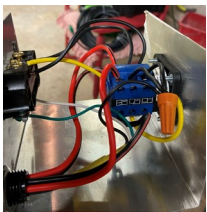
0,1,2,3 Cam switch / Duplex Outlet / Cable Clamp / Marrette / Project Box
Black is HOT
White is Neutral
Green is Ground
Yellow is a Jumper (to make 1 & 2 hot at the same time).

	0	1	2	3
1–2	×			
3–4	×			
5–6			×	
7–8			×	
9–10				×
11–12				×

0 Off
1 Transformer only
2 Trans AND Charger
3 Battery only
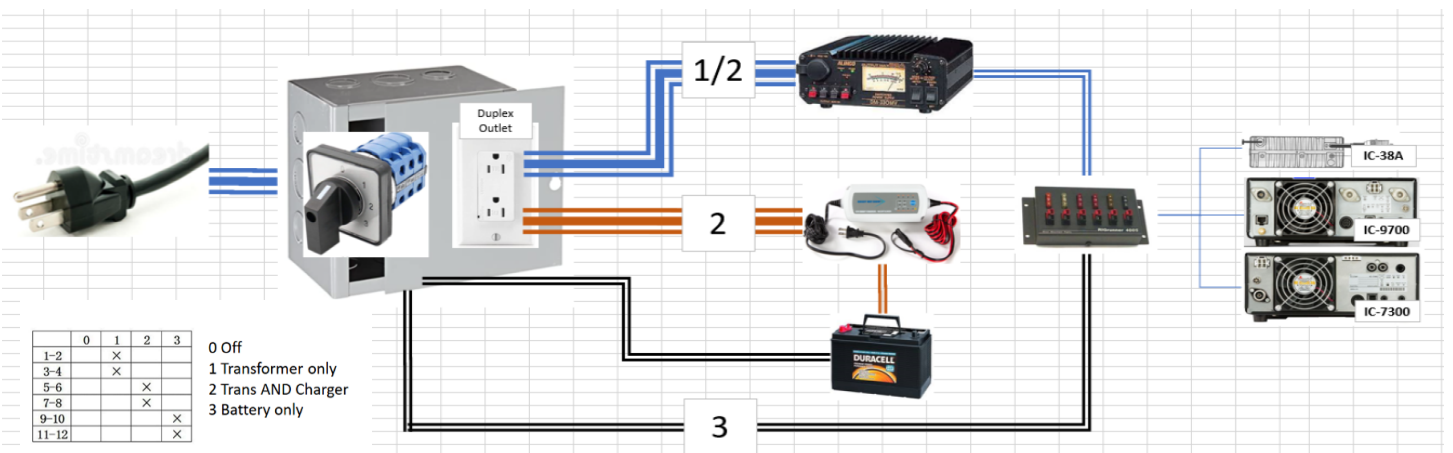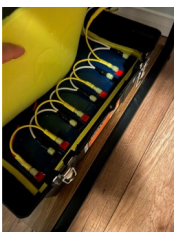
Also Radio…

Ben MacIntyre

Agent Sonya

The woman they knew as Mrs Burton was really Colonel Ursula Kuczynski of the Red Army (pictured), a dedicated communist, a decorated Soviet military-intelligence officer and a highly trained spy

She was a highly trained spy who had conducted espionage operations in China, Poland and Switzerland before coming to Britain on Moscow's orders.

Her scones were the envy of the British Oxfordshire hamlet of Great Rollright, where the friendly woman known as Mrs Burton lived in a stone farmhouse. In her late 30s, she moved there with her three children and husband Len just after the end of World War II. She had a faint foreign accent but the locals took no notice and she soon became a stalwart of village life.

They were unaware of the massive secret she was hiding — one that even now, 75 years later, had people reeling in amazement at the audacity and ingenuity it involved on her part.

Ben Macintyre's book Agent Sonya tells the story of Soviet spy Colonel Ursula Kuczynski and the unforgivable treachery. Because, beneath the mask of respectability, Mrs Burton was really Colonel Ursula Kuczynski of the Red Army — aka Agent Sonya, a dedicated communist, decorated Soviet intelligence officer and highly trained spy who had conducted espionage operations in China, Poland and Switzerland before coming to Britain on Moscow's orders.

In Oxfordshire, she was very much on active duty. In the privy was a radio transmitter tuned to Soviet intelligence headquarters.

Best-selling biographer Ben Macintyre reveals all this in the first 400 words of his book, Agent Sonya, confident of our amazed attention as he then spins gloriously through one of the most extraordinary private lives of the 20th century.

Ursula, who died in 2000 aged 93, was a unique personification of the political and ideological conflicts of that turbulent century, from Kaiser Wilhelm to Vladimir Putin. Drawing on her own confessional autobiography, Macintyre paints a vivid picture of dedication, daring, passion, lust and, above all, subterfuge. For all her misguided convictions about the Soviet Union, hers was a life lived to the full, and more.

Growing up in a family of Left-wing Jewish intellectuals in Berlin, Ursula committed herself to communism as

a teenager, joining the party (whose paramilitary wing taught her to shoot) and being clubbed to the ground by police at a banned May Day demonstration.

She married young, to Rudi, an architect, who took a job in Shanghai. It was there that Ursula was recruited and seduced by a Soviet agent, Richard Sorge, a charismatic womaniser later described by Bond author Ian Fleming as 'the most formidable spy in history'. Via his bed she was drawn into his espionage ring, while still with her unsuspecting husband and their newborn son.

Her double life had begun.

As for her motivation, Macintyre concludes she became a spy on ideological grounds, but also for herself, driven as she was by 'an extraordinary combination of ambition, romance and adventure'. During one of many lengthy separations from Rudi, a husband so besotted he tolerated her infidelities, she went to Moscow for espionage training.

Radio transmission became her speciality, but she was also taught how to blow up railway tracks. Moving to China, she was paired with a spy named Johann Patra. There her task was to supply communist insurgents: she would smuggle radio parts inside her little boy's teddy bear.

Messages she couldn't put into code she would leave in a hollow tree root for 'Sergei' from the Russian Embassy to pick up. She and Patra became lovers and he fathered her second child.

Her next assignment was in Poland, where she would collect reports from communist spies while pushing her new baby in a pram and then, at night, transmit them to Moscow on a radio hidden inside a gramophone. On the eve of war she was in Switzerland, planning to assassinate Hitler at his favourite Munich restaurant, when the Soviet Union and Nazi Germany signed a non-aggression pact.

Her world turned upside down with an order from Moscow: 'Cease all activities against Germany.' She was mortified — and also had a problem: she was in Switzerland on a German passport. She fled from England to East Berlin in 1950 when Fuchs was arrested and confessed to spying for the Communist regime In danger of being sent back to Germany and certain death at Nazi hands, she quickly divorced her husband and married a fellow spy, a working-class Englishman who'd fought in Spain. It was a marriage of convenience but she soon fell for handsome Len Burton, at 25 seven years younger. Her third child was born. Despite the misgivings of MI5 in London, which saw her as a potential

security threat, her British passport was issued and, in 1941, she settled outside Oxford.

When Hitler invaded Russia, she resumed working for Moscow and was promoted to colonel. Effortlessly she switched between her two identities. As Mrs Burton, she had a settled home, contented children and friendly neighbours. As Agent Sonya, she had a camera for producing microdots, a network of sub-agents and a radio transmitter in he bedroom cupboard.

She would meet nuclear physicist Klaus Fuchs in the Oxfordshire countryside where he would hand over technical documents, drawings and blueprints, for her to copy and transmit. Fuchs was a leading member of the so-called 'Tubes Alloy' project, Britain's equivalent of America's Manhattan Project. Fuchs, a German communist fugitive, believed it wrong for Britain and the U.S. not to share this world-changing nuclear knowledge with the Soviet Union, a supposed ally: passing over secrets was redressing an unfairness.

She proved remarkably adept at living a lie. Three times a week, while the children slept, she would transmit reports to Moscow from the privy, often about Britain's atomic bomb research. Those she couldn't put into code she would leave in a hollow tree root for 'Sergei' from the Russian Embassy to pick up.

For Ursula, it was the spy's perfect cornucopia, the richest haul of secrets, much of it going directly onto Stalin's desk. Thanks to her and Fuchs, he would soon have his own nuclear bomb. Better still, he could keep the West, which planned to use theirs as a threat to keep him in check,

© Picture Alliance / Topfoto

guessing until Russia's first nuclear test in 1949. Here was the key that determined how the East-West power struggle would work out. And she was its sine qua non.

Miraculously she was never caught, despite being watched, having her post intercepted and telephone tapped. She even bluffed her way through MI5 interviews.

And when Fuchs was arrested and confessed to spying for the Soviet Union she was one jump ahead, fleeing the country with her children for East Berlin the day before his trial. Once behind the safety of the Iron Curtain, she gave up the espionage game.

Fuchs was jailed for 14 years in 1950.

Twenty years was enough, she told her Soviet bosses and, as a mark of her achievements, Ursula Burton was allowed to come in from the cold.

Her loyalty to the lost cause of communism never wavered — nor did her devotion to her children which, surprisingly given their disrupted childhoods, they returned.

But that's another story.

'She lived several whole lives in one very long one,' Macintyre concludes, 'this woman of multiple names, numerous roles and many disguises'.

~ Available at [Amazon books](#)

Also Radio…

Adam Fabio

The bug

The theremin originally known as the etherphone, thereminophone or thereminvox is an electronic musical instrument controlled without physical contact by the thereminist (performer). It is named after its inventor, Leon Theremin (born Lev Sergeyevich Termen), who patented the device in 1928.

The instrument's controlling section usually consists of two metal antennas that sense the relative position of the thereminist's hands and control oscillators for frequency with one hand, and amplitude (volume) with the other. The electric signals from the theremin are amplified and sent to a loudspeaker.

The sound of the instrument is often associated with eerie situations. Thus, the theremin has been used in movie soundtracks. But Theremin is known for another invention… a highly successful listening device placed in a seal hung in the US embassy in Moscow.

The creation of Léon Theremin's bug can be attributed to the success of his instrument. Theremin, the man, was a scientist by training. Theremin was an aspiring physicist. World War One saw him enter military engineering school for radio operations. After the war, he worked on experiments as diverse as a device to measure the dielectric constant of gases and hypnosis. Léon even did work in Ivan Pavlov's lab.

In 1920, while working on his dielectric measurement device, Theremin noticed that an audio oscillator changed frequency when he moved his hand near the circuit. The Theremin was born and, in November of 1920 Léon gave his first public concert with the instrument. He began touring with it in the late 1920's and in 1928, he brought the Theremin to the United States. He set up a lab in New York and worked with RCA to produce the instrument.

In 1938, with the Nazi threat growing stronger, Theremin returned to Russia. He expected to send for his wife a few weeks after his arrival. Unfortunately, that wasn't to be the case. Léon and Lavinia never saw each other again.

Upon arrival in Leningrad, Theremin was imprisoned, suspected of crimes against the state. He found himself working
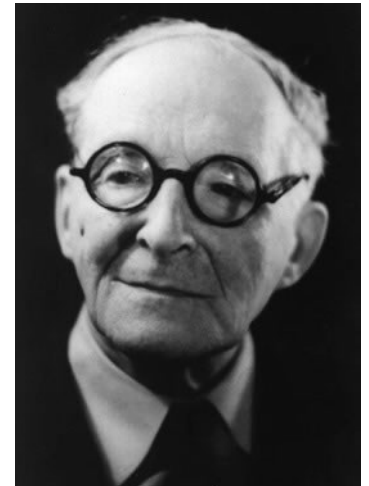
[above and below] Theremin

Never heard a theremin play? Check out https://www.youtube.com/watch?v=K6KbEnGnymk

in a laboratory for the state department. This was not an unusual situation. Aircraft designer Andrei Tupolev and missile designer Sergei Korolyov were two of many others who faced a similar fate.

It was during this time as a prisoner that Theremin designed his listening device.

Placing the bug

The European war was over, and the nuclear bombing of Hiroshima was only two days away. A group of 10 to 15 year old boys from the Young Pioneer Organization of the Soviet Union arrived at the US embassy carrying a hand carved great seal of the United States of America. They presented the seal to W. Averell Harriman, the US ambassador to the Soviet Union. The seal was given as a gesture of friendship between the US and Soviet Union. Harriman hung the plaque in the study of his residence, Spaso House. Unbeknownst to Harriman, the seal contained Theremin's sophisticated listening device. The device, later known as "The Thing", would not be discovered until 1952 — roughly seven years later.

Discovered!

The discovery of the great seal listening device is an interesting one. British broadcasters reported hearing American voices on the their radios in the vicinity of the American embassy. No Americans were transmitting though, which meant there had to be a bug. Numerous sweeps were performed, all of which turned up nothing. Joseph Bezjian had a hunch though. He stayed at the embassy pretending to be a house guest. His equipment was shipped in separately, disguised from Russian eyes. Powering up his equipment, Bezjian began a sweep of the building. With his receiver tuned to 1.6 GHz, he heard the bug's audio, and quickly isolated the source in the great seal. Close inspection of the carving found it had been hollowed out, and a strange device placed behind the eagle's beak. No batteries or wires were evident, and the device was not powered through the nail which had been hanging the seal. Bezjian removed the device from the great seal and was so cautious the he slept with it under his pillow that night for safe keeping. The next day he sent it back to Washington for analysis.

Theory of Operation

The great seal bug quickly became known as "The Thing". It was a passive resonant cavity device, containing no batteries or other power source. It consisted of an antenna and a small cylinder. One side of the cylinder was solid. The other side

consisted of a very thin diaphragm, obviously some sort of microphone. Passive resonant cavities had been explored before, both in the US and abroad, but this is the first time we know of that was used for clandestine purposes. In his book Spycatcher, British operative Peter Wright claims that the US came to him for help determining how the device worked. However he is not mentioned in other accounts of Theremin's bug.

Regardless of who figured out the device, the method of operation is devilishly simple. The Soviets would sit outside the embassy, either in another building or in a van. From this remote location they would aim a radio transmitter at the great seal. The bug inside would receive this signal and transmit voices in the room on a second, higher frequency. It did all of this with no standard internal components. No resistors, no tubes, no traditional capacitors, or the like. There were capacitive properties to the mechanism. For instance, a capacitor is formed between the diaphragm and the tuning peg of the device.

Receive tuning (if it can be called such) was achieved by the precisely cut antenna. The RF carrier transmitted by the Russians would be received at the antenna and travel into the body of the device which was a resonant cavity. That resonant chamber was capacitively coupled to the thin conductive diaphragm which formed the microphone.

Sound waves would cause the diaphragm to move, which would vary the capacitance between the body and diaphragm, forming a condenser microphone. It is important to note that the bug didn't transmit and receive on the same frequency. According to Peter Wright, the excitation frequency used by the Russians was actually 800 MHz. The cavity would resonate at a multiple of this base frequency, producing the 1.6 GHz output seen by Bezjian.

While bugs of this type have fallen out of favor, the idea of "illuminating" a device with an external transmitter lives on. [Check out [Elliot's] description of the RageMaster bug from the ANT catalog here](). Resonant cavities have found common use as well. Every microwave oven or radar system with a magnetron uses one.

The great seal bug disappeared for a number of years. The Russians knew we had caught them, and moved on to other espionage devices. It finally reappeared in 1960 at the United Nations. During the Gary Powers U2 incident, Ambassador Henry Cabot Lodge Jr. presented the seal as concrete proof that Russia was spying on the Americans.

A replica of the great seal is on display at the NSA National Cryptologic Museum.

Afterward

Léon Theremin was released from his camp in 1947. He married Maria Guschina. This time the state did not intervene, and the pair had two children. In 1964, Theremin became a professor at the Moscow Conservatory. He lost his job after an article published in the New York times was read by the assistant director of the conservatory. The assistant director stated "Electricity is not good for music; electricity is to be used for electrocution" before throwing Theremin and his instruments out of the establishment. Through the 1970's, Theremin worked in Moscow University's Department of Acoustics. While there he built a polyphonic version of his instrument. Stored in a back room, the instrument was looted for parts by students and professors. Meanwhile, Theremin's instrument was returning to vogue in the western world. Electronic music was hot, spawned by instruments such as the MiniMoog, and the Arp Kitten.

Theremin finally visited the United States in 1992, reuniting with old friends. He performed in a concert at Stanford and was interviewed by Robert Moog, who considered him to be a hero of the electronic music world. After filling in many of the blanks of his story, Theremin asked Moog and co-interviewer Olivia Mattis to be responsible when writing up their story. "But if you write that I have said something; against the Soviet government and that I have said that it is better to work elsewhere, then I shall have difficulties back home [ironic laughter]". Even then at the twilight of his life, with the fall of the Soviet Union underway, Theremin was still looking over his shoulder, worried about what the government might do if he offended them.

Theremin passed away in 1993. The unlikely master of this spy-gadget was 97 years old.

~ *Hackaday*

https://hackaday.com/2015/12/08/theremins-bug/

A passive transmitter
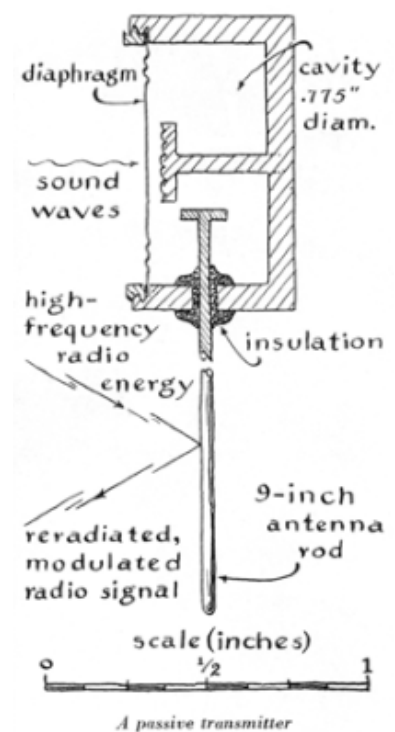
To Draw Youth To The Hobby…

Scouts taking Ham radio training

…the Scouts were keen enough to fulfill nearly all requirements for obtaining their merit badge

Assistant scout leaders David Godell KG5VLY and Scott deMasi KC5NKW taught their troop amateur radio.

The Net News Ledger reports:

If you have ever watched the havoc that a hurricane can cause, you won't be surprised to learn about washed away bridges, flooded roads, power outs, and washed away cellphone towers. One thing that pandemic and natural disasters like these have taught us is that often we aren't prepared for emergencies and lack the right kind of precautionary measures and survival tools/ gadgets. To deal with the frustration of power outs and with no way to reach family and friends and check-in on them if they were safe, deMasi realized that something needed to be done.

During the initial meeting, the Scouts were presented with study materials and useful links to familiarize them with these awesome radio-communication devices. The Scouts were also taken to test sites to enable them to become licensed ham radio operators.

To raise their troop's interest and participation level, deMasi and Godell collaborated with their local radio club, and a one-day class was organized for the troop at the Texas Emergency Amateur Communicators radio station. Subsequently, by ending with the mandatory licensing exam, the Scouts were keen enough to fulfill nearly all requirements for obtaining their merit badge.

Both Scoutmasters bought them handheld radios with the right frequencies to enable their troops to continue using and practicing their new skills. Once the seed of interest was planted into the Scouts' minds, there was no going back.

Read the full story at:
http://www.netnewsledger.com/2021/02/05/when-scoutmasters-got-trained-to-be-amateur-radio-operators/

~ Southgate Amateur Radio

Both Scouts and Guides have been welcome visitors to the SARC-SEPAR OTC . We have participated in Jamboree On The Air (JOTA) for several years, and we welcome new opportunities post-COVID.

Measurements With The NanoVNA

Arie Kleingeld PA3A

Part 2—Measurement of (high) impedances

As a result of positive feedback arising from Arie's article in the last issue, I contacted him and he has kindly offered to share his entire Nano VNA series with The Communicator. Here is Part 1—Ed.

Preface

There are many discussions about sheath current chokes (also called common mode chokes). They should have a high impedance (5 kohms or more). In this article, I test whether you can measure such high impedances sufficiently well with the nanoVNA. I can already tell you that it stands its ground. In episode 3 we will then measure different chokes from practice so that you can test your own chokes with the nanoVNA. But first a description of the measuring method that can be used and the results of the test measurements.

Brief explanation of measuring with the nanoVNA

The nanoVNA measures S11 and S21

S11: S11 is a measure of the reflection from port 1 back to port 1. Hence the name S11. This is also called the reflection coefficient. With this we calculate, for example, the SWR known to us or the other (more sexy) expression of reflection, the "return loss" in dB. Within the domain of the S11 you can also calculate which impedance appears on the measuring port CH0 of the nanoVNA. This is expressed in R + jX, so resistance plus reactance. The program nanoSAVER has that and then puts it in an easily readable graph.

S21: S21 indicates how much signal is coming into port 2 (CH1) from port 1 (CH0), hence the name S21. With this we can e.g. measure the transmission characteristic of a filter. Not only the amplitude of the transmitted signal is measured and thus the degree of damping in dB is determined, but also the phase so that capacitive or inductive behavior becomes visible.

Export measurements in a file

NanoSAVER can export the measurement values of a sweep to a file so that you can save or import them into another program. These are the S1P file for 1 port (in our case values of S11) and the S2P file for 2 ports (in our case for the values of S21, among others). We will actually use and process the S2P export later with Excel.

The file format that nanoSAVER uses is fixed and contains a number of columns as follows: S1P file (3 col): Stim (ulus) Re (S11) Im (S11)
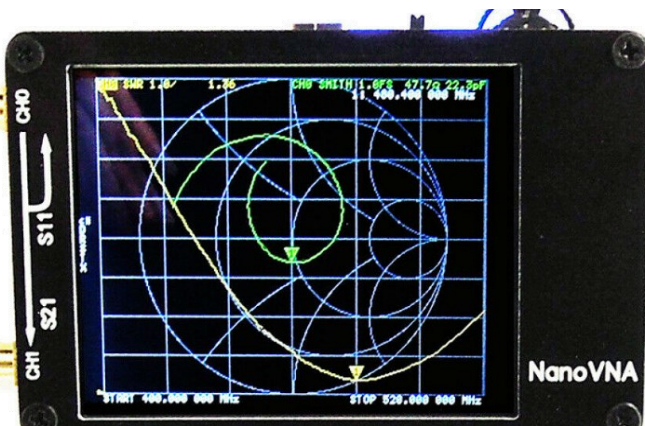
S2P file (9 col): Stim (ulus) Re (S11) Im (S11) Re (S21) Im (S21) Re (S12) Im (S12) Re (S22) Im (S22)

Stimulus is the frequency used and further we see the different transmissions. Each time there is a split into "Re" and "Im". Here "Re" again stands for the real part and "Im" for the imaginary part so that we not only know the amplitude of the measured signals, but also the angle of rotation. The nanoVNA does not measure S12 and S22, because it requires a signal source in port 2 (CH1), which is not the case. NanoSAVER will therefore export a zero in the S2P file in those places. Imported into Excel it looks like this:

	A	B	C	D	E	F	G	H	I
1	#	Hz	S	RI	R	50			
2	500000	0,317827	-5,33E-05	0,680673	-0,00019	0	0	0	0
3	795000	0,317765	0,000451	0,680574	-0,0002	0	0	0	0
4	1090000	0,317748	0,000244	0,680465	-0,00021	0	0	0	0

Please note: the first line does not give the header names of the columns but tells something about the file:

• Hz: frequency is expressed in Hz

• S: These are S parameters

• RI: file is in Re (Sxx) Im (Sxx) format so split into real and imaginary part

• 50: characteristic (measurement) impedance is 50 ohms.

For the numbers below, the format mentioned earlier is valid: frequency (Hz), Re (S11), Im (S11), Re (S21), Im (S21) and the aforementioned four zeros, since S12 and S22 are not measured.

Some programs generate the total value of Sxx, expressed as | Sxx |, plus the angular displacement in radians or degrees associated with it. This can cause confusion if you want to do something with this file. So if you use a program other than nanoSAVER to export the values, pay attention to what's in the file.

Measure the value of a number of resistors by means of S11:

To test the performance of the nanoVNA we will measure 4 resistors: 47, 470, 4700 and 10,000 ohms over a range from 500 kHz to 30 MHz. Once we understand how the nanoVNA performs (or fails), we can later estimate the value of the measurements on an HF sheath current choke. The intention is to measure practically. So measuring is not the goal here, it is only a means to find out something.

All measurements below were made with nanoVNA type H3.2 linked to the nanoSAVER program. The connected resistor in the diagram below has impedance Z, consisting of R + jX.
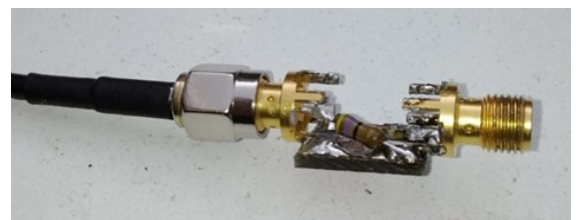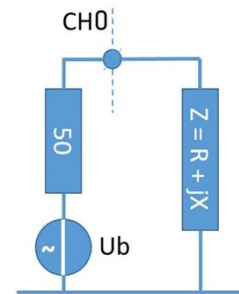
First, a 47 ohm resistor is connected to CH0 and the S11 is measured.
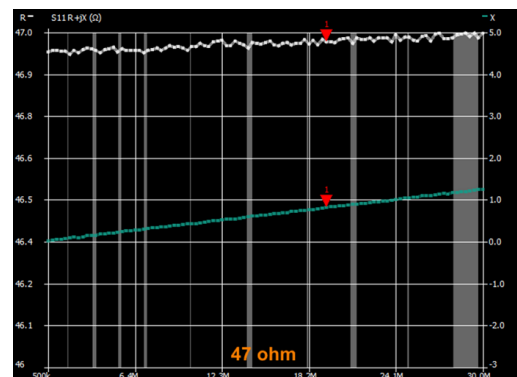
NanoSAVER reports from the nanoVNA, among other things, an S11 graph for R + jX. We see that the resistance value is almost 47 ohms (white line, left scale) and also has some inductive reactance (the green line with the right scale). We see that the X goes up almost linearly to about 1 ohm and that's not much. This corresponds to a coil value of approximately 5 nH. This is in line with expectations when you see how it is measured. There is a small loop in the signal path *[see photo]*.

The other resistances 470, 4k7 and 10k have also been measured in this way with the following result curves for S11 R + jX.
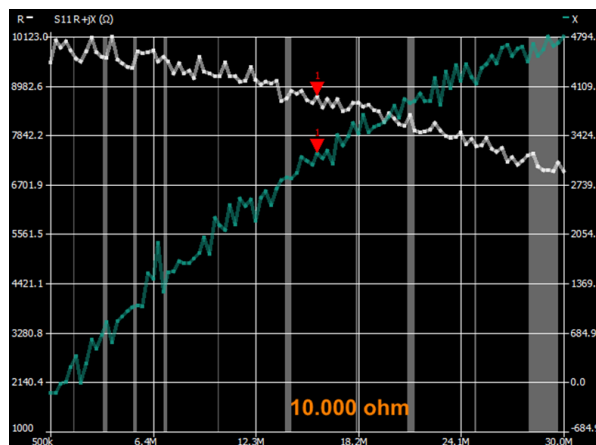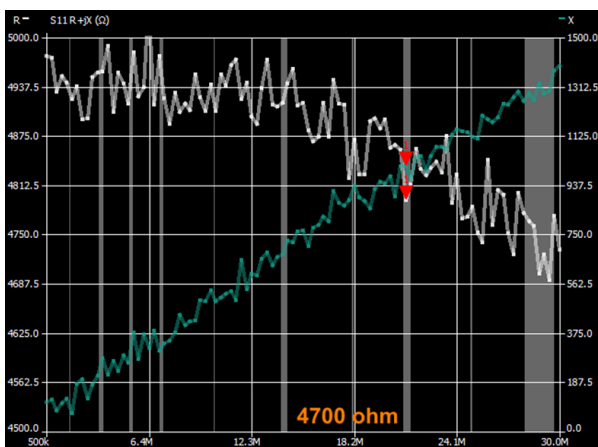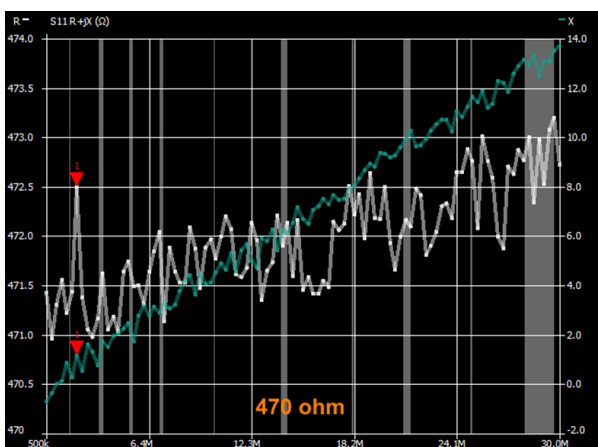
Overview of measured values by means of S11, read from the graphs.

Resistance	S11 report R + jX (see graphs above)	Series L value
47 ohm	R: 47 X: 0 − 1	5 nH
470 ohm	R: 470 X: 0 - 14	70 nH
4700 ohm	R: 4k9 − 4k7 X: 0 − 1k4	8 µH
10,000 ohm	R: 10k − 7k X: 0 − 5k	about 30 µH

Observation: 47 and 470 ohms are well measured. For 4k7 and 10k we see some deviations and unexpectedly high inductance values. The measurement of high resistance values also appears to be very sensitive. Influences include recent calibration of the nanoVNA, heating of the nanoVNA and is a connector tight enough or not. Please note, we are in a ham shack so we are doing "best effort" here.

In summary: measuring 47 ohms and 470 ohms is not a problem, but if we end up in kohms, the combination nano (VNA + SAVER) gives a less reliable measurement via S11 R + jX.

Measure these resistances again based on the S21

We will now see how well the measurement of the resistors goes by hanging them between the two nanoVNA ports. This in itself is not an unknown method. G3TXQ wrote about this before (see reference) testing a number of chokes with different core materials. However, he uses a more expensive VNA.
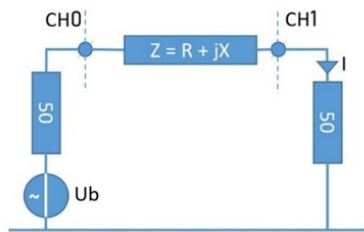
We start with 47 ohms and see the following graphs in nanoSAVER: S21 Gain and S21 Phase.

Gain

Phase
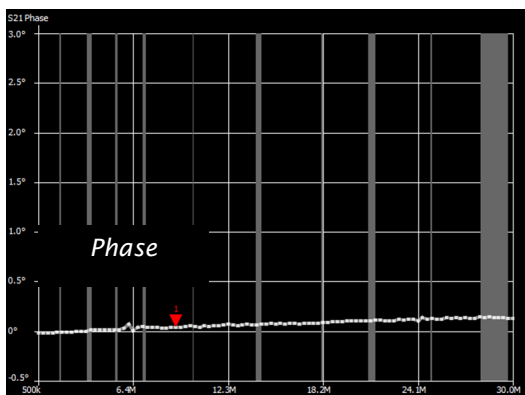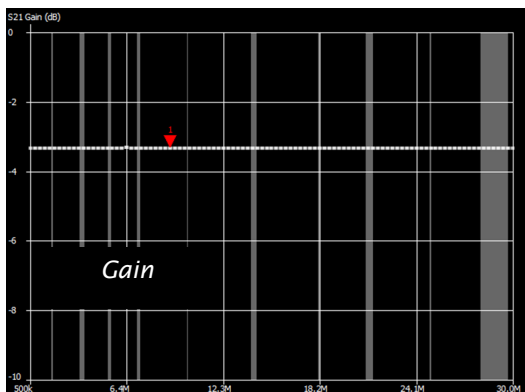
There appears to be a constant and expected damping of 3.3 dB (calculation see box 1) and a slight increasing angular displacement positive, which indicates slightly capacitive behavior that increases with frequency. This means that there must be a (parasitic) capacitor parallel to the resistor. We see that with the other three resistors also, the expected damping (e.g. 40dB at the 10k resistor) with increasing phase angle.

Unfortunately, nanoSAVER does not have an algorithm that converts the S21 values to a parallel connection of Rp and jXp, nor to a series connection of Rs + jXs.

The solution is a manual conversion of the S21 values from the S2P file. The formulas from the previously quoted article of G3TXQ do not work with the nanoSAVER export, so new formulas have been derived. Box 2, for example, shows the outcome for conversion from S21 to series connection Rs + jXs. Box 3 shows the conversion of series values Rs and Xs to parallel values Rp and Xp. You can get the derivation of it if you email me, but it is only a handwritten sheet of paper.

Converting the S21 file for the measurement of 47 ohms yields the following picture (Xp has already been converted to capacitance in pF):
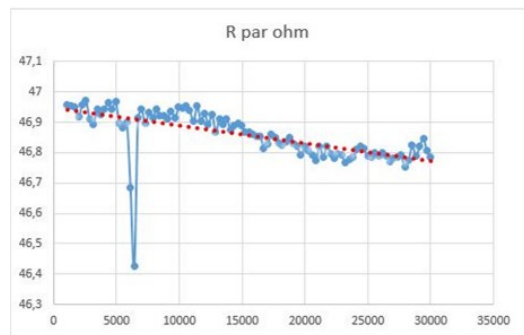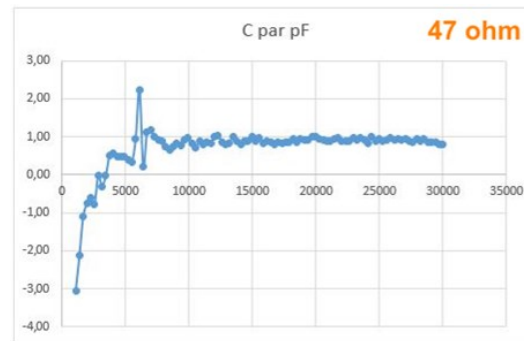
A few points are striking:

There are a few deviating values around 6 MHz. This is a minor glitch in the nanoVNA. At a low frequency, the capacitance is negative. This indicates that some inductance is still seen before the parallel C takes over in the current. For the big picture, it doesn't matter. You can actually measure that 47 ohm faster with the S11 R + jX.

For the set of 470, 4k7 and 10k resistors, we immediately convert the damping to Rp and jXp with the conversion from jXp to a capacitance value. All in all, we get a completely different picture with the S21 measurement, compared to the previous S11 measurement.

C par pF — 470 ohm

C par pF — 10.000 ohm

R par ohm

R par ohm
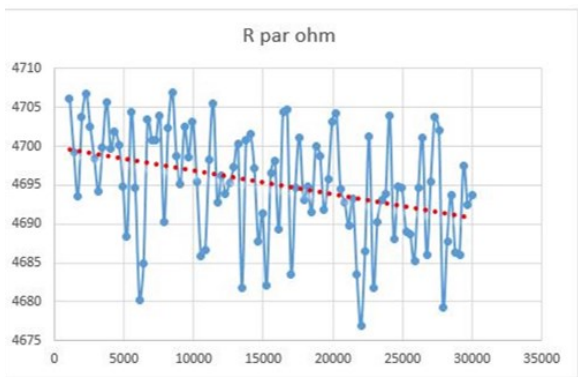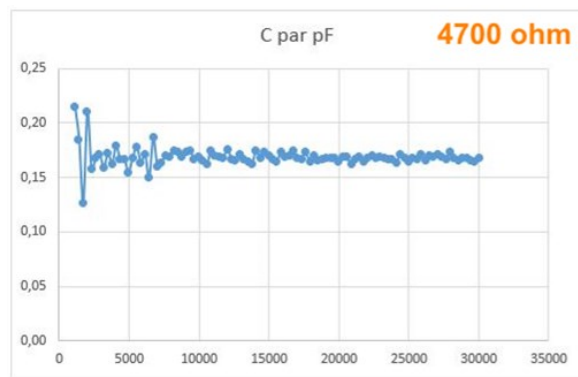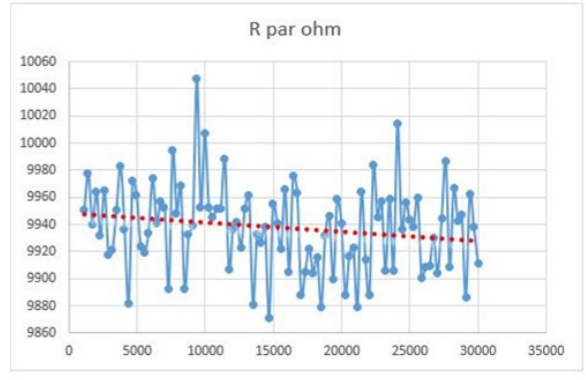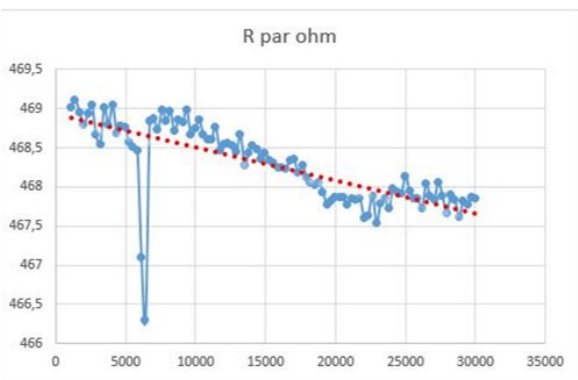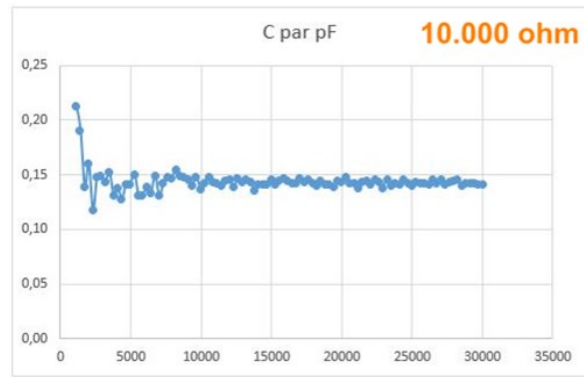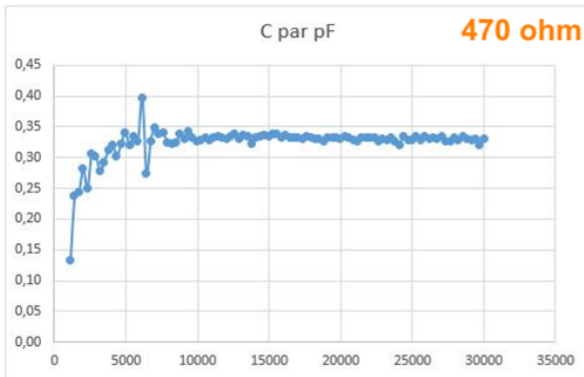
C par pF — 4700 ohm

Overview of measured values by means of S21, read from the above graphs.

Resistance	S21 report R→p + jXp	From Xp: CValue
47 ohm	Rp: 46.9 ± 0.1	1 pF
470 ohm	Rp: 468 ± 1	0.33 pF
4700 ohm	Rp: 4,69 k ± 0.01 k	0.17 pF
10,000 ohm	Rp: 9.94 k ± 0.05 k	0.14 pF

These are actually incredibly good and stable outcomes. Considering that the nanoVNA 3.2 doesn't exactly have a 50 ohm input resistance on CH1. Apparently the calibration is doing well and PA3A might also be lucky with its measurements

Conclusion

With the help of the nanoVNA and some calculations you can measure resistances with fairly high values using the S21 method. An unambiguous calibration is required.

R par ohm

Box 1.

We could have predicted the 3.3 dB. In case of a short circuit between the ports, the current (see schedule):

$$I_0 = \frac{Ub}{100}$$

With the resistance of 47 ohm it is:

$$I_{47} = \frac{Ub}{147}$$

The ratio of the currents is then

$$\frac{I_{47}}{I_0} = \frac{100}{147}$$

With that, the gain is:

$$Gain = 20 * \log\left(\frac{100}{147}\right) = -3,3 \text{ dB}$$

Box 2

Convert S21 (damping D) to Rs+jXs

$$Re(S21) = Dr \ en \ Im(S21) = Di$$

$$Rs = \frac{100\left(Dr - (Di^2 + Dr^2)\right)}{Di^2 + Dr^2}$$

$$Xs = \frac{-100\,Di}{Dr^2 + Di^2}$$

In Excel, these formulas are easy to use.

Box 3

Converting series switching from Rs and Xs to a parallel circuit consisting of Rp and Xp.

$$Rp = \frac{Xs^2}{Rs} + Rs$$

$$Xp = \frac{Rs^2}{Xs} + Xs$$

In part 3 of this series we will measure Common Mode Chokes (mantle current chokes) from practice. It is expected that reliable results can be achieved with the S21 damping measurement, using conversion to Rs + jXs. We will see it in a future Communicator installment.

73,

~ Arie Kleingeld PA3A
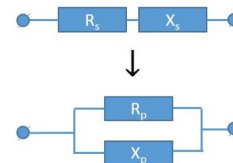
Reference: Amateur Radio (G3TXQ) - Common-mode chokes: http://www.karinya.net/g3txq/chokes/#measurement

"On FT8, no one knows you're a dog."

Ham Hardware

Al Duncan VE3RRD

The Cheap and Ugly Dual Band Whip

Old analog cellular (850 MHz) magnetic mount 3db gain antennas can now be obtained very cheaply from various sources in the Barrie and Toronto area. Try one of the cellular dealers who do in-car installations of cellular phones such as the Bell World store and the Rogers Wireless store (both located in the Cedar Point area in Barrie). Other places in Barrie to watch for these antennas (as well as other goodies) is Barrie Metals and Princess Auto.

The cellular antennas I obtained were made by "The Antenna Company" and did not work on any ham bands before modification. By using a pair of vise-grips and slowly working my way around each loop by repeatedly snapping them on, starting from the bottom of the coil; I was able to straighten the heavy steel wire and thus lengthen the antenna so that it was resonant on the 2M band. Note that a ¼ wavelength antenna for 2M will also work on the 440 MHz ham band as well – making this a dual band antenna!

See the VSWR plots on the next page – this antenna covers a really wide frequency range. As shown on the VSWR plots, the entire 2M band from 144 MHz to 148 MHz is covered with a better than 1.5:1 VSWR. On the UHF side, the 1.5:1 VSWR frequency range is from 429 to 453 MHz which covers most repeater frequencies (usually in the 438 to 450 MHz range).

You will require some means of measuring the VSWR as you straighten out the coil loops. Although a professional analyzer, like the one I used, makes it easy; a VSWR meter or power meter that covers the 2M and 440 ham bands can also be used. Place the antenna on the roof of your car each time you want to check your progress and measure the reflected power when you key the transmitter. Probably the 440 MHz band is best to measure this way. After getting a low reflected power reading from at least 438 to 450 MHz, check the 2M band to make sure it looks good from at least 144 to 148 MHz.

In the picture you can see that this antenna isn't exactly commercial quality in appearance!! Some of the final kinks were removed with a hammer. Also, it needs a touch-up paint job as some of the black enamel was chipped off during the "straightening process". But appearance isn't everything and it works very well (for a ¼ wave antenna).

On the left is the original unmodified cellular antenna On the right is the 2M/440 Cheap and Ugly Dual Band Whip.

VSWR
144WHIP
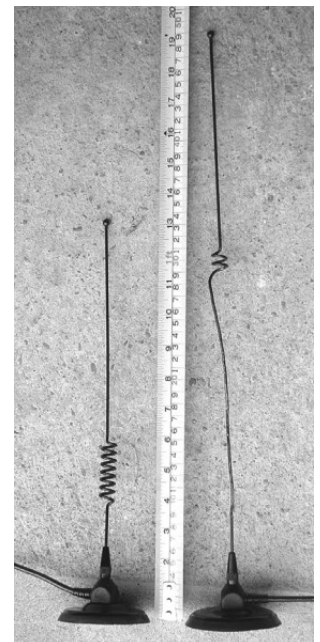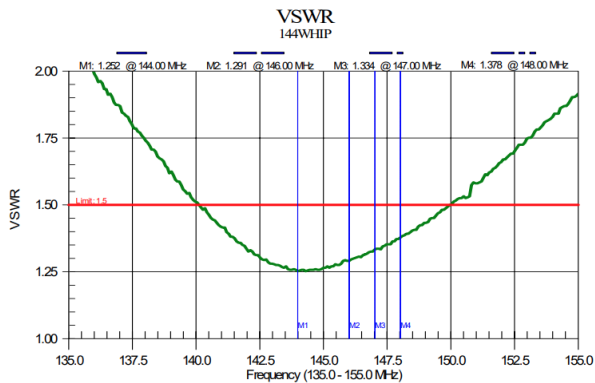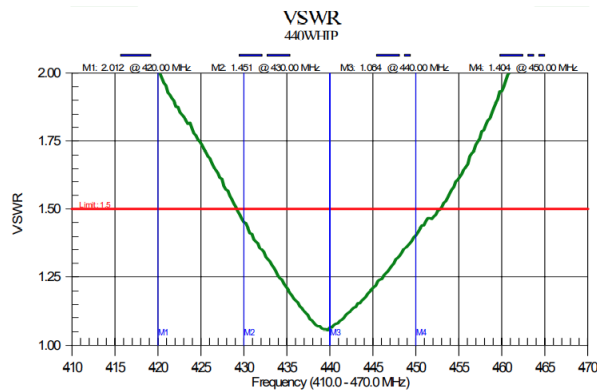
Resolution: 259
Date: 07/12/2005
Model: S331B
CAL:ON(COAX)
Time: 17:29:43
Serial #: 00001020
CW: OFF

VSWR
440WHIP

Resolution: 259
Date: 07/12/2005
Model: S331B
CAL:ON(COAX)
Time: 17:21:41
Serial #: 00001020
CW: OFF

The magnet is very strong and has been tested to 140+ Km/hr. The coax is a low loss foam RG-58 type cable which will usually have a TNC connector on it. Cut off the old connector and replace with a PL-259 or BNC as required. Adapters can be used to convert from a BNC to a SMA or Mini-UHF handheld connector for example.

Left is the VSWR plot for the 2 meter band with the 4 blue marker lines at 144, 146, 147 and 148 MHz. Below left is the plot for the 440 band with the 4 blue marker lines at 420, 430, 440 and 450 MHz. Most repeater input/output frequencies fall between 438 and 450 MHz. VSWR plots were generated with an Anritsu model S331B "Sitemaster" Handheld Antenna Analyzer.

~ Al Duncan VE3RRD
ve3rrd@rac.ca

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Just scan this QR-code with your cellphone camera or click on https://ve7sar.blogspot.com/search/label/The%20Communicator

Solder Splatter

Michael Martell N1HFX

12 Volt gel charger

Recently, a fellow amateur was looking for a gel cell charger which would first charge at a fixed rate and then later switch to a trickle charge when the cell was fully charged. After reviewing several catalogs and web sites, the MAX712 IC was discovered. This IC meets all the requirements for almost any type of battery charging system. The circuit was designed specifically for 12 volt gel cells.

When a discharged gel cell is connected, the charger goes into a fast charge mode at a fixed rate of 400 ma. After the chip detects the voltage leveling off or when 4 1/2 hours has elapsed. (which ever happens first.) the fast charge will stop. After the fast charge has ended, the IC goes into a trickle charge rate of about 50 ma. This trickle charge continues until 13.8 volts is reached which will stop all charging current since the cell is now fully charged. If the cell voltage should drop for any reason, either a fast charge or trickle charge (IC will detect what is needed) will start again.

When constructing this circuit, be sure to attach a small heat sink to Q1. Apply a DC (partially filtered) voltage of at least 15.3 volts. The voltage must never go below this level even under load conditions. Many of the DC wall transformers available will work just fine as long as they meet the minimum voltage requirement. The input voltage can be as high as 24 volts. If the input voltage must be in the 30 volt range, increase R1 to about 820 ohms.

The output voltage must be aligned prior to use. Disconnect the battery from the circuit and apply power. Connect a digital volt meter or other accurate volt meter to pin 2 (positive lead) and to pin 12 (negative lead). Adjust R7 until exactly 13.8 volts is read.

Because this circuit will not overcharge a gel cell, the battery can be connected indefinitely. This circuit is designed primarily as a 12v backup system and can be connected to the load provided the device to be powered only draws current during power line interruptions. Use a diode from the battery to load if needed. This circuit makes an excellent battery backup to an amateur transceiver.

~ N1HFX

IC1 MAX712 Battery Fast-Charge Controller IC
R1 680 ohm 1/2 watt resistor
R2 150 ohm resistor
R3 68K resistor
R4 22K resistor
R5 62 ohm 1 watt resistor
R6 1.8K resistor
R7 10K PCB trimmer resistor
R8 470 ohm resistor
C1 1.0 microfarad tantalum capacitor
C2,C4 .01 microfarad capacitor
C3,C5 10.0 microfarad electrolytic capacitor
Q1 TIP42 PNP transistor or similar
D1 1N4001 Diode
LED1,LED2 2 volt standard LED
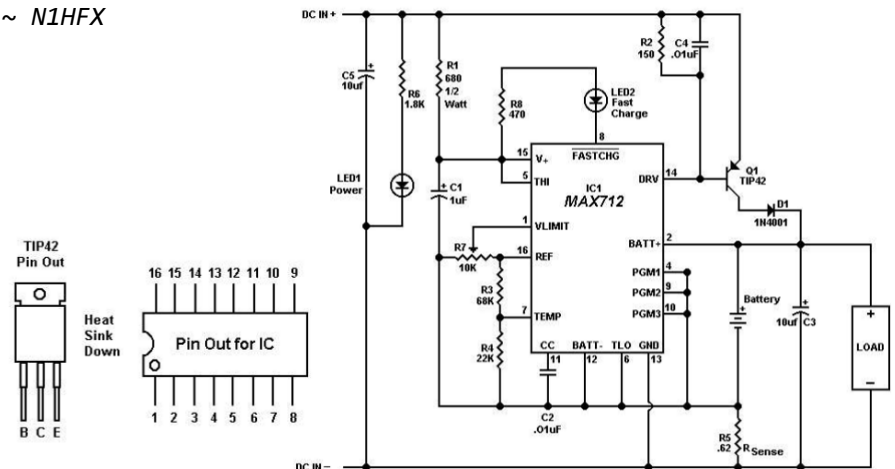
VE7SL's Radio Notebook

Steve McDonald VE7SL

Building A Neophyte Companion Transmitter

My recently constructed 1-tube Neophyte regen receiver turned out to be a much better performer than anticipated. I soon decided that it really deserved to have a matching transmitter which could be paired-up to make a complete but simple station! I visualized a cold rainy winter being spent in the cozy radio shack, challenging myself to work (and confirm) all 50 U.S. states using just the tiny regen and a matching one-tube transmitter.

The circuit I sought would require the transmitter to use a miniature tube in order to physically match the regen in appearance. After searching out various possible transmitter circuits, I finally decided on one originally published by W6NJV back in the 60s and described on W9BRD's wonderful website, Enjoying Radio. Dave's website is a treasure trove of information on regens, simple transmitters, oscillators, tube lore and ham radio nostalgia. I find myself often going to this site for building inspiration. If you haven't visited Dave's site, you're missing out ... there is much wisdom to be found within its pages!

The W6NJV 5763 crystal power oscillator described on Dave's page fit the bill perfectly and the project was soon underway.

5763s

The 5763 is a 9-pin miniature beam power tetrode power amplifier that was originally developed in the late 40's for use in low power mobile application on HF and VHF. It was commonly used in driver / multiplier stages as well as in oscillators.

It seemed that the described circuit should readily supply enough RF (7-8W) to allow some trans-continental work on both 80 and 40m CW and I liked the more modern pi-network output as it would be a refreshing change from my usual tuned link-coupled output one-tube transmitters. My initial concern was that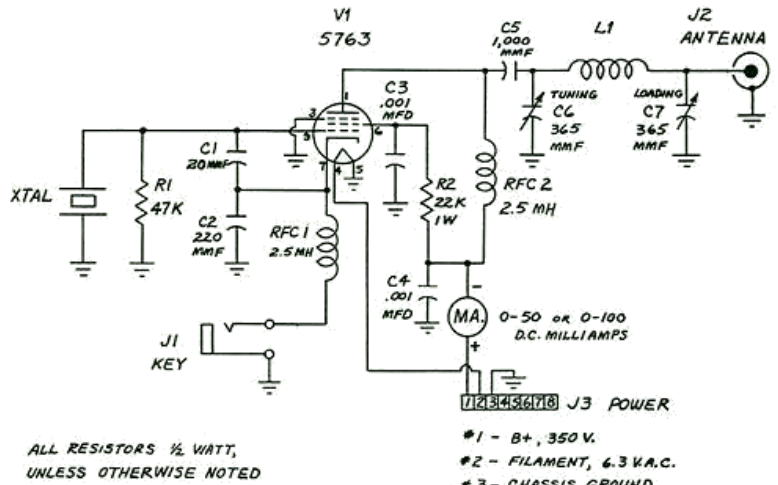 the small chassis restrictions might not provide room for the rather large loading capacitor needed in the pi- network. After quickly sketching out a parts placement plan and measuring the loading capacitor's size, it seemed like everything might just fit!
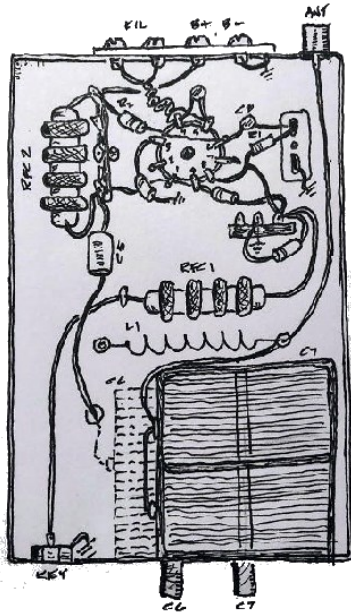
The circuit is not particularly unique and is eerily similar to several one-tube designs from the 50s and 60s such as [Ameco's famous AC-1](#). Most however, don't use a tube as ideal as the 5763. The 7-pin miniature tube is not only a good RF oscillator but its physical size would provide me the matching Neophyte appearance I was looking for.

A forage through my junk box revealed that all the necessary parts were on hand and once gathered, the circuit was breadboarded on an aluminum sheet test bed. The test bed, something that is done with all projects, allows part values to be optimized and circuits parameters to be measured before final assembly.

It performed well, keying like a dream on any crystal that was tried… even the tiny HC-49 style crystals keyed without damage but they did chirp when tested at full power… however, my only two 5763s were not in great

shape and initially provided lower output than expected. I was fortunate to find a nearby tube supplier that had listed a box of five NOS JAN5763s at a price too good to pass up.

The new ones produced even more output than expected. Was it because of their heftier military-grade construction? I would expect JAN tubes might be physically more rugged but I wonder if their operating specs are also beefed-up?

Before disassembling, a few 40m contacts were made, with clip leads and parts dangling from the vise-held plate, further testament to the 'magic' of radio!

Circuit Changes

Some small changes were made to optimize the circuit. The screen resistor (R2) was changed from 22K to 14.5K which still kept the screen current within rated value. The grid leak resistor (R1) was dropped from 47K to 6.8K following the advice found on Dave Newkirk's page re the advantages to be had with a smaller than 'usual' grid leak ... if you have an AC-1 or a clone, try this as well. The loading capacitor was increased from the specified 365pfd to 800pfd.

With 400 VDC on the plate, the transmitter produces 12-13 watts output on 40m (depending on crystal activity) into a 50 ohm load. Measured screen current is 11 ma. with a screen voltage of 260 VDC. With a DC plate input power of ~23W, the efficiency is ~ 55%. The 365pfd loading capacitor specified in the original article is not enough to properly match to a 50 ohm antenna on either 80m or 40m, a common problem with many pi-network rigs. Even with the two-sections of my dual 400pfd loading capacitor paralleled, the range was not sufficient for 80m, but fine on 40. An extra phono jack was mounted beside the antenna output jack to plug in an additional fixed (mica) capacitance of 1600pfd to increase the pi-network's matching capability when on 80m.

Coil

The coil specified in the original article was found to be too large. I cut the B & W Miniductor down to 12.6uH which covers both 80 and 40m perfectly with my 240pfd plate capacitor.
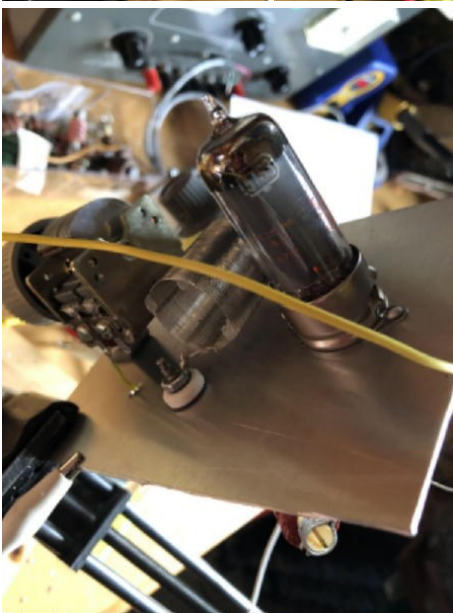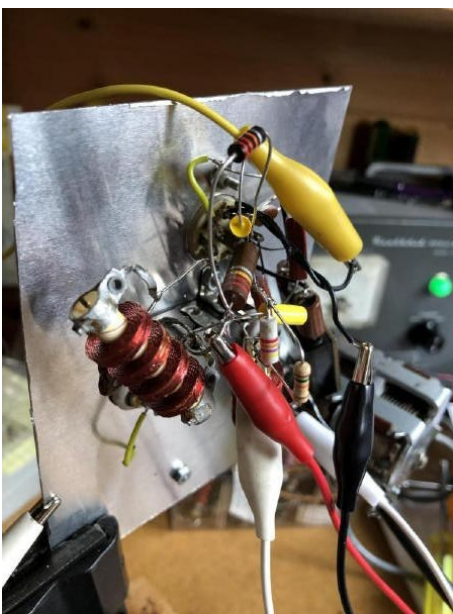
For more information about the W6JNV circuit, visit W9BRD's Celebrating the One-Tube Oscillator Transmitter page.

Like the Neophyte regen, the companion transmitter worked even better than expected, producing more power and better keying characteristics than I had originally hoped for. Several stations have commented on the nice keying and that it didn't sound like most one-tube power oscillators. The circuit seems to put little stress on precious crystals yet still produces useful output power. The two units make a compact and capable little station.

The final outcome turned-out as initially visualized and the transmitter, along with the one-tube Neophyte regen, have been in daily use on 40m. My usual frequency is 7120 kHz while 7113 kHz is secondary when QRM is not a problem. I'm using a 40m 'half-sloper' for the antenna system *[below]*.

Since the transmitter is crystal-controlled, almost all of my contacts have come from stations replying to my CQs.

After two months of near daily afternoon operation, on January 22, 2021, the little pair completed Worked All States on 40m CW. Also worked has been VE9, VE1, VY1, VE3, VE6 and VE7.

Some of the Neo-twin's cards are still arriving and are shown below. I've yet to put the duo to work on 80m but will do so shortly.

If you're looking for a simple yet effective one-tube transmitter, the 'Neophyte Companion' might be just what you need.

~ Steve VE7SL
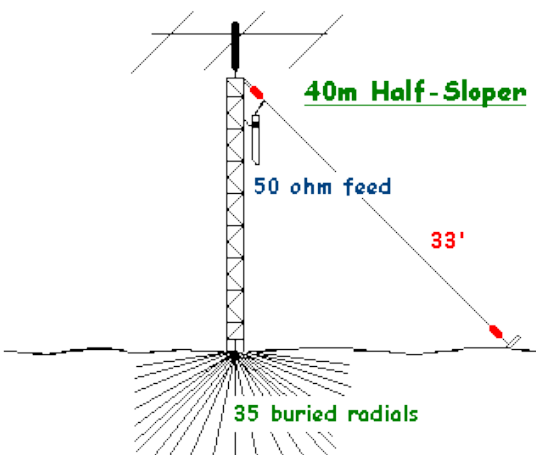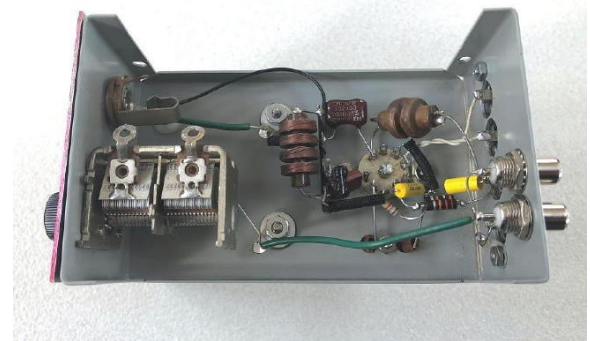
Reproduced with the author's permission, Visit The VE7SL Radio Notebook at: The VE7SL Radio Notebook (qsl.net)

and Steve's blog at" VE7SL - Steve - Amateur Radio Blog
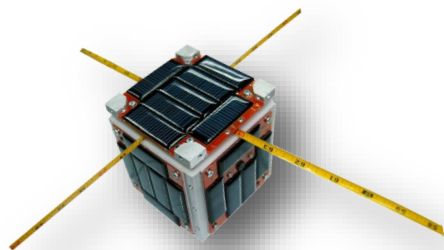
Satellite News

The Early History of EME

The first Amateur EME tests & contacts

This month it's not satellites but space… the moon in particular, as we look at some of the history behind Earth-Moon-Earth (EME) contacts.

The first reception of EME echo in 1944

The first EME history was written in 1944 when first EME echoes were received on 564 MHz by German Würzmann radar according to the article by Dr. Ing. W. Stepp.

During autumn 1943 an experimental unit was built by the Telefunken company on the Rügen island (Göhren) on the shore of Baltic sea (exact locator JO64UI). The codename of this Radar was "Würzmann", a combination of the names of "Wüerzburg" Radar with increased power (120kW in peek on 564 MHz) and the type of antenna of the "Wassermann" Radar. They used collinear arrays of the early radio-relay DMG4k "Michael", mounted on two towers at 36m height. The antenna area was 45m2, pulse duration about 1,5 uS, signal was horizontal polarized and this radar was able to change the beam just in horizontal direction.

In January 1944 the radar was inadvertently beamed towards the rising Moon while some radar measurements were on the way. Suddenly there were observed strange series of pulses just 2,5 seconds after the transmission. This effect disappeared after a short time as Moon missed the antenna lobe. This Moon echo effect was tested during next day at moonrise time with positive result.

http://www.qsl.net/dl9mcc/EME_D_V1-Dateien/neue_seite_6.htm
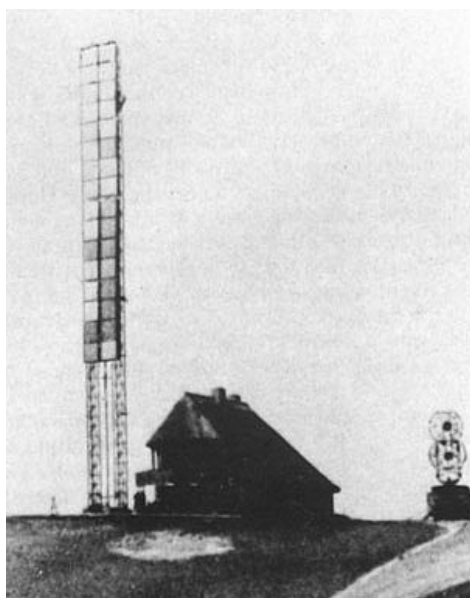
The first official EME test in 1946 - Project Diana

The first consciously created and fully documented EME signals were received in 1946 during Diana project. The whole story is well described at the web of K3KGP http://www.k3pgp.org/1946eme.htm.

There is a movie about Diana project at YouTube: https://www.youtube.com/watch?v=SqobJ_gajvQ&feature=emb_logo

The first official European EME test in 1946 - Hungary

Just one month after successful Diana EME reception - check http://www.pulispace.com/en/education/space-moon-and-the-hungarians/105-zoltan-bay-and-the-moon-radar-experiment

The military use of EME propagation during 50's - 60's

During 50's and 60's there were lot of EME tests, look at http://history.nasa.gov/SP-4217/ch2.htm By the way, did you know that EME could start World War 3 in 1960?

Check http://www.ll.mit.edu/publications/journal/pdf/vol12_no2/12_2detectsatellitiesplanets.pdf [5th Page].

The EME propagation was also used by CIA for monitoring of Soviet radars - https://www.cia.gov/library/center-for-the-study-of-intelligence/kent-csi/vol11no2/html/v11i2a05p_0001.htm

And finally..

### Lunar DX on 144 Mc! [1953]

W4AO and W3GKP Bounce 2-Meter Signals Off the Moon

QST: Listening to the wire recording from which the *[below]* graph was made, it doesn't sound like much; a one-second beep, an interval of receiver noise, then a wavering trailing bee-e-e-e-p barely discernible in the midst of the slightly musical rushing sound that is characteristic of high-selectivity reception. You wouldn't be impressed if you happened to hear it casually, but to Ross Bateman, W4AO, and Bill Smith, W3GKP, it was music of the sweetest sort; evidence that more years of thinking, figuring, building, re building and testing were not in vain. An amateur signal had been sent to the moon and back, at last!

Bouncing signals off the moon is not new, of course. It was done on 110 Mc. by the Signal Corps back in 1946 and something approximating intelligence was sent from Cedar Rapids, Iowa, to Washington, D. C., on 400 Mc. more recently, using the moon as a reflector. These were high-power projects, however, and their slim margin of success indicated that lunar DX for amateurs was a long-chance proposition. It was an end that just might be achieved, but only after the most painstaking effort, if at all.

The best available information indicated that it would take the level amateur power limit, pushed to the last watt. An antenna gain of at least 20 dB was required, and a degree of receiver performance to tax the ingenuity of the best engineers in the business was called for. Obviously, a 144 Mc. WAS, lunar style, was a long way off, but it was a challenge that a few enterprising and infinitely patient hams were bound to accept.
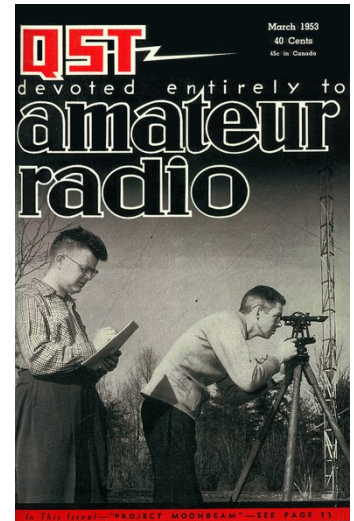
"Aiming an antenna at the moon is an exacting proposition. Our cover [QST March 1953] shows W4AO, left, and W3GKP checking the alignment of the 20 wavelength stacked rhombics used for Project Moonbeam.
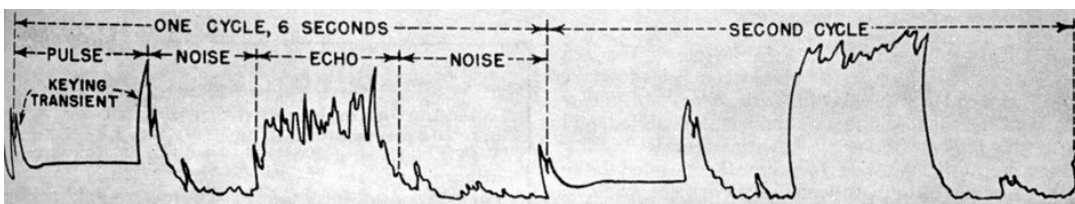
One such ham was Bill Smith, W3GKP, then of Silver Spring, Maryland. Smitty knew what he was about, and he went at the job with no illusions about aiming his beam at the rising moon some night and then sitting back to listen to the W6s. He knew the requirements, in a general way, and he felt sure that the trick could be turned, eventually. The first step was to find a co-worker, so that the burden of equipment development and construction could be shared. A ham with a kilowatt rig and a big beam for 144 Mc. would be a fine start. Several prospects were lined up, and early in 1950 a few transmitting tests were made, while W3GKP worked on his receiving gear, but none of the prospects had sufficiently good equipment to make reception possible at that stage of the game.

Other amateurs, among them W4AO, Falls Church, Va., had been working along similar lines. Learning of W3GKP's interest, Ross joined forces with Smitty, and Project Moonbeam was on its way in earnest. Ross brought to the operation the technical know-how and the enthusiasm and perseverance Smitty had been looking for, and he had a 2-meter rig capable of a full and efficient kilowatt, a 32-element array, a low-noise receiver and a quiet suburban location. After many evenings of discussion, planning and construction, the stage was set for a series of tests with a set-up that appeared to have some chance of succeeding.

The rig at W4AO was maintained on frequency precisely, and keyed in one-second pulses.

The required separation in frequency between the transmitter and receiver frequencies (to take care of Doppler effects resulting from movements of the earth and moon) had been calculated, and the receiver frequency set with elaborate stability precautions. A wire recorder was connected to the receiver output, to catch as permanent evidence any sign of a returned signal. The system was put in operation whenever the moon was in the right place, and no minor considerations like eating or sleeping were allowed to interfere.

At long last, at 5:03 A.M. on July 15, 1950, came something that sounded like an echo. It was faint and indefinite, but it started at the right time and it sounded like the real thing. What was more important, it was caught on the wire recorder. It was just one tiny beep after a long series of transmitter pulses, but it was enough to keep enthusiasm going.

Workers of lesser stature might have called in the press and announced their results to the world, but Ross and Smitty wanted something more solid than a single faint and somewhat dubious return on which to rest their case. Copies of the recording were mailed out to a few interested parties who could be trusted to say nothing until given the word, and Moonbeam went on and on. (A wire copy of that first success has rested in the desk of QST's V.H.F. Editor for nearly three years.)

Test after test piled failure on failure, but still the beeps were sent. An infinitesimal improvement in receiver noise figure, another decibel of antenna gain, a correction
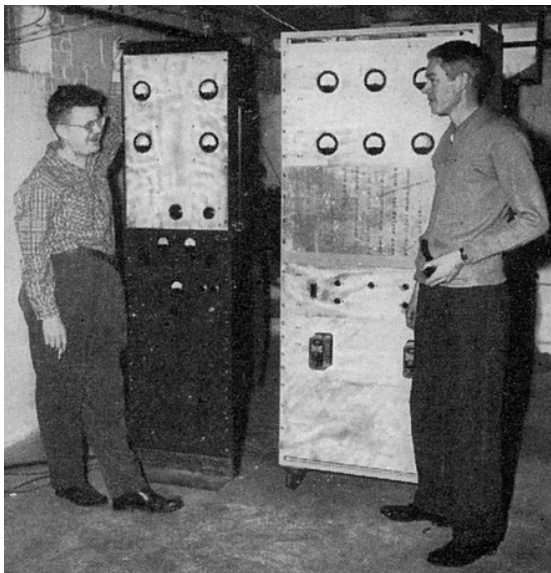
Ross Bateman, W4AO, left, and Bill Smith, W3GKP, smile happily over the success of Project Moonbeam, after three years of trying. The high-power stages of the 1 kW. 2-meter transmitter are in the left-hand rack, as are crystal-controlled converters for 144 and 50 Mc. The large cabinet houses power supplies, modulator and control circuits.

of a degree of antenna aiming error, an improved method of "reading" signals inaudible in the noise; any or all of these might tip the balance. Methods that were tried and found wanting will not be recounted here, but they were many.

Moving to a new home location necessitated the dismantling of the receiving set-up at W3GKP, so Moonbeam moved its entire facilities to the basement at W4AO. In November, 1952, a huge stacked rhombic was erected and tested, and it showed a gratifying improvement over the 32-element array. A system had been devised to tie in transmitter and receiver frequencies together accurately. A new receiver front end brought the noise figure down under 4 dB.

Tests on November 30th and December 3rd brought no results, so a slight modification was made in the rhombic design, to radiate maximum signal at 2 degrees above the horizon, in readiness for the next round December 27th. There were some very faint returns this time, but nothing tangible on the 30th and 31st.

Meanwhile, the staff of Moonbeam had been augmented by the addition of Ted Tuckerman, W3LZD, of Dunmore, Penna., who erected a 30-wavelength rhombic array in time for tests in late January. The receiver bandwidth at W4AO was shaved another notch for this try, too.

Ted arranged to listen for the ground-wave signal with his normal 2-meter array aimed at W4AO, and then switch to the moon rhombic to try for the echo. His low-noise crystal-controlled converter and communications receiver were equipped with a super-selective 50 kc. if, system built by W3LCK. On January 23rd, this combination produced its first positive results, and a series of weak echoes was received at W3LZD, at a time when nothing was detected by the set-up at W4AO.

Tests the following afternoon produced nothing, but beginning at 1533 EST on the 27th, a whole series of echoes was recorded at W4AO, two cycles of which are reproduced at the start of this article. Success, at last, and in sufficient quantity and quality to provide irrefutable evidence!

The equipment used in this and earlier stages of Moonbeam will be described by W4AO and W3GKP in a subsequent issue of QST. Now the question is, "Where do we go from here?" As Smitty puts it, "This is the end of Phase A - we've got an echo. Phase B will be to transmit intelligence to another station. Phase C will be to work somebody, two-way. Phase D will be to break the 2-meter record. Phases E, F - well, can go on almost indefinitely. After three years we're just getting started!"

~

http://www.ok2kkw.com/eme1960/eme1960eng.htm

Part of the equipment used in Project Moonbeam, as it operates in the basement at W4AO, Falls Church, Va. At the control position is the Super-Pro receiver, flanked by microphone preamplifier and beam direction indicator. The rolling table, center, carries frequency-checking gear. On the workbench at the right are the frequency control units and exciter. The high-power stages of the transmitter are out of sight at the right, in racks that also house the crystal-controlled converters for the v.h.f. bands.

HAM NEWS
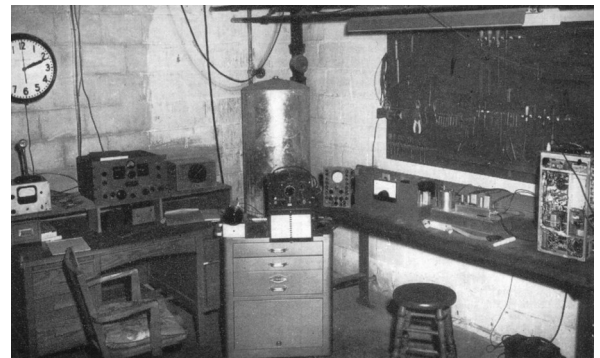
The RF Seismograph

A team fund-raiser via GoFundMe to support further development

Alex Schwarz VE7DXW, presented his findings at the SARC April 2019 monthly general meeting. Alex is exploring the possibility that "RF signatures" detected by the RF Seismograph propagation tool could also be indicating earthquakes, and may even be able to predict them shortly before they occur; one or two hours appear likely. A real-time HF propagation-monitoring tool developed by Schwarz and the MDSR team, the RF Seismograph shows both band noise and activity or band activity alone on six HF bands. These findings are yet to be proven scientifically, hence the GoFundMe X-prize initiative.

The RF-Seismograph was developed in 2016 by Alex Schwarz, an amateur radio operator, for the solar eclipse experiment in August 2017. The set-up, which includes a shortwave antenna, shortwave receiver, and specialized software, has the capabilities to see changes in the ionosphere around the world. The "RF-Seismograph" was tested by a team of volunteers. We did not measure a big difference

during the eclipse, but the solar science that we were able to record was invaluable. After the eclipse, we decided to let the instrument run and worked to improve its stability and reliability. In the fall of 2019 we made an exciting discovery. We found that the RF-Seismograph was actually able to record earthquakes by detecting radio propagation changes during 3 local quakes.

Since we had the RF-Seismograph running since 2016, we started to investigate all of our collected data. As our understanding developed, we were able to confirm that out of more than 200 M6.0+ quakes that occurred during the time data was collected, at least 80% were detected. Over time, we worked to modify all aspects of the set-up to be more efficient. With our improved setup and software, we can now match over 95% of all significant earthquakes that are detected by the USGS Mechanical Seismograph System! One shortwave receiver located in Vancouver, Canada is able to detect earthquakes around the world! But, to this day, it is the only station that is capable of receiving the changes earthquakes make; we would like to change that.

At the beginning of 2020, we started to develop the RF-Viewer which had the goal of matching shortwave propagation detected by the RF-Seismograph with the
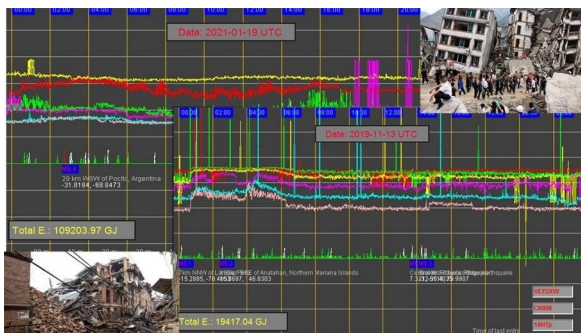
quake database of the USGS detected quakes. The title images were created by this software, showing the changes earthquakes make while they occur. With the improved knowledge of how earthquakes can be detected by the changing shortwave reception, there is hope that one day it may lead to a pre-earthquake warning system.

The RF-Seismograph team provides a real-time propagation report on our website as well as a daily summary of the earthquakes that have been detected. We also offer a synopsis report explaining the recorded events. Our daily Quake versus Propagation reports and report history are available through our user group:

https://www.qsl.net/rf-seismograph/

https://groups.io/g/MDSRadio

Any funds that we collect will be going to one or more Universities that can replicate the findings of the RF-Seismograph and show that the concept of detecting earthquakes via the changes of the ionosphere is feasible.

We cannot do this alone… that is why we are creating the X-Prize that we are currently fundraising for.

See Alex's presentation and description at this link:

https://ve7sar.blogspot.com/2019/04/can-shortwave-radios-detect-earthquakes.html

To donate, visit the GoFundMe link: https://www.gofundme.com/f/new-way-to-detect-earthquakes-and-save-lives?member=8211558&utm_medium=email&utm_source=customer&utm_campaign=p_email%2Binvitesupporters

~

Alex Schwarz VE7DXW has carried out extensive research into the relationship between earthquakes and HF radio propagation. He reports daily on the earthquakes the world over and their relationship to propagation on the HF bands. However, as you will see in this article, the acceptance of his ideas and evidence has been slow in the scientific world.

Alex's equipment

HamShack Hotline
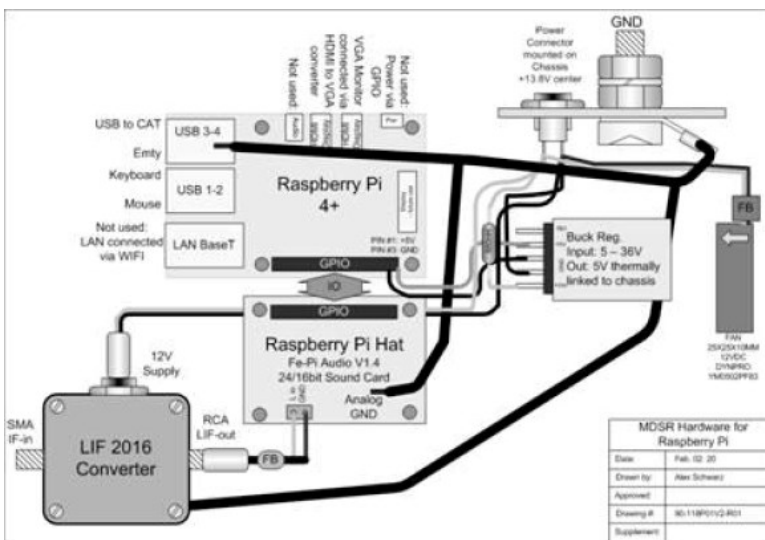
John Schouten VE7TI

A follow-up from last issue

Last issue I wrote about HamShack Hotline, a new tool to our collection of emergency preparedness (and social) methods of communication.

Having two-plus months of experience behind me, with a great deal of experimentation, I can provide you with an update.

Shortly after I purchased my initial HamShack Hotline (HH) Cisco phone, I found a better one... better meaning a colour screen and additional features. The first phone worked well and I was able to resell it without issue, but my new SPA-525 is truly the Cadillac (or is it now Mercedes?) of phones for this purpose.

Aside from having access to 5 lines (and 32 more with the optional sidecar), I now also have a fully-featured standard IP-based landline through voip.ms. For C$0.85 per month plus a fraction of a penny per minute I can make all the Canada wide telephone calls I wish through the Cisco phone or the handy apps on my iPhone and iPad—from anywhere in the world I have an Internet connection. Call quality is amazing and I have voicemail, messaging, call transfer, conference calling and more. Foreign calls are also very, very reasonable.

But back to HamShack Hotline. Very early on I discovered their FaceBook page filled with helpful folks and IP telephone experts who were able to guide me through some of my 'experiments'. Twice weekly there is a 'net' on HH Info #311 where your questions are answered by the tech team. With a bit of basic programming you can enter strings for each line into the setup page (accessible through your browser and the IP phone's network address).

I now have pre-programmed buttons for our local SARC HH members that include John VA7XB, Kevin VE7ZD, Steve VE7SXM, Jason VA7ITJ, Ion VE7NL and Pat VE7PJS. Looking at the local HH map, I don't feel so lonely anymore.

I have also set up two local group lines, one a conference line for SARC at HH# 1370 and a fan-out at HH# 811, and we have acquired a HH phone for the OTC, with plans to activate additional phones for the SEPAR trailer and Surrey EOC.

For those who wish to go a bit further, one of the programming skills is adding a 'string' to a number field. Such a string directs the phone to take an action when you either push a button or dial a specific number. Typically that looks like this:

fnc=sd;ext=300@$PROXY;nme=Public 1

or *fnc=sd;ext=6044983600@$PROXY;vid=2;nme=Pizza*

What this string represents is a sequence of commands:

fnc= Function Type

sd= Speed Dial

ext= The number to be dialed, either a HH local or standard telephone number, like our local pizza place.

vid= The extension on the calling phone from which the outbound call is sent

nme= the name of the line to be displayed. In this example Public 1, a general HH meeting place.

cp— Call Pickup

sub— Subscriber (station name)

blf— Busy Lamp Field

prk—Call Park

The guide for this model and others is available directly from the Cisco website:
https://www.cisco.com/c/dam/en/us/td/docs/voice_ip_comm/csbpipp/ip_phones/administration/guide/spa_wip_admin.pdf

It looks more complicated than it really is. I picked up the information I needed from the HamShack Hotline FaceBook page and, together with Kevin VE7ZD we figured it out.

~ John VE7TI

A number of Cisco phone models are accepted including the Cisco SPA-504g, SPA-514g, SPA-525, and the Linksys/ Cisco SPA941/942. Other phones can be used on the network, but must connect to the HHX, and may require more expertise in configuring for service. Assistance is available, but not guaranteed.

Listed here, are various documents to answer most questions. While not every case/question might be answered by one of these documents, we encourage you to open a ticket to the HHOPS team if you can't find the answer to your question here. Thank you for your interest in the Hamshack Hotline!

Directory – Now on line! HH will be adding search tools soon!

You Tube Channel

Knowledge Base -all of our documents in one place.

Links to Radio Services

Hamshack Hotline Audio Feeds

Conference Bridge List

Tri-Fold informational Brochure

Ham Leftovers...

Which power supply do I use for my ham radio?

In this video, Ria Jairam N2RJ talks about power supplies, both linear and switching and the different types available

https://www.youtube.com/c/RiaJairam/videos
https://twitter.com/RiaJairam

How to Convert a Computer ATX Power Supply to a Lab Power Supply

https://www.wikihow.com/Convert-a-Computer-ATX-Power-Supply-to-a-Lab-Power-Supply

Decommissioned SuitSat: The Horror Movie

On February 3, 2006, the crew of the International Space Station (ISS) shoved an unmanned spacesuit stuffed with discarded clothing and radio equipment out the door, creating a ghostly scene that resembled a cosmonaut tumbling away from the orbiting outpost.

Complete with helmet and gloves, the spacesuit floated past the Russian section of the ISS, 220 miles (354 kilometres) above the Earth, before rotating away feet first and beginning its orbit around the globe.

"Goodbye, Mr. Smith," said Russian flight engineer Valery Tokarev, giving the figure a nickname. Tokarev discarded the old spacesuit. The Russian suit was equipped with a radio transmitter which will send recorded messages in six languages to amateur radio operators for several days before re-entering the Earth's atmosphere and burning up.

But it's back… at least in the production "Decommissioned".
https://www.youtube.com/watch?v=TNtpdvfbTjA

Slow Scan Television (SSTV) is transmitted by the ARISS Russia Team from the amateur radio station in the Russian Service Module of the International Space Station using the callsign RS0ISS. The equipment used is a Kenwood D710 transceiver running about 25 watts output which provides a very strong signal enabling reception using simple equipment. https://amsat-uk.org/beginners/iss-sstv/

Radio Garden began as a special web project in Amsterdam in 2016, an exhibition commissioned by the Netherlands Institute for Sound and Vision. Radio Garden lets you tune in to thousands of live radio stations by pointing at stations identified by a green dot on a spinning globe. The globe is pictured as a garden, and the stations are the seeds within that garden. A fascinating trip! Just click on https://radio.garden/ to get started.

RAC Update:

World Amateur Radio Day | IARU

A message from RAC BC Director Keith Witney

This is a preliminary announcement and further information specific to the 2021 World Amateur Radio Day (WARD) activities will be forthcoming.

World Amateur Radio Day | IARU.

RAC is repeating its successful WARD activity day which celebrates the formation of the IARU on Sunday, April 18, 0000 to 2359 UTC.

VxXRAC stations from across Canada will be activated by RAC members. Anyone who makes a contact with any RAC station will be able to download a beautiful PDF certificate.

Upon application to the BC Yukon Director (VE7KW dir.bc.yukon@rac.ca), the VE7RAC/VY1RAC call signs may be used subject to the following requirements.

Anyone activating a RAC call sign must:

1. be a member of RAC;

2. must provide a complete electronic log in ADIF or Cabrillo format to racqsl@rac.ca. For WARD 2021, the logs must be in by 2359 UTC on 25 April 2021.

3. As the calls may be used by multiple stations at the same time as long as they are not on the same band/mode, you must register your planned activities with VE7KW or a delegate to be announced. Last year a spreadsheet was kept with 2 hour blocks.

Note that this is an activity contest and while QSO party type activity was the most common, any form of activity resulting in contacts is encouraged. Remember that some frequencies are inappropriate for contesting.

WARD activity was very successful last year with minimal notice so hopefully it will expand this year.

~ *Keith VE7KW*
  RAC Director BC and Yukon

Radio Amateurs of Canada (RAC) is the national association for Amateur Radio in Canada. It is a not-for-profit membership association with its headquarters in Ottawa, Ontario, Canada, representing the interests of Amateur Radio across Canada.

The Canadian Amateur (TCA) magazine, Canada's premiere national magazine devoted to Amateur Radio, is published six times per year and is available in both print and digital (eTCA) formats as a benefit to RAC members.

WORLD AMATEUR RADIO DAY

April 18 is the day for all of Amateur Radio to celebrate and tell the world about the science we can help teach, the community service we can provide and the fun we have.

Every April 18, radio amateurs worldwide take to the airwaves in celebration of World Amateur Radio Day. It was on this day in 1925 that the International Amateur Radio Union was formed in Paris.

Amateur Radio experimenters were the first to discover that the short wave spectrum — far from being a wasteland — could support worldwide propagation. In the rush to use these shorter wavelengths, Amateur Radio was "in grave danger of being pushed aside," the IARU's history has noted. Amateur Radio pioneers met in Paris in 1925 and created the IARU to support Amateur Radio worldwide.

Just two years later, at the International Radiotelegraph Conference, Amateur Radio gained the allocations still recognized today — 160, 80, 40, 20, and 10 meters. Since its founding, the IARU has worked tirelessly to defend and expand the frequency allocations for Amateur Radio. Thanks to the support of enlightened administrations in every part of the globe, radio amateurs are now able to experiment and communicate in frequency bands strategically located throughout the radio spectrum. From the 25 countries that formed the IARU in 1925, the IARU has grown to include 160 member-societies in three regions.

IARU Region 1 includes Europe, Africa, the Middle East, and Northern Asia. Region 2 covers the Americas, and Region 3 is comprised of Australia, New Zealand, the Pacific island nations, and most of Asia. The International Telecommunication Union (ITU) has recognized the IARU as representing the interests of Amateur Radio.

Today, Amateur Radio is more popular than ever, with more than 3,000,000 licensed operators!

World Amateur Radio Day is the day when IARU Member-Societies can show our capabilities to the public and enjoy global friendship with other Amateurs worldwide.

We have provided a poster for World Amateur Radio Day. Any club may download it and use it to promote WARD in their area. The poster comes in two sizes: 61cm x 91cm and a small (A4) flyer.

Groups should promote their WARD activity on social media by using the hash tag #WorldAmateurRadioDay on Twitter and Facebook. IARU will list all WARD activities on this page. To have your WARD activity listed, send an email to IARU Secretary David Sumner, K1ZZ.

April 18 is the day for all of Amateur Radio to celebrate and tell the world about the science we can help teach, the community service we can provide and the fun we have.

We hope you will join in the fun and education that is World Amateur Radio Day! The theme is "Celebrating Amateur Radio's Contribution to Society."

Brazil: LABRE Roraima, PV8AA, will sponsor various activities and satellite operations with participation by Scouts, including young Venezuelan refugees.

Radio Amateurs of Canada has decided to hold a new "Get on the Air on World Amateur Radio Day" special event in which we encourage as many Amateurs as possible to get on the air and contact as many RAC stations as possible. For more information visit https://www.rac.ca/operating/world-amateur-radio-day-april-18/

Denmark: Operators in Denmark will be permitted to use the call signs 5P0WARD and 5P0WHD on April 18. Single operators will be assigned a special suffix extension (00 to 99) to distinguish individual stations, e.g., 5P0WARD/36 or 5P0WHD/7. Speciel Awards will be available for contacts with stations on all modes and bands. Read more on the qrz.com

Luxembourg: The special call sign LX5WARD will be in use from 6 to 26 April 2020 by members of Radioamateurs du Luxembourg (R.L.), a Founding Member of the IARU. A special QSL card will be issued via the LX IARU QSL Bureau. There is no need to send a card. www.rlx.lu

The regular Ten-Tec 80 meter SSB net, Saturday at 1015 UTC in the eastern United States, will have a WARD theme on April 18.

The Echolink World Conference and irlp 9251 is going to help celebrate World Amateur Radio Day on Sunday April 18 from 12am to 12 am April 19th. The special event callsign will be W7W. Hope you are able to check in. — Tom AF7J

VOIP/ECHOLINK *DODROPIN* Conference node #355800 16:00 − 04:00UTC(12 NOON EST-12 MIDNIGHT EST) via VOIP/ECHOLINK *DODROPIN* Conference node #355800/ W2JLD, VO1UKZ, MW6SZL, MW8SZL, KI7BR, WD8ODF Net Controllers. A special event call sign W2W has been secured for this event. All stations from around the world are encouraged to check in. Email questions to: John DeRycke, W2JLD, W2JLD2@GMAIL.COM
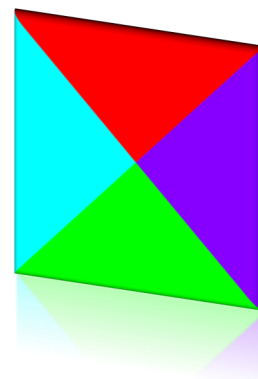
~ IARU
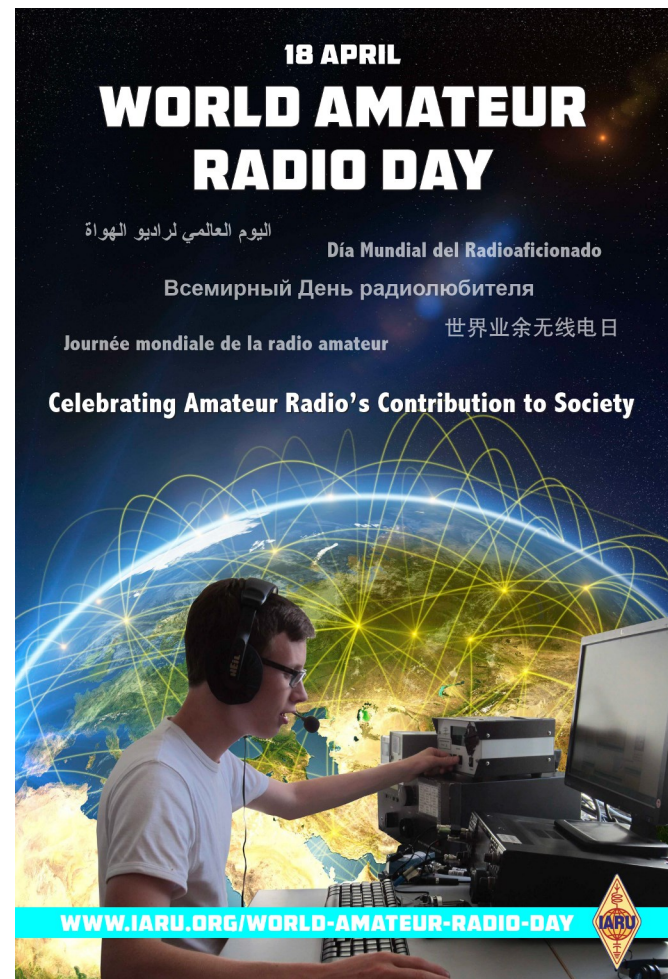
Foundations Of Amateur Radio

Onno Benschop VK6FLAB

Running out of things to do…

So, there's nothing on TV, the bands are dead, nobody is answering your CQ, you're bored and it's all too hard. You've run out of things to try, there's only so many different ways to use the radio and it's all too much.

I mean, you've only got CW, AM, SSB, FM, there's Upper and Lower Side-band, then there's RTTY, the all too popular FT8, then there's WSPR, but then you run out of things. I mean, right?

What about PSK31, SSTV, then there's AMTOR, Hellschreiber, Clover, Olivia, Thor, MFSK, Contestia, the long time favourites of Echolink and IRLP, not to forget Fusion, DMR, D-STAR, AllStar, BrandMeister or APRS.

So far I've mentioned about 20 modes, picked at random, some from the list of modes that the software Fldigi supports. Some of these don't even show up on the Signal Wiki which has a list of about 70 amateur modes.

With all the bands you have available, there's plenty of different things to play with. All. The. Time.

There's contests for many of them, so once you've got it working, you can see how well you go.

Over the past year I've been experimenting with a friend with various modes, some more successful than others. I'm mentioning this because it's not difficult to get started. Seriously, it's not.

The most important part of this whole experiment is getting your computer to talk to your radio. If you have FT8 already working you have all the hardware in place. To make the software work, you can't go past installing Fldigi. As a tool it works a lot like what you're familiar with. You'll see a band-scope, a list of frequencies and a list of decodes. It's one of many programs that can decode and generate a multitude of amateur digital modes.

If this is all completely new to you, don't be alarmed.

There are essentially two types of connections between your computer and your radio. The first one is audio, the second is control. For this to work well, both these need to be two-way, so you can both decode the audio that the radio receives and generate audio that the radio can transmit. The same is true for the control connection. You need to be able to set the transmit frequency and the mode and you need to be able to read the current state of the radio, if only to toggle the transmitter on-and-off. If you already have CAT control working, that's one half done.

I've spoken with plenty of amateurs who are reluctant to do any of this. If this is you, don't be afraid. It's like the first time you keyed up you radio. Remember the excitement? You can relive that experience, no matter how long you've been an amateur.

Depending on the age of your radio, you might find that there is only one physical connection between your computer and the radio, either using USB or even Ethernet. You'll find that your computer will still need to deal with the two types of information separately.

Notice that I've not talked about what kind of operating system you need to be running. I use and prefer Linux, but you can do this on any operating system, even using a mobile phone if that takes your fancy.

Getting on air and making noise using your microphone is one option, but doing this using computer control will open you to scores of new adventures.

I will add some words of caution here.

In general, especially using digital modes, less is more. If you drive the audio too high you'll splatter all over the place and nobody will hear you, well, actually, everyone will, but nobody will be able to talk to you because they won't be able to decode it. If the ALC on your radio is active, you're too loud. WSJT-X, the tool for modes like FT8 and WSPR, has a really easy way of ensuring that your levels are right, so if you've not done anything yet, start there.

Another issue is signal isolation. What I mean by that is you blowing up your computer because the RF travelled unexpectedly back up the serial or audio cable and caused all manner of grief. You can get all fancy with optical isolation and at some point you should, but until then, dial the power down to QRP levels, 5 Watts, and you'll be fine.

A third issue that was likely covered during your licensing is the duty cycle. It's the amount of time that your radio is transmitting continuously as compared to receiving only. For some modes, like WSPR for example, you'll be transmitting for a full 2 minutes at 100%, so you'll be working your radio hard. Even harder might unexpectedly be using FT8, which transmits in 15 second bursts every 15 seconds, so there may not be enough time for your radio to cool down. Investing in a fan is a good plan, but being aware of the issue will go a long way to keeping the magic smoke inside your radio.

I'm sure that you have plenty of questions after all that.

You can ask your friends, or drop me an email, cq@vk6flab.com and I'll be happy to point you in the right direction.

Next time there's nothing good on TV, get on air and make some digital noise!

~ I'm Onno VK6FLAB

Changing of the guard ...

When you begin your journey as a radio amateur you're introduced to the concept of a mode.

A mode is a catch-all phrase that describes a way of encoding information into radio signals.

Even if you're not familiar with amateur radio, you've come across modes, although you might not have known at the time.

When you tune to the AM band, you're picking a set of frequencies, but also a mode, the AM mode. When you tune to the FM band, you do a similar thing, set of frequencies, different mode, FM. The same is true when you turn on your satellite TV receiver, you're likely using a mode called DVB-S. For digital TV, the mode is likely DVB-T and for digital radio it's something like DAB or DAB+.

Even when you use your mobile phone it too is using a mode, be it CDMA, GSM, LTE and plenty of others.

Each of these modes is shared within the community so that equipment can exchange information. Initially many of these modes were built around voice communication, but increasingly, even the basic mobile phone modes, are built around data. Today, even if you're talking on your phone, the actual information being exchanged using radio is of a digital nature.

Most of these modes are pretty static. That's not to say that they don't evolve, but the speed at which that happens is pretty sedate.

In contrast, a mode like Wi-Fi has seen the explosion of different versions. During the first 20 years there were about 19 different versions of Wi-Fi. You'll recognise them as 802.11a, b, g, j, y, n, p, ad, ac and plenty more.

I mention Wi-Fi to illustrate just how frustrating changing a mode is for the end-user. You buy a gadget, but it's not compatible with the particular Wi-Fi mode that the rest of your gear is using.

It's pretty much the only end-user facing mode that changes so often as to make it hard to keep up. As bad as that might be, there is coordination happening with standards bodies involved making it possible to purchase the latest Wi-Fi equipment from a multitude of manufacturers.

In amateur radio there are amateur specific modes, like RTTY, PSK31, even CW is a mode. And just like with Wi-Fi, they evolve. There's RTTY-45, RTTY-50 and RTTY-75 Wide and Narrow, when you might have thought that there was only one RTTY. The FLDIGI software supports 18

different Olivia modes out of the box which haven't changed for a decade or so.

The speed of the evolution of Olivia is slow. The speed of the evolution of RTTY is slower still, CW is not moving at all. At the other end new amateur modes are being developed daily.

The JT modes for example are by comparison evolving at breakneck speed, to the point where they aren't even available in the latest versions of the software, for example FSK441, introduced in 2001 vanished at some point, superseded by a different mode, MSK144. It's hard to say exactly when this happened, I searched through 15 different releases and couldn't come up with anything more definitive than the first mention of MSK144 in v1.7.0, apparently released in 2015.

My point is that in amateur radio terms there are modes that are not changing at all and modes that are changing so fast that research is being published after the mode has been depreciated. Mike, WB2FKO published his research "Meteor scatter communication with very short pings" comparing the two modes FSK441 and MSK144 in September 2020, it makes for interesting reading.

There are parallels between the introduction of computing and the process of archiving. The early 1980's saw a proliferation of hardware, software, books and processes that exploded into the community. With that came a phenomenon that lasted at least a decade, if not longer, where archives of these items don't exist because nobody thought to keep them. Floppy discs thrown out, books shredded, magazines discarded, knowledge lost.

It didn't just happen in the 1980's. Much of the information that landed man on the moon is lost. We cannot today build a Saturn V rocket with all the support systems needed to land on the moon from scratch, even if we wanted to. We have lost manufacturing processes, the ability to decode magnetic tapes and lost the people who did the work through retirement and death, not to mention company collapses and mergers.

Today we're in the middle of a golden age of radio modes. Each new mode with more features and performance. In reality this means that your radio that came with CW, AM, FM and SSB will continue to work, but if it came with a specialised mode like FSK441, you're likely to run out of friends to communicate with when the mode is depreciated in favour of something new.

In my opinion, Open Source software and hardware is vitally important in this fast moving field and if we're not careful we will repeat history and lose the knowledge and skill won through perseverance and determination due to lack of documentation or depreciation by a supplier.

When did you last document what you did? What will happen to that when you too become a silent key?

~ I'm Onno VK6FLAB

QRU-QSP - News

A bit late for the last Communicator issue but you'll have lots of time to sharpen your skills for next year. The QRUQSP group has added a Winter Field Day Logging module. This module is similar to their summer Field Day Logger with changes for the Winter Field Day Rules. Login to qruqsp.org/manager to check it out.

If you're going to be running multi operator, they invite you to contact them for help to set that up.
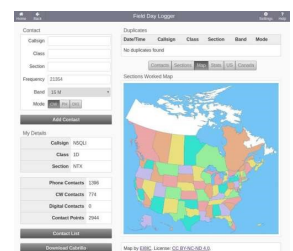
KB6NU's Column

Dan Romanchik, KB6NU

Operating notes: Slow down to bust contest pileup, panadapter helps work DX, HW U?

When he's not trying to figure out which way current flows, Dan blogs about amateur radio at KB6NU.com, teaches ham radio classes, and operates CW on the HF bands. Look for him on 30m, 40m, and 80m. You can email him at cwgeek@kb6nu.com.

Slow down to bust a contest pileup

In the Minnesota QSO Party last weekend, there was a big pileup trying to work a station in some remote county. The operator was working about 23 – 25 wpm, so I replied at that speed. I even sped up a little thinking that I might be able to slip my call in before the others.

Well, after several unsuccessful calls, and hearing the MN station reply to several slower stations, I decided to slow down myself. Bingo! I got a reply to my first call at the slower speed. My guess is that the slower speed made my call easier to copy and to stand out from the others. I don't know if this tactic would work in a bigger contest, but I'm going to use this tactic again in a future QSO party.

Panadapter helps work DX

Last night, I was trying to squeeze another QSO out of 40m, but not having a lot of success calling CQ just below 7030 kHz. Scanning the panadapter, I saw a lone signal down on 7012 kHz. From the pattern, I guessed that the station was calling CQ. Sure enough, I tuned down there (actually clicked on the signal in the panadapter) and found a YV5 calling CQ. We each gave each other 579 reports, and I had another DX QSO in the log.

HW U?

At the end of the first transmission, it's customary to send HW? short for "how copy?" Well, if the signals are good, and I've worked the other station before and know the operator, I've started sending HW U? instead. This is short, at least in my book for, "How are you?"

This is a little more personal than just HW? and seems to elicit a more personal response. It's definitely a better conversation starter, and you'll certainly make a better impression on the operator at the other end. Give it a try. You never know what you'll learn.

~ Dan KB6NU

No-Ham Recipes
Heather VE3HQH

Meatball Minestrone

A steaming bowl of minestrone soup is always a welcome meal. Minestrone's roots are Italian; it is probably more commonly eaten throughout Italy than pasta, according to several sources, and it has no set recipe. It is usually made from whatever vegetable are in season, with the addition of pasta or rice. Sometimes meat is added, as well as a meat broth. It seems "minestrone" has become synonymous with "hodgepodge."

- 4 ounces (125 ml) spaghetti, broken into 2 inch pieces
- 1 - 16 ounce (500 ml) can kidney beans, rinsed and drained
- 1 - 16 ounce (500 ml) package frozen mixed vegetables
- 2 tablespoons (30 ml) beef bouillon granules
- 1 tablespoon (15 ml) dried minced onion
- 1 -14 ½ ounce can (435 ml) stewed tomatoes

- ½ teaspoon (2.5 ml) pepper
- 1 teaspoon (5 ml) dried basil
- 1 teaspoon (5 ml) salt
- 1 bay leaf
- 6 cups (1.5 litres) water
- 24 cooked meatballs

In a Dutch oven or soup kettle, combine the first nine ingredients. Bring to a boil, add spaghetti. Reduce heat, cover and simmer for 10 minutes or until the spaghetti is tender. Add meatballs and tomatoes and heat through. Discard the bay leaf.

Makes 10-12 servings

Social Reminder

The Surrey weekly social gathering is on Saturday at the Kalmar Restaurant at 80th and King George Boulevard between 7:30 and 9:30 am. You don't have to be a SARC member to participate. The restaurant practices responsible social distancing.

Back to Basics

John Schouten VE7TI

From The Canadian Basic Question Bank

Station Accessories

There are a number of station accessories that are the subject of question on the Canaadian Basic Amateur Radio certification exam. This issue we will examine them more closely so the beginning Ham will have a better understanding of their function.

The SWR Bridge

B-3-1-4 Which component in an HF station is the most useful for determining the effectiveness of the antenna system?

A. SWR bridge ✓

B. Antenna switch

C. Linear amplifier

D. Dummy load

A typical SWR 'bridge' for amateur radio use.

Standing waves are caused by an impedance mismatch in the chain of components between the transceiver and antenna. They are reflected energy that can not only reduce the effectiveness of your station, but can damage your transceiver.

The standing wave ratio (SWR Bridge) permits measuring the relative impedance match between the antenna system and the transceiver.

Starting with forward and reverse (reflected) power… It is a simple concept understanding forward power. The transmitter supplies a radio frequency (RF) voltage to the transmission line which behaves very much like a resistor whose value is equal to the characteristic impedance of the line, often 50 or 300 Ω.

Reflected power is perhaps not so easy to imagine. So picture the forward wave traveling down the transmission line at a speed nearly that of light—300m/second. That wave is going to reach the end of the transmission line, and what happens next depends on the quality of the match. If at that end there is a resistance equal in value to the characteristic impedance of the line, another length of line of the same impedance or a load such as an antenna that behaves like a resistor at the frequency in use, then the wave will be totally absorbed and no power will be reflected. That is a good thing.

However, if the line is not terminated with a resistance equal to the characteristic impedance, then not all of the power in the wave will be absorbed and some power will be reflected back as a wave flowing in the reverse direction, and that is a bad thing.

The ratio of the forward and reflected voltage is the VSWR, while power PSWR will be the square of VSWR.

Although opinions vary, the maximum acceptable SWR is 2:1. The ideal rating is 1:1 that is the power reaches the destination and reflects no power back. If the SWR reaches 3:1 damage to your equipment could result.

The SWR meter is the wisest investment you can make after your transceiver and antenna.

The Antenna Switch

B-3-1-5 Of the components in an HF station, which component would normally be connected closest to the antenna, antenna tuner and dummy load?

A. SWR bridge

B. Antenna switch ✔

C. Transceiver

D. Low pass filter

The 'Antenna Switch' provides a convenient way to select a direct connection to an antenna, a connection through the 'Antenna Tuner' to other antennas or to the 'Dummy Load'.

Select an antenna switches with adequate power ratings for your application and construction to eliminate crosstalk and interference caused by strong signals on other ports. Some antenna switches are remotely operated and can be placed right at the antenna. Fully RF-shielded remote switches use quality components and are weatherproofed to stand up to the elements.

The Antenna Tuner

B-3-1-9 In an HF Station, the antenna tuner is commonly used:

A. to tune low pass filters

B. with most antennas when operating below 14 MHz ✔

C. with most antennas when operating above 14 MHz

D. to tune into dummy loads

For example, on the 160 m band (1.8 MHz to 2.0 MHz), the band EDGES are 5% removed from the centre frequency of 1.9 MHz. On 80 m (3.5 MHz to 4.0 MHz), the edges are nearly 7% removed from the centre frequency of 3.75 MHz. On 20 m (14.0 MHz to 14.35 MHz), the edges are only 1.2% removed from the centre frequency of 14.175 MHz. Antennas present an acceptable standing wave ratio over a limited range of frequencies, the Antenna Tuner circumvents that limitation.

Antenna tuner is really a misnomer. This device does not really tune the antenna itself. What it does do is provide a capacitance and inductance combination that provides a match from one impedance to another, much like a balun. This it would be better described as an antenna matching unit, but they are also referred to as a matchbox' or 'transmatch'.
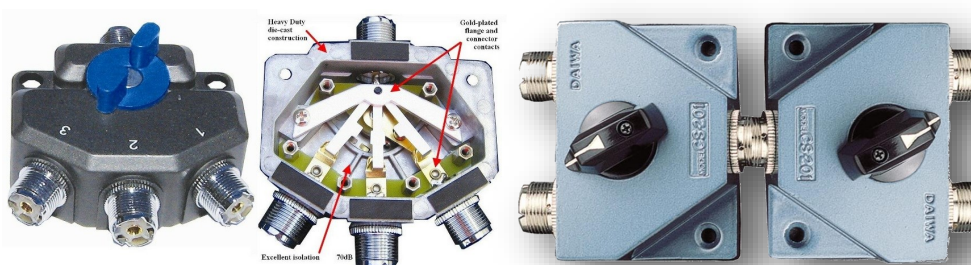
[Far left] A 3-position antenna switch. You can select 3 antennas from one transceiver or 3 transceivers from one antenna.

[Left] Two switches may be connected together to select multiple transceiver/antenna combinations.
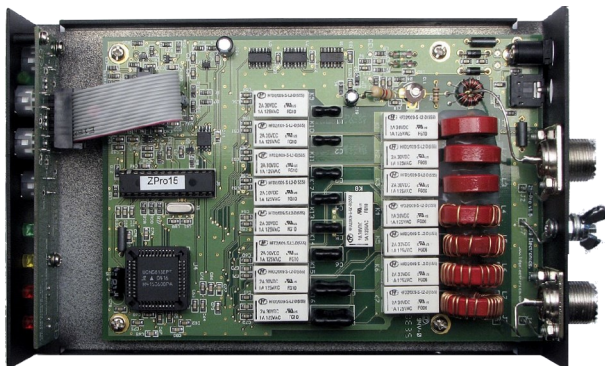
Typical modern automatic [left] and manual [above] antenna tuners.

So, the 'Antenna Tuner' permits using an antenna on a frequency or band other than the one for which it was designed by providing a variable impedance transformation: it can adapt the impedance of a the antenna system (which changes with antenna dimensions and operating frequency) to the design impedance of the transceiver.

Many manual antenna tuners can typically match up to a 10:1 SWR, while automatic antenna tuners, many of which are now built into modern HF transceivers can generally match up to a 3:1 SWR.

As is the case with all accessories, ensure that your external antenna tuner is capable of handling the power output of your transmitter.

Dummy Load

B-3-1-7 In an HF station, which component is temporarily connected in the tuning process or for adjustments to the transmitter?

A. Dummy load ✔

B. SWR bridge

C. Low pass filter

D. Antenna tuner

The 'Dummy Load' (a resistor with a high power rating) dissipates RF energy as heat without radiating the RF on the air. Permits tests or adjustments without causing interference to other stations. The 'tuning process' refers to a manual procedure necessary for equipment, feedline and antenna tests or adjustments with each frequency change.

They are available for various power levels all the way up to 2,500 watts. Dummy loads for a typical VHF/UHF transceiver of up to 50 Watts are easily made with parallel high wattage resistors *[as shown]*.

Manufacturers offer fan-cooled, air-cooled, and oil-filled dummy loads. If you are buying an HF dummy load on the used marked, be aware what oil it contains. Older transformer oil used to contain poly-chlorinated biphenyls (PCBs) up until about 1980, so don't use transformer oil that's more than 40 years old. Transformer oil made since then is PCB free, by law. Recent findings suggest that the risk health associated with exposure to these chemicals is not as high as first thought, but most wouldn't want them in my shack. If you get transformer oil, make sure it's PCB-free.

The big claim to fame of transformer oil is that it has a very high dielectric strength to withstand the high voltages in the electrical distribution network, up to 80 kV. But we don't have such high voltages in our dummy loads, we know from Ohm's Law that 1.5 kW across 50 ohms is just 273 volts.

These "Cantenna" style loads have relief vents, and are always a little oily outside, especially on top. I'd go with mineral oil; that stuff is totally safe. Don't use cooking oil of any type. It will go rancid after a few months and you'll wonder where the smell is coming from in your shack.

Do not use motor oil either. It has a low flash point that could cause a fire. Some use Ford Type F automatic transmission fluid. It is reported to be safe but is red in colour and can cause a mess if spilled.

[see https://ve7sar.blogspot.com/2019/04/about-dummy-load-pcbs-and-oil.html for a PCB test procedure and http://www.orcadxcc.org/content/cantenna_va7jw.pdf for additional information]

~ John VE7TI

Do you need more information about our courses?

https://bit.ly/SARCcourses or scan the QR-code with your cellphone camera

Study Links for more information

Whether you are new to the hobby or brushing up on skills, you should find these study links helpful:

1. RIC-7 is the entire up-to-date Industry Canada (IC) Basic Question Bank. http://tinyurl.com/CanadaBasicQB

2. Industry Canada (ISED) on-line practice page: https://apc-cap.ic.gc.ca/pls/apc_anon/apeg_practice.practice_form

3. The Amateur Radio Exam Generator is at: https://www.ic.gc.ca/eic/site/025.nsf/eng/h_00040.html

4. The ExHaminer Study software for Windows is at: https://wp.rac.ca/exhaminer-v2-5/

5. VE3YT has an excellent question-based guide available at ve3yt.com

6. There are plenty of good resources for both basic and advanced exam study courtesy of the Cold Lake Amateur Radio Society at: http://www.clares.ca/va6hal%20training.html

Contact SARC if you wish to write the Basic or Advanced Exam. If you pass we'll even give you a year free as a SARC prospective member!

Newly Licensed? When you receive your paper license in the mail, it will come with a form that can be filled out and mailed to the Radio Amateurs of Canada office, at which point an introductory RAC one-year membership will be set up. Introductory memberships are identical to our existing basic memberships and you will receive The Canadian Amateur magazine for one year.
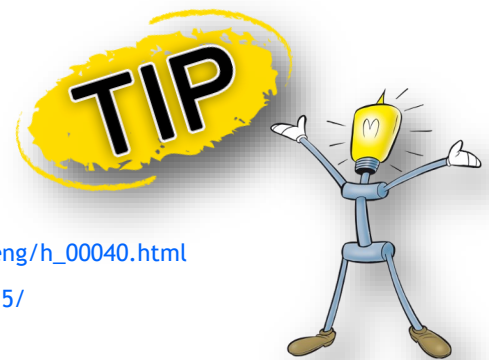
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Surrey Amateur Radio Communications
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ARDF: Foxes & Bunnies

John Schouten VE7TI

The SARC 80m Fox Hunt on Saturday, May 8th

Time flies, and it is not too early to plan for the next SARC Fox Hunt. SARC member Anton James VE7SSD has organized the event for many years and, although it was delayed due to COVID restrictions in 2020, we are hopeful it will happen on the usual early-May date this year.

A fox (or bunny) in ham radio terms is a low power hidden transmitter. Both 2m and 80m fox hunts are common; in recent years ours have been 80m. If you have never participated, you should consider giving this a try. It's a great family excursion even during these COVID times.

I wrote an article for The Communicator [*Sep-Oct 20-20 page 100* *re-published in the RAC Canadian Amateur magazine*] about my experience introducing two of my grandkids age 6 and 4 to Fox Hunting. They thoroughly enjoyed the experience and look forward to this year's event.

It is really not that difficult, and you do not need an Amateur Radio qualification because you are not transmitting. It can be done with an inexpensive VHF 2m receiver although I recommend using one of the new receivers specifically built for Fox Hunting. We have several available on loan.

Les Tocko VA7OM and Dave Miller VE7HR have designed and built this device using experience from years of hunting at International levels.

The location is at Crescent Park. This is a large 52 hectare (128-acre) destination park in South Surrey. The Park offers walking trails through mature second growth forests, with ponds, streams and lots of meadows to discover. It is home to numerous species of birds that prefer the dense undergrowth, as well as ducks and kingfishers that use the small ponds.

The park's wildlife, open fields, covered picnic shelters and forested trails make it a relaxing destination and a place of discovery.

In addition to its spectacular natural areas, the eastern portions of Crescent Park offer a range of park amenities and a playground.

There are two parking lots that can be accessed [*see the QR-Code on the poster following this article for specific directions*].
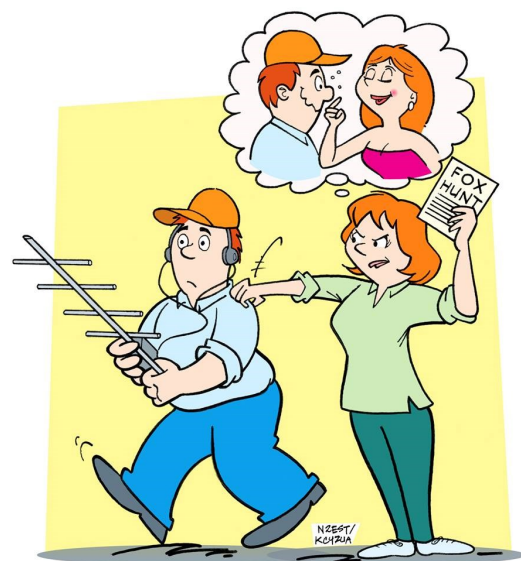
The nature trail around Crescent Park is around 3.8 km long.

So how do you hunt foxes? After a brief familiarization with the device you set out to find five hidden transmitters. Each transmits it's Morse code identifier for one full minute. It is then followed by the next for a minute and so on until all five foxes have transmitted. Then the sequence starts all over again. You do not need to know Morse code. You simply count the 'dots' at the end of each identifier to know which is beaconing.

Carefully rotating the receiver will identify its strongest signal, which is   it's direction. The loudness of the signal gives a hint to the closest one and you decide which of the five you want to find first.

When you locate a fox you note the keyword associated with it and note it on your form to confirm your find. With 2 small kids we did it in a respectable 41 minutes — and I'm no expert.

We have documented previous events on our SARC YouTube channel. Have a look at https://youtu.be/DMEKWOyaAnc and you will see how it all works. The barbecue is still dependent on COVID restrictions but, burgers or not, it's a great Saturday morning.

~ John VE7TI

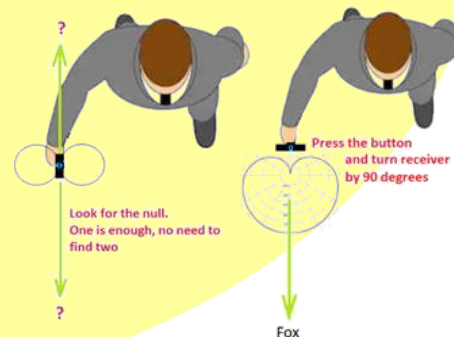## 2ⁿᵈ *Generation 80m Foxhunt Receivers Now Available*

Order now for the Spring foxhunt season, second generation 80m foxhunt receivers by Les Tocko VA7OM and Dave Miller VE7HR are now complete, with the production run tested, tuned up and available for sale.

My involvement has been in the administration and final assembly but otherwise all the credit for this technical achievement goes to Les and Dave. Having seen every unit up close, I can assure you that RX80M, as it is called, is of an exceptional professional quality. Full details on the cost, specifications, instructional video and ordering information can be found at www.RX80M.com.

Only 100 of these units are available. Although priority is being given to local orders, it will be "first come, first served" so if you want one, don't delay ordering.

80m transmitters (foxes) will be available soon.

~ John VA7XB

Look for the null. One is enough, no need to find two

Press the button and turn receiver by 90 degrees

Fox

SURREY AMATEUR RADIO
foxhunt

HIDDEN 80M TRANSMITTER HUNT
no radio license needed

FREE EVENT · OPEN TO THE PUBLIC

SATURDAY MAY 8, 2021 at 9am

Crescent Park, South Surrey

Parking Enter Off
Crescent Rd. & 129th St.

Crescent Park
Picnic Shelter
Assembly Area

Pre-hunt Coaching,
Registration &
Instruction 9am
FoxHunt 10am—Noon

Location See
QR Code Below

If you are a beginner and do not have an 80m receiver, come anyhow, we have loaner equipment, or we can team you up with someone experienced.

Talk-in 147.36+ (110.9 Tone)

All are welcome but we ask that you RSVP to jamesadf77@gmail.com
COVID Protocols Apply

SARC
Surrey Amateur Radio Communications

March 2021

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1 **On-line Basic Course 19:00 hrs**	**2** **1930 SEPAR Net** **2000 SARC Net**	3	4 **On-line Basic Course 19:00 hrs**	5	6 7:30-9:30 AM SARC Social: Kalmar Family Restaurant 8076 King George Blvd, Surrey, BC CONTEST: ARRL Int'l. DX Contest (SSB)
7 CONTEST: ARRL Int'l. DX Contest (SSB)	8 **On-line Basic Course Review 19:00 hrs**	9 **1930 SEPAR Net** **2000 SARC Net** **SARC-SEPAR Basic Course local exam**	10 **1900 SARC General Meeting** **[Zoom]**	11 **On-line Basic Course Review 19:00 hrs**	12	13 7:30-9:30 AM SARC Social: Kalmar Family Restaurant CONTEST: RSGB Commonwealth (CW); OK, ID QSO party (all modes)
14 CONTEST: RSGB Commonwealth (CW); OK, ID QSO party (all modes); WI QSO party (all modes)	15 CONTEST: WI QSO party (all modes)	16 **1930 SEPAR Net** **2000 SARC Net**	17	18	19	20 7:30-9:30 AM SARC Social: Kalmar Family Restaurant CONTEST: VA QSO party (all modes)
21 CONTEST: VA QSO party (all modes)	22	23 **1930 SEPAR Net** **2000 SARC Net**	24 **1900 SARC Exec Meeting**	25	26	27 7:30-9:30 AM SARC Social: Kalmar Family Restaurant CONTEST: CQ WW WPX (SSB)
28 CONTEST: CQ WW WPX (SSB)	29 **SARC-SEPAR next on-line Basic course starts—7pm**	30	31	For details on all SARC events, go to ve7sar.net		

Contest Details: http://hornucopia.com/contestcal/contestcal.html

April 2021

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	For details on all SARC events, go to ve7sar.net			1	2 **Good Friday**	3 7:30-9:30 AM SARC Social: Kalmar Family Restaurant 8076 King George Blvd, Surrey, BC CONTEST: LA, MS QSO Party (all mode)
4 **Easter** CONTEST: LA, MS QSO Party (all mode)	5 **Easter Monday** **On-line Basic Course 19:00 hrs**	6 **1930 SEPAR Net** **2000 SARC Net**	7	8	9	10 7:30-9:30 AM SARC Social: Kalmar Family Restaurant CONTEST: NE, NM, GA, ND QSO Party (all mode)
11 CONTEST: NE, NM, GA, ND QSO Party (all mode)	12 **On-line Basic Course 19:00 hrs**	13 **1930 SEPAR Net** **2000 SARC Net**	14 **1900 SARC General Meeting [Zoom]**	15	16	17 7:30-9:30 AM SARC Social: Kalmar Family Restaurant CONTEST: CQMM DX contest (CW); MI QSO Party (all mode)
18 **WORLD AMATEUR RADIO DAY** CONTEST: CQMM DX contest (CW); MI QSO Party (all	19 **On-line Basic Course 19:00 hrs**	20 **1930 SEPAR Net** **2000 SARC Net**	21	22	23	24 7:30-9:30 AM SARC Social: Kalmar Family Restaurant
25	26 **On-line Basic Course 19:00 hrs**	27 **1930 SEPAR Net** **2000 SARC Net**	28 **1900 SARC Exec Meeting**	29	30	

Contest Details: http://hornucopia.com/contestcal/contestcal.html

Ham Gear For Sale

For sale are **Four 8' long tower sections** = 32' free standing. The bottom anchors are missing as they were left in the concrete, after it was taken down. **$75.00 or best offer**.

Kjeld also has a rather large Marine Radio (HF?) sitting at his home and he'd like to find a new home for it. If you're interested contact him.

Contact: Kjeld VE7GP 604-531-6396 or VE7GP@telus.net

70 cm Fast Scan TV Transmitter
For sale is an analog fast scan (NTSC standard) ATV transmitter in a hardened and waterproof metal case. Suitable for mounting outdoors. Last used by hams at Simon Fraser University on an emergency communications project in the early 1990s. Runs on 12 VDC. Approximately 100 feet of power/antenna/control cables included. As is, but if it doesn't work to your satisfaction you can return it. **$100 OBO.**
Contact: Kevin McQuiggin VE7ZD/KN7Q   mcquiggi@sfu.ca
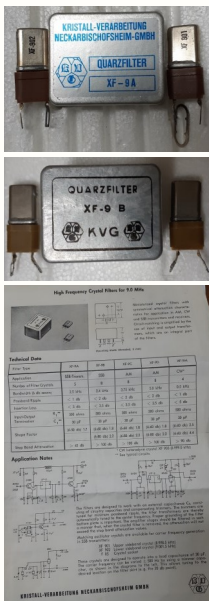
Crystal Filters

$60 each or both for $100, plus shipping.

I have both the XF-9A for SSB TX and the XF-9B for SSB RX plus matching crystals, sockets and spec sheet. These are high quality crystal filters made in Germany. The TX is unused and the RX is like new.

I can also supply crystals to heterodyne 10-15-20-40-80 m to a 9 MHz IF using a 5-5.5 MHz VFO. And, if you are building a receiver, I can provide 9 MHz IF transformers to match.

WANTED: **Old National Geographic and Reader's Digest Magazines.**

Contact: John VA7XB va7xb@rac.ca or 604-591-1825

A *REAL* SDR Transceiver! **Flex-3000 fully SDR 100W Transceiver C$800 with FireWire card and headset adapter (laptop not included)**

Great condition but rarely used now. Details at https://www.flexradio.com/documentation/flex-3000-owners-manual/

Free Oscilloscope

Early 80s solid state Tektronix scope. Has a trace, may need some work but you can't beat the price… Free

Contact: John VE7TI ve7ti@rac.ca

Photos from the top…

Yaesu FTdx 9000 Transceiver HF / 50MHz, boxed, including: 200w dual receive / dual transmit / high-end contesting transceiver, Heil headphone & mic with Yaesu connectors, Heil PR 781 mic & desk boom stand with Heil foot control pedal. $1,300

Icom 706 MkII G HF / VHF / UHF Transceiver $775

Alinco DM-330 mv Power Supply $400

Two KK7UQ Inter-Mod Distortion (IMD) meters (each) $60

Two Daiwa CN-101L SWR Crossed-Needle Power Meter (each) $50

US Navigator Digital Interface (with Yaesu cable connector) $100

Bencher YA-1 Low Pass Filter (1.5kw continous power) $25

Kuranishi HF / VHF Standing Wave Analyzer $200

Palstar DL1500 Dummy Load (1-500Mhz 50 ohm) $150

One Dummy Load antenna $50

Samlex SEC-1212 Switching DC Power Supply 10amp/13.8dc $25

Heil Foot (press to talk) control for microphone $25

Bencher Straight Key $60

Bencher Paddle in plexi case with plug $60

W3FF Buddipole HF Portable Antenna System, c/w carrying case $400

MFJ Econo Keyer II $20

The Gear is located in Qualicum Beach (Vancouver Island)

Interested parties should contact John MacFarlane 250-594-2260 or

qbsurf@shaw.ca

SURREY AMATEUR RADIO COMMUNICATIONS

Radio-Active

John Brodie VA7XB

Profiles Of SARC Members

*John Vander Est
VE7QU*

I was born in the mid '50s in Alert Bay, BC and grew up in Powell River. I have a younger sister and brother, neither of whom are involved in Amateur Radio.

My father worked for the telephone company doing installation and repair work. He sometimes brought home discarded telephones and other items. I don't know how many what would now be vintage telephones I destroyed by taking them apart to see what was inside. I also occasionally accompanied my father when he had some small job to do in the telephone office on a weekend. The step by step exchange was fascinating to watch and listen to as the switches moved in response to dial pulses.

My father also had a general interest in electronics, which helped me to develop similar interests. He amassed quite a large collection of parts and old radios over the years. Members of the municipal garbage crew used to save old radios from the garbage for him.

I think I got my first radio when I was about 9 or 10 years old. I don't have any clear memories of it, but it would have been an old 5 tube AC/DC set. I

became an avid shortwave broadcast listener about the time I started high school. I used an old console radio that had several shortwave bands on it. This really opened the world to me and helped me to learn about countries around the world. Shortwave listening also tuned me into a lifelong fan of the BBC.

When I was in grade 9 a friend who shared an interest in electronics said he was going to attend a night school class to get his Amateur Radio licence and invited me to join him. I accepted the invitation thinking that by attending I could at least learn more about electronics. As the course progressed I became more and more enthusiastic about Amateur Radio. I passed the exam and received the callsign VE7AFD in 1969. I have been licensed continuously since then but have not always been active. Ironically my friend did not pass the exam though he did so a few years later.

My first receiver was a Heathkit HR-10B basic HF amateur receiver. For the first year I used a borrowed Heathkit DX-60 transmitter. I operated exclusively CW on 80 through 15

SURREY AMATEUR RADIO COMMUNICATIONS

metres. CW on HF is still the mode I enjoy the most. At that time all Amateurs were restricted to CW only on HF for their first year on the air.

Art, VE7DO, acted as a mentor when I was starting in the hobby. He helped me to build my own HF transmitter during my first year on the air. It was CW only and initially crystal controlled, restricting transmission to the few specific frequencies for which I had crystals. I later added a homebrew VFO, which enabled me to transmit on any frequency on 80 through 15 metres.

After graduating from high school I attended UBC where I studied physics. I was an active member of the Ham Radio Society there. I lived on campus so one of my favourite activities was to work Japan late at night from VE7UBC on 40m CW. It was a pleasure operating the club's Collins S Line station. I continued to operate my homebrew transmitter and Heathkit receiver from Powell River in the summers.

In 1974 I passed the Advanced exam. Also, during my time at UBC I got my first 2 metre radio, a single channel RCA Carfone base station. It was an ex radiotelephone probably from a remote community or logging camp somewhere near Powell River. I bought crystals for it and set it up on BC's then standard simplex frequency of 147.33MHz.

I graduated from UBC in 1976. Pursuing a dream of spending time living abroad, I went to Nigeria to teach secondary school physics and math. This put me off the air for two years because the country was under a state of emergency and all Amateur Radio activity was suspended. The emergency, however, did not prevent me from pursuing my hobby of photography. I took hundreds of colour slides while there. The experience of living in Nigeria also initiated a love for Africa which continues to this day.

After my return to Canada I attended BCIT, taking the Electronics Technologist program with the telecommunications option. I returned to operating on HF CW during periods I was in Powell River while attending BCIT. I was also on 2 metres a little from both Powell River and Burnaby.
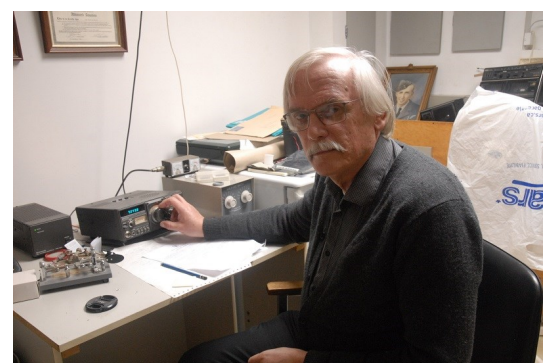
SURREY AMATEUR RADIO COMMUNICATIONS

The first order of business after graduating from BCIT was starting what has become 40 years and counting of happy marriage to my wife, Miriam even though (or perhaps because) Miriam has little interest in Amateur Radio and Technology. We spent our first two years together in Banff, where I worked as the audio-visual maintenance technician at the Banff Centre. While there I bought an HF transceiver and operated a little on CW. I made very few 2 metre contacts from Banff. My Alberta callsign was VE6CLX.

From Banff we moved to The Gambia, the smallest country on the African continent, and I taught in the Telecommunications Training Centre there. My students were trainee technicians for the telephone system and airport. The students had completed their O levels (equivalent to about grade 11 in BC) and they wrote exams set by the City and Guilds of London Institute at the end of the course.

My Gambian callsign was C53EV. I was fairly active on 15 and 20 metre CW while there. Being in a relatively rare country meant there was usually no shortage of people wanting to talk to me, though I don't recall generating any big pileups.

After two years in The Gambia we moved to the United Kingdom where I worked as an electronic test engineer for a scientific equipment manufacturer not far from London's Gatwick airport. Our first son was born in the UK.

He currently works in Halifax as an engineer with the public safety radio system for the Maritime Provinces.

My UK callsign was G0AFX but I was on the air very little, managing to fill only one page in my logbook over the four years we spent there.

We returned to Canada in 1988 and settled in Surrey. My first job was with a manufacturer of two way radio accessories. Then, after a year, I got the job for which I had been unknowingly preparing since high school. It was as a technologist in the electronics shop in the Science Technical Centre at SFU Burnaby. With the others in the shop I repaired and built electronic equipment used in scientific research and teaching. It was extremely varied work, dealing with everything from hotplates to NMR systems. This has turned me into an electronics jack of all trades and master of none.

Our second son was born about the same time I started working at SFU. He currently works in software development in Vancouver.

When we returned to Canada I was issued the callsign VE7FWV and then in 1992 I received my present call. Over the past 30 years I have been mostly inactive in Amateur Radio with a few periods with some activity. Working in electronics has made me look elsewhere for leisure activities. I have continued with photography through all of these years. Some of my pictures may be seen at https://www.flickr.com/photos/jvde. Also, I have been a member of the sound team at our church for nearly 20 years. This has involved operating the sound system for services and special events as well as repairing and modifying the system.

When I retired at the end of last August after over 30 years at SFU I bought a dual band handheld and have been checking in regularly to the Rainbow Country and Surrey nets as a first step to becoming more active on the air again.

~

SEA-PAC Waves

SEA-PAC Weekend Activities
June 4, 5, 6, 2021

SEA-PAC On-Line Seminars

SEA-PAC seminar planning is ongoing. The hope is to have 2 days of on-line seminars, but we need your help.

If you have a topic and/or would like to present an on-line seminar, please contact Delvin Bunton, NS7U, at seminars@seapac.org

Registration will be required to log into the seminars.

SEA-PAC QSO Party

The planning for the SEA-PAC QSO Party is well on its way. Here are a few highlights, more to follow on the SEA-PAC website and in future Waves newsletters.

- The SEA-PAC QSO Party will be a contest to encourage Radio Amateurs in the Pacific Northwest and beyond to work as many stations as possible
- There will be 4 categories, SSB high and low power, digital and Sponsoring Club Bonus Stations, W7OTV and W7AIA
- The Party will run on Saturday, June 5th and Sunday June 6th

https://SeaPac.org

The Contest Contender

The BCQP as distributed multi-op

Fred Orsetti VE7IO
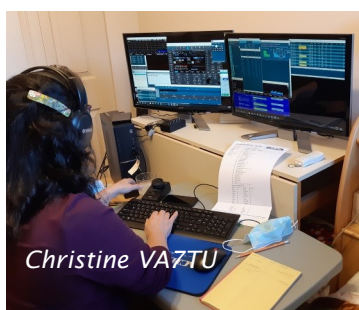
Christine VA7TU
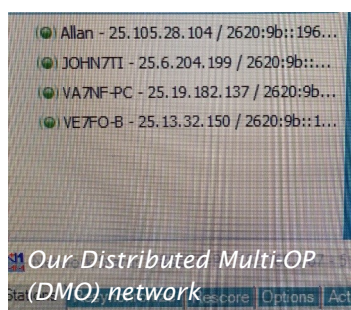
Our Distributed Multi-OP (DMO) network

Stan VA7NF at VE7IO

John VE7TI

For the BCQP we operated as a M/M distributed multi-op (DMO) and the setup worked flawlessly. We seem to be improving our skills in setting up and using the DMO setup.

All stations were located in the Metro Vancouver area with two of the 5 on the VPN located at VE7IO with one remoted and the other in the shack. We had our limit of 5 stations connected for the free service.

We used a combination of radios at VE7IO the radio in the shack was a Flex 6700 and the remoted radio was an Icom 7610. Jim, VE7FO, was operating an Elecraft K3, Al, VE7WJ, was running an Icom 7700 and John, VE7TI, was running an Icom 7300. Guest operators who operated the remote radio at VE7IO were Jeanne, VA7QD and Christine, VA7TU. Due to Covid-19 we were careful to only have one operator at the remote radio at a time with cleaning between ops.

Stan, VA7NF operated the Flex 6700 full time in the shack and he was the biggest contributor to the final score. He operated CW only.

Our final score was 1,157,096 points

N1MM performed flawlessly as well and we were able to communicate with each station using the talk feature. Thanks to all the stations who participated in the BCQP and a particular thanks to the stations that put us in their logs.

~ 73 Fred VE7IO

Band	CW Qs	Ph Qs	CW Mults	Ph Mults
160:	7	0	6	0
80:	20	60	11	28
40:	122	32	52	20
20:	338	345	70	59
15:	104	114	41	39
10:	0	0	0	0
Total:	591	551	180	146

The Contest Contender II

2020 BCQP

Rebecca Kimoto VA7BEC

Participation was up

Normally, I have my 3830 post ready within a few days of BCQP ending. That was not possible this year because I was so busy confirming receipt of BCQP logs. Maybe it's time for a contest robot? But then, you'd all miss out on my charming, personalized emails. LOL And I'd miss out on all the lovely replies.

I think participation was up this year, especially on CW. Quite a few operators did mixed mode, so they would periodically disappear from CW when they switched to PH and vice versa. That might have created the impression that there were fewer operators calling CQ at any given time. But overall, I believe the BC presence was quite solid.

Some people who have posted to 3830 don't share this view. It's interesting to read how some operators heard and were heard by a lot of BC stations and built very nice-sized logs - certainly larger than last year — while others felt there was a dearth of operators to contact.

Perceptions vary from station to station, of course. It's the whimsical, or fickle(?) nature of the propagation gods that make signals strong, clear, armchair copy, are-you-in-my-driveway beautiful into one area and down in the mud to another area, regardless of actually distance. But then, so many factors are at play, from equipment and operator ears to conditions, band + time of day and good timing when a band opens.

I'm not sure if conditions were all that much better than last year. Zero sunspots. Horrible QSB. Major noise - maybe just local, but hard to catch callsigns on the first try. But stations near and far certainly persevered. Despite the challenges, the depth of participation seems to have improved, or maybe it's just that the regular crowd stayed in the chair for more hours?

I noticed some new BC callsigns in the mix, some calling CQ in little-activated districts. A fabulous development that I hope is the beginning of a new trend. But some of the regular participants, many of

> *…I'm not sure if conditions were all that much better than last year. Zero sunspots. Horrible QSB. Major noise - maybe just local, but hard to catch callsigns on the first try.*

SURREY AMATEUR RADIO COMMUNICATIONS

them multi-op teams at club stations, weren't on the air. Undoubtedly a consequence of COVID-19 restrictions on gatherings.

From my perspective at sponsor station VA7ODX and from what other BC operators have told me, 10m was a blank, 15m had moments… so, of course, it was a matter of good timing to move to 15m at those moments — and 20m was the workhorse band. But for that reason, maybe, 20m was very crowded. I had a hard time finding a place to run and running is what the sponsor station must do. 40m, 80m and 160m were, naturally, most productive in the evening. For CW operators, Saturday evening activity was hindered by NA Sprint. But happily, Sprint shifted to a 0300z start and ended an hour earlier than in the past which gave BCQP participants an hour clear of Sprint mayhem to log some Qs on the low bands.

I feel that BCQP 2021 was very well attended. As always, it would be nice to have more BC stations on the air and calling CQ. It's a gradual process. I know a number of regular participants who still aren't comfortable calling CQ. They have good signals when they do S&P, at least when I hear them, but they don't or won't or can't call CQ for whatever reason. As a result, it seems like there aren't many BC stations involved. That said, several times I looked at the cluster, mostly to make sure that VA7ODX had not been busted. If it was listed as VE7 or DOX, I would have moved. Anyway, I often saw several other BC stations above and below. Great stuff! Makes S&P a lot easier and more fun for everyone near and far. The CW OP saw the same on CW. A terrific development.

BC Electoral District map

And obviously there were so many U.S. stations keen for a QSO. The State QSO Party Challenge put BCQP in a very bright spotlight. People who used to only focus on MNQP or maybe MNQP with a little VTQP on the side realized they would benefit by responding to BC stations calling "CQ BCQP". A lot of people did, achieving results perhaps beyond their expectations.

On numerous occasions, as I was looking for a running frequency, I came across U.S. stations calling "BCQP. Looking for BC stations." A nice strategy. It does have a downside — the outside-BC station gets responses from other stations outside BC, so no BCQP points. But it absolutely has an upside — BC stations that only do S&P will throw out their callsign and probably a nice mult to boot.

QSO parties are typically casual events. They are a great entry point into more competitive international weekend marathons because they allow participants to become comfortable with equipment, learn how to call CQ and efficiently exchange required information, and fine-tune operating strategies in a less stressful on-air environment.

It was wonderful to hear so many familiar callsigns and to exchange a quick hello amid the VA7ODX pileups. Let's all do this again next year February 5-6, 2022 — and bring your friends to the party. The more, the merrier — well, actually, the more, the bigger the pileups. And that is absolutely more fun.

Stay safe. Stay well.

~ *Rebecca VA7BEC*
  BCQP Contest Coordinator

General Meeting Minutes

January 13, 2021

SARC General Meeting Minutes January 13, 2021

Attendees: 44

Meeting Start: 7:00pm

Location: Online Zoom Meeting

Welcome & presentation of agenda

John Brodie welcomed everyone to the meeting. We had many guests, and will try to get through the business portion quickly to allow for the presentation "Getting Started on VHF" by John Schouten VE7TI.

Financial report

Scott presented a financial report.

SEPAR Report

Gord VA7GK: SEPAR Executive meeting to be held tomorrow Jan 14th.

January 28th at 7pm there will be apresentation on the Emergency Program and BCWARN (Amateur Radio system EOC-to-EOC Internet Network) Email va7gk@shaw.ca for the invite link.

Weekly winlink check-in Send email to Don va7gl@winlink.org to participate.

Repeater Report

Steve VA7SXM: Funding was approved at the last meeting for IRLP nodes, the PSU and battery. The IRLP nodes have been installed, PSU and batteries also installed. The batteries we had already were re-purposed for the repeater sites. We did not yet buy batteries but once the OTC is available we would buy 1-2 new batteries.

John VA7XB: We have had some noise issues for several months related to a NEW 600 KHz AM broadcast station nearby. It's not the AM stations fault but a rusty connection or some other as yet unknown issue at the repeater site. It's being worked on by several members and we have taken this opportunity to replace some components like IRLP nodes and power supply.

Ham Class

John VE7TI: A very large class (64 students) in January including a group of firefighters from central BC and students from as far as New Brunswick. The demand has caused us to expand to two separate classes per week, on Tuesday and Thursday evenings, both online. Steve McLean VA7SXM is now a licensed SARC examiner.

The Communicator

John Schouten VE7TI: The January-February issue is available online and is well received 1000s of page loads so far. Still seeking Antarctica, our one missing continent as a viewer. Contributions can be sent to communicator@ve7sar.net

SURREY AMATEUR RADIO COMMUNICATIONS

OTC (Operations Training Centre)

Gord VA7GK: No update, Ciyty of Surrey is preparing for the electrical work required.

Field Day

Jason VA7ITJ: An exercise in June and often in the field (outdoors) but not always. It's a contest and social event June 26-27th 2021. Field Day 2020 was missed due to the pandemic. Email to j.w.biggin@gmail.com to volunteer for planning Field Day 2021

FoxHunt

Anton VE7SSD: Our foxhunt is an annual event and this year it will be held on Saturday May 8, 2021 at Crescent Park in White Rock 10am-12:30pm.

Amateur Radio Direction Finding can be fun for everyone. Five 80m transmitters are hidden within the grounds of the field. We set out to find them. Coaching will be provided and equipment can be available for loan. 80m receivers are available for sale.

See https://ve7sar.blogspot.com/2019/05/sarc-fox-hunt.htm

and http://www.rx80m.com/ for more info.

This is a free event but the BBQ after (if it is held due to COVID) is $10. Contact Anton James jamesadf77@gmail.com to RSVP for the hunt, BBQ or both.

New Business

None

Presentation

Getting Started on VHF - John Schouten VE7TI The presentation may be viewed at https://drive.google.com/file/d/1TkZWzDsznMV1hbcq69Jwtn9AxSp3MCXW/view?usp=sharing

Next month's meeting topic is Getting started on HF

Motion to adjourn the meeting by John S. seconded by Gord K.

Meeting Adjourned at: 9:05pm

Minutes prepared by Jeremy Morse VE7TMY

~ Jeremy Morse VE7TMY

Message from Hans-Martin DK2HM: APRS - more than just position data

APRS is more than just position data. Very often APRS is only known for sending out position data. At the same time APRS provides a lot more services and applications. With APRS you can send e-mails, do a qrz.com query, ask for the next transit of the international space station ISS, use it for a SOTA mountain activity and much more.

To get an overview, I have set up a page on my local radio club's homepage with all known APRS services. For sure there is a lot more. I am thankful for all additional ideas, that for sure will be added to the list.

So please let me know. You can find the overview in English on www.t08.net/aprs-en/

General Meeting Minutes

February 10, 2021

SARC General Meeting Minutes February 10, 2021

Attendees: 43

Online Zoom Meeting

Welcome & Introduction

John Brodie welcomed everyone and called the meeting to order at 7 pm. Introductions were skipped in the interest of time.

Agenda

Gord K. moved to accept the agenda. Steve M. seconded. Carried

Announcements

John B: the March meeting will be a presentation by Kevin VE7ZD titled "Success on FT8"

April meeting will be an introduction to foxhunt plus off-roading (RR, LADD and APRS).

May meeting is usually Field Day Planning.

June is our AGM.

Financial Report

Scott H. gave a financial report. Thanks were expressed to Marvin Hunt, who was instrumental in getting our first Surrey Community grant a few years ago.

SEPAR Report

Gord Kirk, emergency radio coordinator for the Surrey Emergency Program Amateur Radio, described SEPAR as comprised of amateur radio operators who volunteer their time to serve the City of Surrey and the community when regular communications are interrupted. Last month SEPAR had a presentation on BC Warn, which is a backup Internet communications linking system created by amateurs for amateurs. This started with the Okanagan Fires years ago when there was a need for assistance in messaging. SEPAR's next meeting does not yet have a topic but will be on Thursday, February 25th 7-8:30pm PDT on Zoom. Please send an email to Gord for an invitation: ve7gk@shaw.ca.

Communicator

John S. is about to get started on the next Communicator and is looking for articles. He noted that Daniel Romila, who has provided many articles for the last few years, has decided to focus his attention elsewhere.

If anyone has anything for sale please email communicator@ve7sar.net. If you have a For Sale ad in the Communicator please let John know if it should continue or not. Stats are slightly lower than previous months ~4800 downloads, but with 3 more countries which brings readership up to 130 countries.

Repeater Report

Steve M: We still have the intermodulation issue and have been troubleshooting it. Next step is to test our antenna, pull it down and clean it up or possibly replace it to see if that helps. The South repeater is online.

SURREY AMATEUR RADIO COMMUNICATIONS

Ham Class

John S. We are into week 4 now and it's being hosted online Monday and Thursday. On Tuesday we still have the in-person class at the Fire Training centre but because of the mask policy and COVID we're down to about 2 attendees. We are recording the sessions and making them available to the students on CANVAS.

The manual, question bank, and recorded presentation of the meetings on Mon/Tues are now available. We are already gathering students for the next course and the demand is high.

Membership

John B. We are well over 200 members now, many of whom are ham class students with a free 1 year membership.

OTC (Operations Training Centre)

Gord K: A new shared space has been located where the SFSR (South Fraser Search and Rescue) is currently located. We met with the electrician on Monday to discuss power requirements and are hoping in the next few months the electrical will be completed and we can move in. The gray portable HF beam and tower/trailer will be used.

Field Day

Jason Biggin will be providing an update on Field Day planning soon.

John B.: Field Day is the 4th weekend in June every year. In previous years we've held this at Grandview Heights school. We do not know yet what form Field Day will take this year due to COVID.

FoxHunt

Anton: Foxhunt is an annual event and this year it will be held on Saturday May 8th at Crescent Park in White Rock from 10am to 12:30pm. Even if you have not participated in an ARDF event before, everyone is welcome. We will have some 80m receivers available for

loan and as well some will be available for sale at $125. If you wish to purchase see: http://ve7sar.net/docs/Model%20RX80M%20Information.pdf. Last year we were able to hold the actual event but could not host the BBQ. This year we will see if conditions improve to allow us to continue as planned. In our April meeting we will have some discussions about the Fox Hunt and some training.

Our Field Day video is at: https://youtu.be/DMEKWOyaAnc

New Business

None.

Presentation

Getting Started on HF - The presentation may be viewed at : https://drive.google.com/file/d/1pQbcxoy2FX5u1G8uJNTE2K17jtH5JuBd/view?usp=sharing

Tonight's Presentation:" Getting Started on HF" was presented by: Steve, John XB, Stan, John TI, Gord and Kevin followed by a question period.

At 9:22 pm, Steve moved that we adjourned the meeting. Seconded by John S. Carried.

~ *Jeremy Morse VE7TMY*

Keep one wavelength apart at 144 MHz

144 MHz

λ

(2.0M)
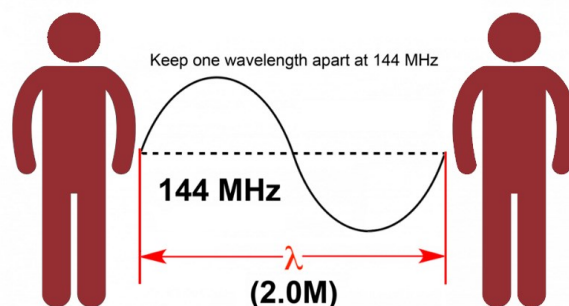
The Communicator

The Monthly Newsletter of the Surrey Amateur Radio Club

February 2011

The **SARC Communicator** is published monthly for members of the Surrey Amateur Radio Club.

SARC maintains a website at **www.ve7sar.net** that includes club history, meetings, news and other information.
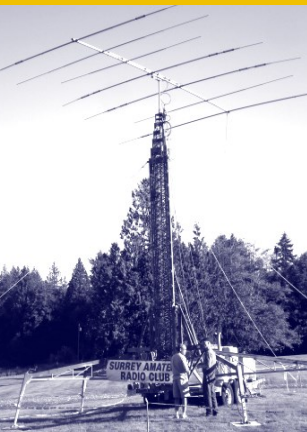
Repeaters On The Move!

Proposed SARC Site at Concord Pacific Tower

It looks like an exciting year coming up for SARC. On the agenda for the immediate months ahead are the purchase and installation of new radios and antennas at the proposed repeater site on Concord Pacific tower, the integration of our repeaters with SEPARS' 220 MHz capability for the EOC and Go Kits, and access to BC WARN.

All these changes will dramatically enhance SARC's VHF and UHF coverage within Surrey and beyond and, through a microwave link to SFU and the BC WARN system, allow reliable access the Internet, telephone, D-Star, digital, voice and email services even if the public systems fail during an emergency. These developments are going to take much of our spare time and all our ingenuity, but fortunately we have the help of some willing and capable non-members to help with the tricky parts.

There has been much pre-planning and modeling, and the new location should provide not only an expanded footprint but significantly better coverage within Surrey. While the existing site has served us well, the proposed site at King George Boulevard near Fraser Highway is at significantly higher elevation thereby covering areas that proved difficult in the past.

Our relationship with the Surrey Emergency Program Amateur Radio Society (SEPARS) and the City of Surrey make this a tremendous partnership and an opportunity to add a reliable and robust link for emergency communications in the Metro Vancouver area.
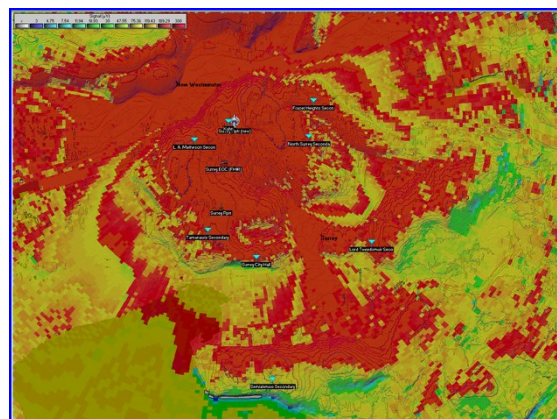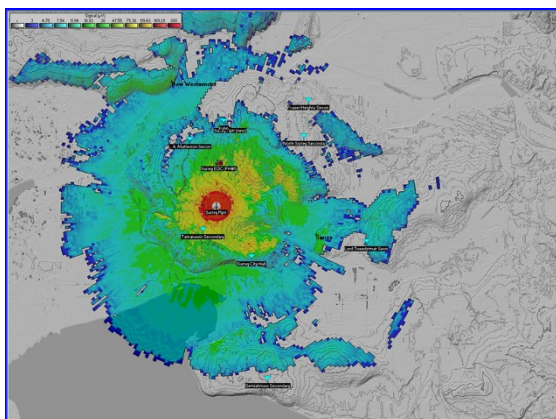
Above: A plot of the current vs the proposed repeater's 2-meter coverage

SURREY EMERGENCY PROGRAM AMATEUR RADIO
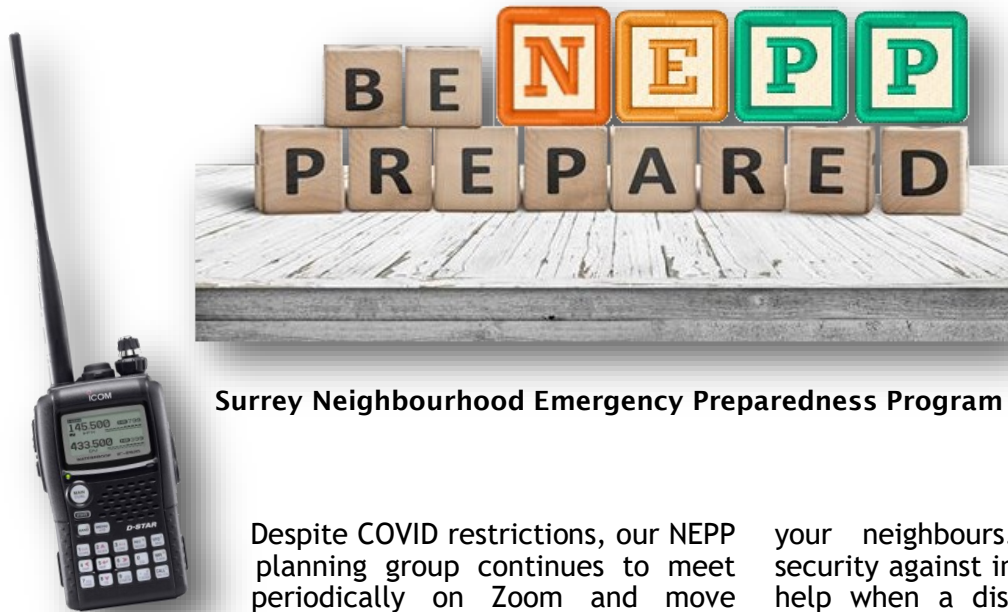
Surrey Neighbourhood Emergency Preparedness Program

John Brodie VA7XB

Despite COVID restrictions, our NEPP planning group continues to meet periodically on Zoom and move ahead for the day when the entire 50-home neighbourhood (one component of the 1000+ homes in Panorama Ridge) can get together in person and share our concepts for preparedness. Meanwhile, several things are happening.

Once the end of COVID restrictions is foreseeable, our strategy is to host another neighbourhood get together and roll out developments of the past year. This would be preceded by a door-to-door invitation to residents along with a brochure which would contain useful information in emergency planning such as tags and labels to be affixed to gas, water, power and furnace shutoffs. Also included would be contact information, confidential questionnaires for residents to identify any health or special needs, equipment that could be deployed for an emergency and check-list for preparedness etc. This meeting also provides an opportunity to identify special skills and recruit additional members for the team. We have found in the past (pre-COVID) that a pot luck social preceding a "business" meeting usually gets them out.

One of the major benefits of NEPP planning is that it provides an opportunity to get to know your neighbours. Whether the issue be security against intruders and thieves, or self-help when a disaster occurs it is mutually beneficial to know who is available to assist and, moreover, to know of the sick, elderly or otherwise vulnerable who may need help.

My personal task in NEPP planning for our neighbourhood is Communications and Transportation. This means addressing not only the exchange of critical information amongst neighbours and team leaders during an emergency, but also communication with the outside world if the inevitable telephone, power and Internet failures occur. I am working with Gord Kirk VA7GK of SEPAR to develop a communication strategy which will guide the use of FRS/GMRS radios (walki-talkies) at a local level and to document procedures for communication with the larger ham community and the EOC at Surrey Fire.

We are encouraged that the vision of our contacts at the Surrey Emergency Program appears to one in which Search & Rescue, SEPAR, SARC and NEPP fulfill separate but mutually supportive roles in emergency planning for Surrey. We look forward to the day when we all have access to the joint facility currently under preparation and can fulfil our respective roles.

~ *John VA7XB*

We're

QRT

for this issue

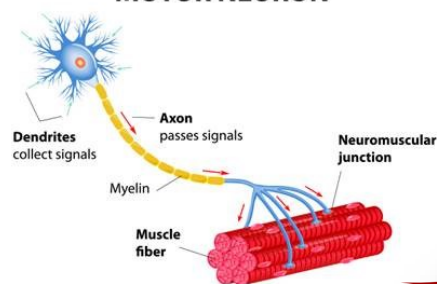# Stimulating the Neurons

John Brodie VA7XB

"None are so old as those who have outlived enthusiasm" – Henry David Thoreau

"Anyone who stops learning is old, whether at twenty or eighty. Anyone who keeps learning stays young" – Henry Ford

Wise words. Are you a person who is old at thirty, or are you one of our octogenarian members who seeks fresh challenges and is not afraid to tackle them head-on? Most of us have both types in our circle of acquaintances and colleagues. But it is worth asking ourselves introspectively in which category do we personally fit?

As we move into our senior years, our physical bodies don't perform the way they used to, we have increasing medical issues, and even if we are blessed to be in good health, then our mental faculties diminish. We may be able to put off the day when we are no longer compos mentos but our ability to solve problems, think quickly or deal with trauma or unusual problems becomes more difficult.

MOTOR NEURON

Dendrites collect signals

Axon passes signals

Myelin

Neuromuscular junction

Muscle fiber

What our atrophying brains need to delay the inevitable is stimulus, i.e. the neurons need to be considered like other muscles that require exercise and some degree of stress. While I personally get great pleasure from fighting through CW pileups in a DX contest which relies on a skill I learned as a 15-year old when my brain was young and receptive to new information, it can give me even more pleasure in my senior years to learn a new skill that involves stretching my mental capacities to their limit, then takes me into a new world.

We can anticipate many frustrations in this process. But if success finally comes after many days or weeks of
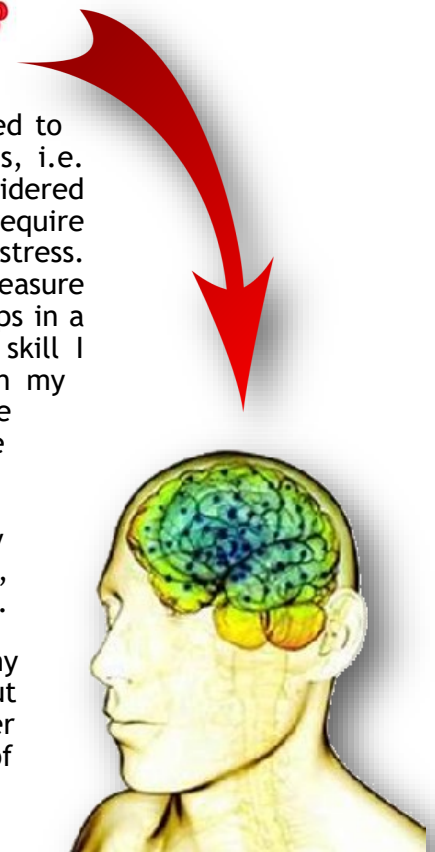
SARC SOCIETY DIRECTORS 2020-2021

PRESIDENT
John Brodie VA7XB
president at ve7sar.net

VICE PRESIDENT
Steve McLean VE7SXM
vicepresident at ve7sar.net

SECRETARY / WEBMASTER
Jeremy Morse VE7TMY
secretary at ve7sar.net

TREASURER
Scott Hawrelak VE7HA
treasurer at ve7sar.net

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Gord Kirk VE7GK
(SEPAR Liaison)

Kevin McQuiggin VE7ZD / KN7Q

John Schouten VE7TI
(SARC Publications/Blog/Social Media & Courses)
communicator at ve7sar.net
course at ve7sar.net

Stan Williams VA7NF

SARC MEMBERSHIP, NET & CONTEST MANAGER
John Brodie VA7XB
membership at ve7sar.net

SARC QSL MANAGER
(pro tem) John Brodie VA7XB

SARC REPEATER MANAGER
VACANT
repeater at ve7sar.net

frustration and failure, the achievement is all that much more gratifying. The hobby of amateur radio offers many such technical challenges as it is, by nature, on the technical frontier of innovation.

Though slightly late for New Year's resolutions, why not resolve that this is the year you will take on a new and daunting task and venture into unknown territory? It is actually easier now than ever before as instructional videos can be found on virtually every imaginable topic.

You will also find many ideas for extending your knowledge and experience within the pages of the Communicator. Scan it from cover to cover and you will be sure to find some topic that is beyond your comfort level. Reach out and explore this amazing world of amateur radio in all its varied facets. You won't be sorry and you may achieve things that you could not have imagined possible.
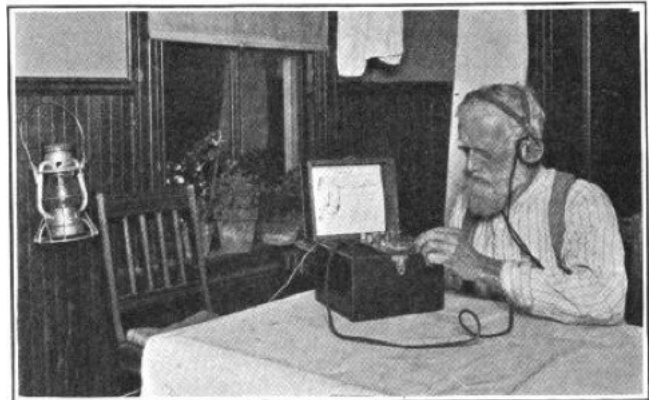
In the process you may add another dimension to your universe. The biggest benefit is that you will have given your brain an extended lease and felt better while it happened.

For myself, I am going to take up Reg's challenge and construct an iGate, though I have never used Raspberry Pi and have only the thinnest understanding of APRS. How about you? What will be your challenge?

~ *John VA7XB*
  SARC President

It's always tough getting out of a concrete and steel building!

We understand Dixie Mogg VA7DIX has been under the weather. Apparently she is recovering and we hope to hear her back on the air soon.

It's March

Well, it looks like better weather is not far off… Time to experience all the levels and all facets of our great hobby.

At our general 'Zoom' meeting on Wednesday, March 10th we will feature a joint presentation on 'Discover FT8', followed at the April 14th meeting with a fox hunt update, APRS and an off-roader/outdoors radio presentation. Whether you're a beginner or pro, we think you will enjoy these topics.

Please join us, visitors always welcome.

Take care, stay healthy!

Down The Log…

SARC Monthly Meetings

2nd Wed. (Sept-Jun)
1900 hrs at the Surrey Fire Service Training Centre, 14923 - 64 Avenue, Surrey, BC. Here is a what3words link and map:
https://what3words.com/markers.addiction.ozone

Weekly SARC Social

Saturday between 0730 and 0930 hrs at the Kalmar Family Restaurant 8076 King George Blvd. Surrey

SARC Net

Tuesday at 2000 hrs local on 147.360 MHz (+) Tone=110.9

SEPARS Net

Tuesday at 1930 hrs local on 147.360 MHz (+) Tone=110.9

VE7RSC Repeaters

2m North: 147.360MHz+ Tone=110.9Hz
IRLP node 1736
Echolink node 496228

2m South: 147.360MHz+ Tone=103.5Hz Fusion capable; No IRLP/EchoLink

1.2m: 223.960 Mhz -1.6 Tone=110.9

70cm: 443.775MHz+ Tone= 110.9Hz
IRLP node 1737

SARC hosts an Amateur Radio net each Tuesday evening at 8 PM. Please tune in to the VE7RSC repeater at 147.360 MHz (+600 KHz) Tone=110.9, also accessible on IRLP node 1736 and Echolink node 496228.

On UHF we operate a repeater on 443.775MHz (+5Mhz) Tone=110.9 or IRLP Node 1737.

We are looking for a SARC Net Manager. Its not a difficult job and, if you have some time to spare, we'd like to hear from you. Basically it involves scheduling someone to do the Tuesday evening weekly net.

SARC Net 20:00 Hrs	
1st Tuesday **Standby**	Jean-Luc VA7JLU Vacant
2nd Tuesday **Standby**	Jinty VA7JMR Sheldon VA7XNL
3rd Tuesday **Standby**	Rob VE7CZV Vacant
4th Tuesday **Standby**	Kapila VE7KGK John VA7XB
5th Tuesday **Standby**	Jinty VA7JMR John VE7TI
Want a turn at Net Control? Contact the SARC Net Manager	