Ottawa Amateur Radio Club

Groundwave

P.O. Box 8873, Ottawa, Ontario, Canada, K1G 3J2

March 2019

This month's speaker (rescheduled from February) is Ron Schwartz, VE3VN, and the title of his presentation is "Chasing 6 Meter DXCC with FT8". DXCC on 6 meters is hard even during a solar maximum and the current lack of sunspots makes it harder still. A contester and 6 meter enthusiast resorted to FT8 and worked 56 countries in 8 weeks during last summer's sporadic E season. Find out how he did it, and how you can too.

See you at the meeting.

Ian Jeffrey, VE3IGJ
Editor

Check out our Web Page: ***www.oarc.net***

Next Meeting 7:30 pm, Wednesday, March 13h in the Colonel By Room at Ottawa City Hall

In This Issue....

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Groundwave
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Articles may be submitted for use in this publication provided that they portray events or activities that promote Amateur Radio. Letters and comments are also welcome. Submissions may be made by mail addressed to the Editor care of the OARC, or by e-mail to "ve3igj@rac.ca". Deadline for submissions occurs three days after the regular monthly meeting of the OARC.

Please support your local radio organisations. They support you!

Club Information

The Ottawa Amateur Radio Club Inc. is an association of Radio Amateurs devoted to the promotion of interest in Amateur Radio communications in the National Capital Area and to the advancement and achievement of club members.

Regular Meetings of the OARC Inc. are held on the second Wednesday of each month (except July and August) in the Colonel By Room which is on the second floor of Ottawa City Hall, formerly Regional Municipality of Ottawa Carleton Headquarters, on Lisgar Street. Meetings commence at approximately 19:30 local. Further details about each meeting are noted elsewhere in this publication.

Executive Meetings of the OARC Inc. are normally held on the first Wednesday of each month at 19:30 local. Contact the President to confirm the date, time and place of the next meeting.

The CAPITAL CITY FM Net meets every Monday (except some holidays) at 20:00 local on the club repeater VE2CRA (146.940-, 100 Hz) to pass traffic and to make announcements of interest to amateurs in the National Capital Region.

The Rubber Boot Net runs week days at 07:30 local on VE3MPC (147.150+, 100 Hz CTCSS tone) hosted by Mike, VA3TJP. The Rubber Boot net has been running since the early 1980's and is popular for the early risers and the go to work crowd.

The POT-HOLE Net is a SSB/HF net sponsored by the Ottawa Valley Mobile Radio Club and is conducted every Sunday at 10:00 hours on 3.760 MHz**.** All amateurs are welcome to check in.

The POT-LID CW Net is an informal slow-speed **CW** net that meets every Sunday, except during July and August, at 11:00 hours on 3.620 MHz, to promote interest in CW and CW procedures.

The QCWA CHAPTER 70 Net meets every Monday evening at 19:30 local on repeater VE3MPC 147.150+, 100 Hz) You do not have to be a QCWA member to participate.

The Ottawa Valley VHF/UHF SSB Net is sponsored by the West Carleton ARC. Look for it every Tuesday night (except the first Tuesday of the month) around 21:00 local on 144.250, (roll calls after net on 50.150, 432.150, 222.150, and 1296.100.) Horizontal polarization is preferred.

The Phoenix Net meets Tuesday evenings at 20:00 local on VE3MPC (147.150+, 100 Hz CTCSS).

The regular **OVMRC net** meets Thursday evenings at 20:00 local on VE3TWO (147.300+, 100 Hz CTCSS tone) analogue FM.

VE3TEN

Tuning in the beacon so that it makes sense requires you tune to **28.175** on **CW** and read the tone that is there . The spaces between the elements are the higher tone. If that doesn't work, tune to **28.175.28** on **lower sideband** for better results.

The Ottawa Amateur Radio Club bulletin "Groundwave" is published and distributed to club members. Publication dates may vary but it is hoped that the bulletin arrives at its destination before the events listed in it have expired. The bulletin is not published for July and August when meetings do not occur. Every effort is made to provide accurate information in the bulletin, however we are all human and mistakes can be made. The OARC accepts no responsibility for any damages that may result from this. The opinions expressed in this bulletin are those of the author.

Voice (VHF) 146.940/146.340 100Hz CTCSS required
(UHF) 443.300/448.300 100Hz CTCSS required

VE3TVA Amateur Fast Scan Television Repeater
Currently off the air and looking for a new home.

IRLP Node 2040 146.940/146.340 (VE2CRA/VE3RC)
(Code 411 for info) (Code 204 for activity)
(Code 88 for time)
For further information please contact the Repeater Chair.

Note: The IRLP link is not connected to ECHOLINK. Please do not try to connect using the alpha keys on your keypad. It just confuses the operator.

Note: The IRLP link is disabled during the Monday night Capital City FM Net from 20:00 to about 21:45 .

Ottawa Amateur Radio Club
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March 2019

February Minutes

As a result of the cancellation of the February meeting due to weather conditions, there are no minutes.

YL 33: The First Female Ham Radio Operators

In honour of International Women's Day, March 8, we are including the following article by Ashley Hennefer from 2014. Ed

Historically, literacy—in its many forms—has given the marginalized a way to speak and participate in a system that previously prevented them from doing so. And while the printing press revolutionized the way writing was exchanged and shared with the world, the invention of radio as entertainment, emergency, and communication technology had a similar effect on oral storytelling. From this, ham radio, also known as amateur radio, was born as a subset of commercial radio. The appeal of communicating independently to others across the globe struck a chord with many people in the early 20th century—including women looking for ways to participate in war efforts, and connect with other women around the world.

Although enthusiasm for ham radio as the medium of choice for hobbyists, veterans, and emergency responders hasn't waned much over the last fifty or so years, the hobby is making a strong resurgence as aspiring makers acknowledge radio's contribution to the movement. Many hams consider amateur radio to be the original maker skill, requiring knowledge of electricity, geography and communication.

And it's one of many mediums that gave women the chance to have a global voice—and they took it.

Dates to Remember

2019

Feb. 9-10	Canada Ski Marathon
Apr. 10	Homebrew Night
May 17-19	Dayton Hamvention
Jun. 12	OARC AGM and Elections
Jun. 22-23	Field Day
Jul. 1	RAC Canada Day Contest
Sep. 14	OARC Hamfest
Sep. 21	Radio in the Park
Sep. 30	Membership Renewals Due
Nov. 1	Joe Norton Award Subm. Due
Nov 21-23	Tall Pines Rally
Dec. 28	RAC Winter Contest

Calm the ham

For those unfamiliar with the subculture of ham radio, the title "ham" was originally used as a negative name associated with amateur operators who, without proper training, would disrupt professionals. Eventually, though, the name lost its negative stigma and is now used interchangeably with "amateur." Regardless of someone's amateur status, all operators must be licensed and complete a training program, through FCC [*in the USA. Ed.*] regulations.

Female hams are called "YLs," which is short for "Young Lady," regardless of the operator's age. While that seems simultaneously antiquated, cute, and patronizing, keep in mind that the ham radio subset of men is referred to as "OMs," or "Old Man." The largest organization for YL ham operators in the world is the Young Ladies' Radio League, Inc. (YLRL), founded in 1939, which exists to encourage and assist YLs throughout the world to become licensed amateur radio operators.

Although amateur and commercial radio was heavily male-dominated, the response to the

(Continued on page 5)

mk's Word

March, and Febrrrruary is over, finally. It is not very often that an OARC meeting gets cancelled by the weather, which just reinforced my feelings about that month. The only good thing about February was that the depth (height?) of the snow meant I could do some tree trimming without using a ladder. The CSM has come and gone for another year. Once again I decided to sit it out. I gather all went well, but expect a full report at the meeting. Speaking of the meeting, I saw Ron's presentation at the Contest Club of Ontario meeting during yet another snowstorm. It is worth seeing, even if you aren't sold on FT8 or 6m DXing. After waiting since November, I FINALLY got a package from China which contained a new set of paddles. They seem to be just what I was looking for in a lightweight, rugged paddle for portable use. The Bencher style are too much of a "hot house flower" for my type of operating, so I have been looking for an alternative for a while now. I will bring them to the meeting so you can have a look. I gave them a workout in the ARRL DX CW contest, with nearly 150 contacts in a rather limited amount of operating time. That may not be much to big time contesters, but I had a lot of fun, worked most of those warm sunny places in the Caribbean, and didn't have to fix the paddles even once. I think I even got a new country in the LOTW log out of the deal. Good times.

After the trouble I had in Winter Field Day, I have been working on a portable 40-20m dipole, along the lines of the 80-40 one I have used at a few "Radio in the Park" and "NVIS test" days. If enough snow goes away, I'll try to get it tuned up enough to bring to the April meeting. There are times when the extra length of an 80m antenna, whether shortened, multi band, end fed, or just the good ol' standard version is just too much of a hassle to be worth putting up for operating in the daytime. As we March fo(u)rth, we get to play in the Commonwealth Contest on the 9-10th. It has to be one of my favourite contest, with no competition from the US, and lots of interesting DX making an effort to get on the air. Maybe, just maybe, we will be able to swap the moon boots and parka for rubber boots and a jacket. Just don't lose track of the snow shovel quite yet.

73 mk
VE3FFK

Fact of the Day

Ground Rod Resistance Measurement

The resistance between two ground rods spaced farther apart than their length can be measured to obtain a general indication of their likely ability to safely conduct lightning induced currents to earth. However, resistance measurements taken soon after ground rod installation are inaccurate, because the soil is not yet in good contact with the rods. It is necessary to wait six to eight weeks in average soil to obtain a reliable measurement. The measured resistance will be twice the earth contact resistance of one rod if the rods are identical. Earth contact resistance below 5 ohms is excellent. 5 to 10 ohms is good. 10 to 15 ohms is poor. Grounds with more than 15 ohms resistance are of little value in reducing damage from lightning induced currents.

IRCs Still Valid

I had thought that IRCs were made invalid by Canada Post years ago, but I was wrong!

I even threw away a wad of them at the time. Now that foreign postage is $2.50/letter, they can save some $$. If you google the Canada Post site suggested below, and print out the page, you also have the proof to persuade those post office people who never heard of them!

"I just stopped by Canning PO, and the postmistress wasn't sure about the validity of the

(Continued on page 6)

(Continued from page 3)
influx of women operators was—and still is—largely positive. In "The Feminine Wireless Amateur," a 1916 article in The Electrical Experimenter, the writer says:

> "Just because a man, Signor Guglielmo Marconi by name, invented commercial wireless telegraphy does not mean for a moment that the fair sex cannot master its mysteries. [...]
>
> Women seem to progress excellently in the engineering branches. Primarily this is so because her brain is quick of action, and moreover she usually will be found to have extremely well-balanced ideas as to proportions, so essential in designing. A wonderful imagination coupled to a number of other worthy faculties help to make a really fine combination, so that we find a steadily growing number of women architects, mechanical and electrical experts, radio operators, civil engineers, ad lib. What we need is more of them in the higher positions, where the square root and binomial theorem are everyday quantities."

That's quite a positive—and progressive—perspective on women in science and engineering – especially for 1919. A 1931 article in the New York Times also remarked on this trend, saying that

> "The list of women obtaining licenses as amateur radio operators is increasing rapidly, the Department of Commerce said today, although there were only eight registered women commercial operators in the country. [...] There are eighty-six women amateurs, compared with about 18,000 men operators."

This number has changed drastically since the 1930. And while there are now thousands of women worldwide with call signs, several notable women during the early 20th century set the stage for the new generations of girls finding a voice on the airwaves.

GladysKathleenParkin

At just fifteen years old, Gladys Kathleen Parkin (1901-1990) received her professional ham radio license. Basically, this makes her a total badass, considering that she'd had her amateur radio license since age nine. She was featured on the cover of The Electrical Experimenter, and at the time was the "youngest successful female applicant for a radio license ever examined by the Government at that time," according to a 1916 article in the San Francisco Chronicle. Parkin began her hobby at age five with her brother, and was the first woman in California to pass the first-class radio license.

Parkin's call sign is 6S0, and she spent her life in the radio industry, developing a reputation for building her own equipment. Here she is, quoted in The Electrical Experimenter:

> "With reference to my ideas about the wireless profession as a vocation or worthwhile hobby for women, I think wireless telegraphy is a most fascinating study, and one which could very easily be taken up by girls, as it is a great deal more interesting than the telephone and telegraph work, in which so many girls are now employed. I am only fifteen. ... But the interest in wireless does not end in the knowledge of the code. You can gradually learn to make all your own instruments, as I have done with my ¼ kilowatt set. There is always more ahead of you, as wireless telegraphy is still in its infancy."

GraynellaPacker

At twenty-two, Graynella Packer of Florida became the youngest woman to become a wireless operator "on board an ocean-going steamship," reads a 1914 article in the King Country Chronicle. Her experiences at sea gave her many stories that she later recounted

(Continued on page 6)

(Continued from page 5)
to her friends and family. Although she technically wasn't an amateur, her passion began as a hobby, and Packer had long been interested in the way electricity and communication worked on the open seas. She served on the steamship Mohawk from 1910 to 1911.

Olive Carroll

Canadian-born Olive J. Carroll had a passion for travel and exploration while growing up during the 1930s and 40s – and radio was her gateway to the world. Carroll's interest in amateur radio began in high school, but she eventually turned it into her career and attended the Sprott Shaw School of Radio, where she earned her second class radio certificate in 1944. She was hired by the Canadian Department of Transport as an interceptor operator, and a few years later, when an opportunity opened on the Norwegian passenger freighter M/S Siranger, she accepted the position—having never before traveled farther than 500 miles from her home. Like Packer, Carroll was driven by a desire to explore the world by operating from the ocean.

In 1994, she authored a book about her experiences called Deep Sea 'Sparks': A Canadian Girl in the Norwegian Merchant Navy. The San Francisco Maritime Museum has recreated a ship's radio room with the same equipment Carroll used during her time on the M/S Siranger.

Clara Reger

It's impossible to talk about notable female hams without acknowledging the work of Clara Reger, who received her call sign in 1933 at age thirty-five. Reger had a long career as an operator, and managed disaster communications after WWII. Known for her exceptional Morse code skills, Reger spent much of her life teaching others how to become operators. She also received the Edison Award for teaching a fourteen-year-old boy without arms to send Morse code with his feet.

But Reger is also known for her signature salutation, which she created especially for women communicating with other women—the salutation '33,' which meant love sealed with friendship. Reger knew that to hear another girl's voice on the other end was rare and special. What a gift, to find kinship with women, through the radio, across the ocean, across the globe!

YL 33 is considered sacred by female hams, and there's a poem dedicated to Reger's accomplishments and passion for radio communications. You can read it in full on the Young Ladies Radio League's website, but here's a passage:

There's no real definition

But its meaning is known well.

It's how a YL says good evening

To another friend YL.

Although these are just a few of the many women who used radio as their medium of choice, their stories as operators are fascinating and inspiring. These women are united in their mutual passion for exploration, technology and adventure, and that still holds true today for many female ham operators. If you're interested in becoming a ham radio operator, consider joining YLRL, the Sisterhood of Amateur Radio, or the ARRL.

(Continued from page 4)
IRCs. I then called the Canada Post customer service # (1-800-267-1177), and after the usual 15 min. of elevator music, got a guy (in Quebec) who looked it up. He informed me that they are still valid, no matter how old they are, They have no expiry date. To confirm this, I Googled "Canada Post International Reply Coupon", and got a page that details the use of the IRCs. It was dated Jan 15, 2018.

So, they are good!"

Fred, VE1FA

From the November 2018 edition of the Halifax Amateur Radio Club *Reflector*.

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What You Need to Know About Radio Telescopes

Radio telescopes are just enormous sensitive broadband receivers that use some of the most advanced wireless technology. You've probably heard of radio telescopes, but do you know how they work and about some of the extreme radio technology involved?

Most people know telescopes as optical instruments for looking at things far away. Well, a radio telescope is the same thing. Instead of looking for light, it looks for radio waves. We can now visually see what appears to be an infinite number of stars, planets, and galaxies with an optical telescope. But that's not all. Lots of other things out in space we simply cannot see. The reason for this is that dust and clouds out in space block a huge amount of the light in the universe. Yet radio waves penetrate right through the clouds and dust as well as the earth's atmosphere.

As it turns out, almost everything in space seems to emit electromagnetic waves. Remember, the electromagnetic spectrum runs from dc though radio waves, then transitions into an infrared region followed by visible light. As we go higher in frequency and shorter in wavelength, ultraviolet waves come next followed by x-rays, gamma rays, and so on. You can think of radio waves as a very low frequency light. Or consider light as an extremely high radio frequency.

Infrared waves come from heat. Any object that emits heat at any temperature above absolute zero (-273°C) emits radio waves. The stars, planets, ionized gases, and galaxies all emit radio waves. The signals are extremely weak as they reach us over a vast distance. Even at the speed of light—300,000,000 meters per second (186,400 miles per second)—it takes light years for remote space signals to reach us. But if we can build a sensitive-enough receiver, we can pick them up, study them, and try to make sense of what happened in the past out there in space.

Extreme Receiver Technology

A good sensitive receiver begins with a great antenna. Radio telescope antennas need to be big and with high gain and narrow beamwidth to convert those tiny signals from space into electron flow we can capture and process. Most radio telescopes feature a huge parabolic dish. The largest are hundred or more feet across.

The dish size or aperture determines the gain of the antenna and its lowest frequency of usefulness. The big dishes have mechanical systems for rotating them in azimuth and elevation. The big dish focuses the incoming waves into a concentrated beam at the focal point, where an antenna translates the weak signal into a voltage that can be amplified.

By the way, the unit of measurement of the signal strength in radio astronomy is called the jansky, named after Karl Jansky, who was the first scientist to discover radio waves from space. One jansky is 10^{-26} watts per square meter per hertz. How's that for weak signals?

Most advanced wireless receivers begin with a low-noise amplifier (LNA). Noise is the main enemy of weak radio signals, as it can mask them completely if the noise level is too high. Despite their name, LNAs also add noise to a receiver. Most of that is thermal noise caused by heat, which energizes atoms and electrons into a random signal. You may have learned somewhere that the thermal noise voltage is:

$Vn = \sqrt{4kTBR}$

T is the temperature in Kelvins (K) or Celsius + 273, B is the bandwidth in Hz, R is the resistance of the component contributing the noise, and k is Boltzmann's constant or 1.38×10^{-23}.

In a radio telescope receiver, the LNA is cooled by cryogenic methods to a temperature close to absolute zero (4K). The receiver front-end (LNA, mixer, and antenna probe) is housed in a vacuum-sealed package and

(Continued on page 8)

(Continued from page 7)
cooled by liquid helium. That's a low-noise amplifier!

The amplifiers also use special components such as transistors and integrated circuits made of materials that work best at microwave and millimeter-wave (mmWave) frequencies. Examples include heterostructure FETs and BJTs, as well as high electron mobility transistors (HEMTs) made of gallium arsenide (GaAs) and indium phosphide (InP).

Once the signals get some initial amplification, they're usually downconverted in a mixer to a lower frequency, usually in the 1- to 10-GHz range, before detection in a Schottky diode. The detected signals are digitized and stored, then converted into color visual images that help explain their nature. Because remote space signals are relatively constant, they can be continually monitored and averaged to boost signal-to-noise (S/N).

It's a consistent challenge to get high gain at the upper mmWave frequencies. One solution has been to omit the amplifier and send the antenna signal directly to the mixer that downconverts the signal to a lower frequency, where lower noise gain is easier to get. The related challenge is making low-noise mixers. That problem has been solved for now with a special mixer known as a superconductor-insulator-superconductor (SIS) mixer, whose nonlinearity comes from quantum tunneling between the two superconductors.

In the past, most radio telescopes used the single huge dish antenna. It can cover a wide frequency range and the gain is enormous and the directivity is narrow. In the older original designs, the receiver was located at the focal point of the dish to get amplification before other parts of the system add noise. Today it is more common to put a reflector at the focal point that directs the signal to the center of the dish where the heavy receiver unit with its cryogenic components can be more securely mounted.

A growing trend is to make multiple smaller (< 25m) dish antennas and arrange them in a mobile array whose combined output is just as good if not better than that from a single large dish. An example is the Very Large Array (VLA) in New Mexico. It uses 27 dishes each with a diameter of 25 meters. One application is to connect two or more antennas to the receiver at the same time to implement interferometry, a collection of techniques that superimpose the signals to improve resolution.

A major part of a radio telescope installation is the computational power. All received signals are digitized and stored and subjected to a wide range of advanced processing techniques. Processing power is impressive as the CPU, FPGA, or other device must compute Fourier and other analysis on large floating-point numbers. Rates up to 750 billion floating-point operations per second have been reported.

Frequencies of Interest

Radio signals from space have frequencies of a few megahertz up to 1 THz. Most are in the hundreds of megahertz or gigahertz range. Some of the signals come from thermal sources, but others are emitted at a single frequency. The earliest signals detected were in the 160-MHz range. Major finds also occurred at 178 MHz. A powerful non-thermal signal comes from hydrogen—the universe is loaded with hydrogen and it emits a very narrow signal at 1420 MHz (21 cm). Astronomers have made big sky surveys at 5 GHz. Some FCC/NTIA protected frequencies are 10.7 GHz and 15.4 GHz. Ammonia molecules were detected at 22 GHz. Carbon monoxide (CO) was discovered at 115 GHz.

Space signal sources can have many frequencies. As a result, good radio telescope receivers must maintain a wide tunable frequency range. The newer systems are being developed to receive the higher mmWave signals. There's a movement to push the technology to 1 THz.

The Truth About Radio Telescope Applications

(Continued on page 9)

(Continued from page 8)

Scientists use radio telescopes to study the universe with its enormous number of stars (suns), planets, moons, galaxies, and weird sources like pulsars, quasars, and black holes. Astronomers can measure the frequency of the signal that can change if the source is moving toward or away from the receiver. By using the Doppler principle, they can make amazing speed and distance measurements.

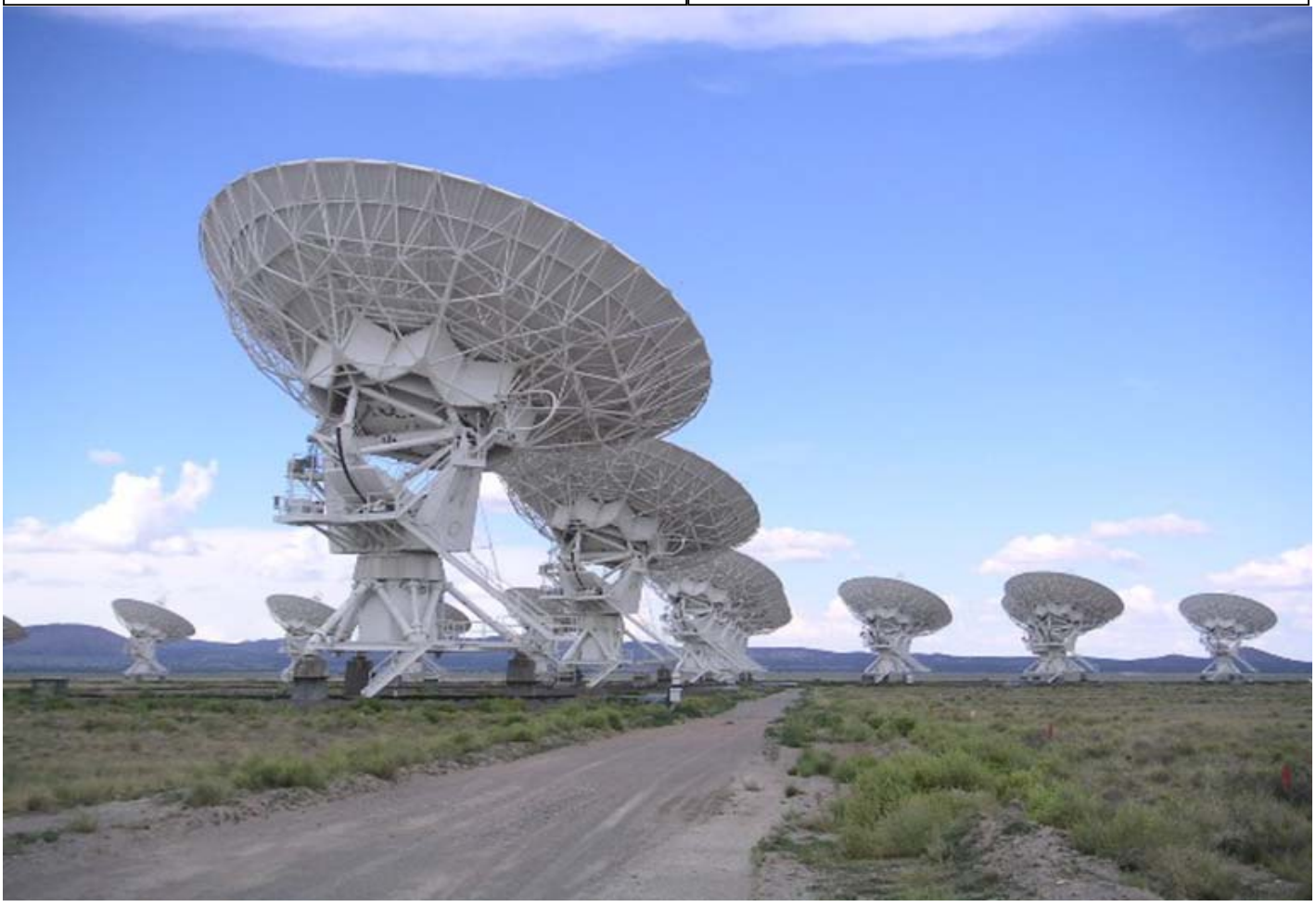
Because of their versatility, big radio telescopes have also been used in projects other than space mapping. Monitoring far distant space craft is one application. They can function as a backup to almost any space activity: moon exploration, Mars monitoring, shuttle and space-station communications and satellite monitoring. And, of course, there's SETI (search for extraterrestrial intelligence).

New radio telescopes continue to be built. Many are multiple dish arrays. However, the trend of building larger dishes is growing. The largest radio telescope in the U.S. is at Arecibo in Puerto Rico. It's a massive 305-meter spherical dish built into a valley. China now owns the largest radio telescope with a dish diameter of 500 meters. No telling what it will be able to "see."

New receivers reaching to 950 GHz with SIS mixers, HEMT LNAs, and the cryocooling make radio telescopes extreme technology. The military probably uses some extreme technology we don't know about. How would we use that technology if it could be brought to the commercial sector? Any ideas? How about a cryocooled cellular base station. Think about it. Then again, maybe not.

Lou Frenzel in *Electronic Design*, Mar 06, 2019

Below: The Very Large Array (VLA) setup in New Mexico. (Courtesy of Wikipedia)



2018-2019 **OARC Membership Application/Renewal**

Ottawa Amateur Radio Club Inc., Box 8873, Ottawa, ON, K1G 3J2, Canada

◯ Single $25 ($20 after February 1)
◯ Family $30
◯ Junior $15 (under 18 years of age)
◯ New Ham $0 (licensed in current membership year)

◯ Emailed Newsletter $0 ◯ Mailed Newsletter $10

Name _____ Phone _____

Callsign(s) _____ Year Licensed _____

☐ Basic ☐ Honours ☐ Advanced ☐ Morse ☐ RAC Member

Email Address _____

Name _____ Phone _____

Callsign(s) _____ Year Licensed _____

☐ Basic ☐ Honours ☐ Advanced ☐ Morse ☐ RAC Member

Email Address _____

Postal Address _____

Membership year is September 1 through August 31. Paying members who are in good standing by the December General Meeting will be eligible for a free one-time name badge. Members who wish to purchase additional replacement badges may do so through the club for $10 each. Ordered badges will be available in January. All prices are listed in Canadian Dollars (CAD).

First Name on badge _____ Callsign on badge _____

First Name on badge _____ Callsign on badge _____

Notes _____