December 2024

# **NARA Newsletter**

#### President's Message – Randy VE7FAA

As we approach the festive season of Christmas and New Year's, I want to personally invite you to the annual NARA Christmas dinner on Saturday, Dec. 14. It starts at 6 pm and the venue is the Cadet building on Nanaimo Lakes Road. Those who attended last year's event thought it was a great meal — thanks Linda and team — as well as a great opportunity to gather socially with other NARA members. I do hope that you will consider joining the 30-plus people who have already signed up. If you will be joining us please advise Jack VE7GDE — no later than Dec. 6 — via email to **ve7gde@gmail.com** so that we know how many will be attending. More details are included further on.

While 2024 seems to have just shot past, I want to say that NARA had another really good year. There were many projects and events, all of which allow us all to learn more about our fascinating hobby/service which has so many different facets to it. There is always more to do and explore, of course.

Notable events for me included Winter Field Day in

#### NARA Executive for the year 2024/25

Island Events	Date	Ву
NARA Christmas Dinner	Dec. 14: 6 pm	NARA
Canada Winter Contest	Dec. 28 to 29	NARA
Winter Field Day	Jan. 26	NARA
Nanaimo Science Fair	Feb 23	NARA

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January, the ARRL Field Day in June, the RAC Canada Day contest, the Bathtub race, the bike race in August, several swap meets, work bees, our membership survey, and the progress NARA made with RAC regarding remote operation regulations. I also always enjoy reading the *NARA Newsletter*, and our monthly meetings give members a chance to connect with each other. By the way, the next General meeting will be on Jan. 9, 2025.

Though from south of the border, in the most recent ARRL annual report ARRL President Rick Roderick K5UR said, *"The future of amateur radio rests on the shoulders of volunteers."* So true.

I want to thank every NARA member for their support during 2024. I am looking forward to 2025 and may I wish you all the compliments of the festive season.

At the NARA AGM on Nov. 16, five members of the NARA executive were reappointed, all by acclamation. These were vice president Jack VE7GDE, secretary Devan VE7LSE and directors Mason VE7PMD, Darryl VE7DDU and Brandon VE7TZD. The NARA Bylaws give the terms of office for the VP and secretary as two years and for the directors one year. The NARA executive for the next year is pictured below. Left to right are: secretary Devan VE7LSE, treasurer Chris VE7TOP, vice president Jack VE7GDE, directors Darryl VE7DDU, Brandon VE7TZB, Mason VE7PMD and president Randy VE7FAA.



#### VE7NA – Fibre now installed 🔗

While the VE7NA radio room at the cadets building on Nanaimo Lakes Road is operational for visitors, there has been a delay in completing the remote operation side. This is because the speed of the internet system needed to be upgraded.

There remain a few more details to resolve before it's fully complete, but the really good news is that a new Telus fibre cable has finally been installed. This is largely due to the follow through from NARA executive member Mason VE7PMD (director), who has been liaising with Telus. The VE7NA station is now well on the way to having remote operation available for amateurs with an Advanced licence. It is also worth a reminder that Radio Amateurs of Canada is now looking at acting on NARA's request to modify amateur radio regulations so that all Canadian amateurs with HF privileges, not just those with Advanced certification, can operate remote stations.



The TELUS team which finally installed the new fibre service to the cadets building.

### Membership Dues \$

If you have not renewed your NARA membership for the club's fiscal year that started Nov. 1, a reminder of the rates. Dues are \$30 per year for an individual, \$45 per year for family membership. You can pay via e-transfer to naraetrans413@gmail.com or via PayPal from https://ve7na/join-now/ or cash/cheque to the NARA treasurer.

#### NARA Basic Courses



NARA offers two ways to study for the Basic amateur radio certificate course. In one, students can study the Basic course content online at their own pace and then take the exam when they think they are ready. In the other, the Basic course is offered each Fall with traditional class instruction over the internet followed by an exam. Close to 40 students are currently signed up to

study for the Basic exam at their own pace. Congratulations are in order to Richard Lewis, who studied via the ongoing course and took his exam with NARA in late November; he earned his Basic with Honours certification and is now licensed as VA7ZNG.

#### Edwin Hubble – 100 years ago

On Nov. 23, 1924, the American astronomer Edwin Hubble published a groundbreaking discovery in *The New York Times*. Hubble announced that the fuzzy objects in the night sky were not inside the Milky Way, but far beyond it and in fact in another galaxy containing millions of stars. Hubble of course gave his name to the famous Hubble space telescope, launched in 1990, which now orbits the Earth at around 540 kilometres.

Today we know that the Andromeda galaxy, also known as M31, is the closest giant galaxy to the Milky Way, at some 2.5 million light years distance, and that it contains at least a trillion stars. So 100 years ago the known universe suddenly became much bigger and today the known universe is much larger still. It was through the Hubble space telescope that astronomers confirmed that all galaxies were receding; in other words the universe is expanding. This discovery confirmed that certain calculations by Einstein were correct. In one of his equations, Einstein put in a factor for either the expansion or the contraction of the universe, except that at the time he could not determine which. Neither man would survive to see this confirmation. Hubble died in 1953, and Einstein in 1955.

We also know today that the Andromeda Galaxy and the Milky Way are on a collision course, heading towards each other at some 250,000 miles per hour. So in about 4 billion years, after the sun has used up all of its hydrogen, our night sky will be dominated by stars in Andromeda.



#### How is DX – David VA7DXX

December is another exciting month for DXpeditions.

(DX)

Being a fan of IOTA (Islands on the Air), I'll especially be looking for the callsign AU2K, from Kanika Island (AS-179) which is located off the northeast coast of India. This is not an easy path from our area, so I am hoping that the DXpedition operators will be using some power and good antennas. The good news is that this DXpedition is being led by Cezar VE3LYC from Ontario, a well known DXpedition operator who is a member of the DX Hall of Fame. If anyone can get a good signal back into North America from across the North Pole, or maybe long path, it will be Cezar. He is joined by Sarath VU2RS, Adi VU3WEW and Anil VU3DXA. This DXpedition runs Dec. 2-7, so fingers crossed for some decent HF conditions. The higher bands on 10m and 12m presently look the best for propagation. This same team will also try to activate Sagar Island (AS-153) from Dec. 10-13 using the callsign AU2S.

Other DXpeditions for December include British Virgin Islands (VP2VMM), Bangladesh (S21DX), French Guiana (TO0J), Dominica (J75K) and Mariana Island (KH0).

November proved to be a good month for me. I worked the V55LA team in Namibia on seven bands, four bands being new to me. At the time of my contacts with Namibia NARA member Ward VE7CYA was there briefly enjoying some gliding during a vacation to South Africa. I worked the VK9CV DXpedition on Cocas Keeling on six bands, again four were new bands to me, and also the S9Z DXpedition at Sao Tome and Principe on five bands, but alas no new bands. I was especially looking for them on 12 and 10m. Also, 3D2Y and 3D2AG/P on Rotuma, E51SGC on the South Cook Islands (on 60m) and a surprise CW QSO with ZB2FK on Gibraltar, a place that I used to fly into as an airline pilot but have not visited for over 25 years. I also worked TL8ES in the Central African Republic, and C5T on the Bijol Islands (AF-060), amongst others. Probably my best long distance contact during November was 5R8IC, Madagascar, on 20m CW

complete with weak signals with lots of rapid flutter, probably a scatter signal.



The largely Norwegian V55LA team in Namibia.



The VK9CV team from Slovakia in Cocas Keeling.



DXpedition logos from S9Z and 3D2Y.



Gibraltar together with its rather short runway. If the wind is in the wrong direction you can get severe turbulence on final approach, caused by Gibraltar's rock.

NARA	Coffee	Klatches	١
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Day	Frequency	Time	Location	
Tuesday	Weekly	10:30 am	South end Smitty's: #50 10 the Street	
Thursday	3rd Thursday of the month	7:00 pm	Tim Hortons: 2320 Northfield Road	
Saturday	Weekly	9:00 am	North end Smitty's: 2980 North Island Hwy, the Rock City Centre	

Finally, NARA member Burnie VE7IAD will not be chasing<br/>any DX during most of December and much of January.been finalized<br/>NARA execut<br/>ve7lse@gma<br/>information.That's because Burnie will be the DX. Burnie is departing<br/>on a 51-day cruise around South America, which includes<br/>the Caribbean. His best DX will be a short visit to Port<br/>Stanley in the Falkland Islands (VP8). I am trying to<br/>arrange for Burnie to visit with some VP8 amateurs while<br/>he is in Port Stanley.NARA execut<br/>ve7lse@gma<br/>information.A reminder to<br/>provide club.NARA execut<br/>ve7lse@gma



Port Stanley is the capital of the Falkland islands with its population of over 2500.

#### NARA Christmas Dinner



Date: Saturday, Dec. 14, 2024

Venue: Cadet Building, 719 Nanaimo Lakes Road

Time: 6 pm, dinner to start at 6:30 pm

Cost: \$12 adults, \$6 for children – pay at the door

<u>Food volunteers contact:</u> Linda VE7JLO at ve7jlo@gmail.com

<u>Booking:</u> Please advise Jack VE7GDE at ve7gde@gmail.com by Dec. 6 if you are attending

Please bring a donation for the Nanaimo Loaves and Fishes food bank if possible.

#### NIARS Summer Campout

Tentative dates for next year's NIARS campout/work bee are slated as Aug. 17-24. Details can be obtained from Devan VE7LSE at **ve7lse@gmail.com**. For those not familiar with this annual event, it mixes camping, socializing, fun, foxhunts, POTA activations, and maintenance work at north Island repeater sites. It's also good learning about repeaters and how the ITS works.

#### Canada Winter Contest 🛛 🕞

The RAC Canada Winter contest takes place Dec. 27-28, a Friday and Saturday. Details for this contest have not yet

been finalized but if you want to take part please email NARA executive secretary Devan VE7LSE at ve7lse@gmail.com. Watch your email for further information.

#### NARA Coax & Antenna wire

A reminder to NARA members: the club is able to provide club members with coaxial cable at a good price. While the prices quoted below are subject to change, depending on the actual cost of the most recent club purchase, the numbers below are a good guide:

Туре	Impedance or Gauge	Cost per foot
RG8X	50 Ohm	On request
LMR400	50 Ohm	\$1.60
BR240 (LMR240)		On request
RG213	50 Ohm	\$1.50
RG9	75 Ohm	\$1.40
Antenna wire	14 gauge	On request

Please contact Jack VE7GDE at **ve7gde@gmail.com** if you wish to purchase coaxial cable or antenna wire from NARA.

#### NARA APRS Tracker



The organizer of the 2024 bike race recently made a donation to NARA. The donation will support the purchase of a Byonics APRS tracker for use in future NARA public service events.



The Byonics MicroTrac AIO tracker which NARA will soon be purchasing for future events involving APRS.

NARA Swag



If NARA clothing or other goodies are on your mind as Christmas gifts, check out the NARA website for colours, prices and costs: https://ve7na.ca/member-purchases.

NARA's Website:

https://ve7na.ca/



#### The Satellite Downlink: November ARISS SSTV and FT4 via Linear Satellites Bruce VE7PTN

In last month's article I discussed Slow Scan Television (SSTV) that is occasionally broadcast from the International Space Station (ISS). There had just been an SSTV event in October, so I wasn't expecting another until December at the earliest. However, after I had submitted my article for publication, there was an announcement for a November SSTV event, Series 22. I highlighted this announcement via the NARA Facebook group, so hopefully you saw that and tried your hand at picking up some images. The event lasted for one week, from Nov. 11 to 18. Again, a series of 12 images were transmitted. I worked the entire event this time and was able to receive all the images with only one partial. I made a submission of a received image to the Amateur Radio on the International Space Station (ARISS) organization as proof of contact and received a digital award diploma.



The best versions of each of the ten SSTV images decoded by Bruce VE7PTN during the November ISS SSTV experiment. The second image in the top row appears to be cropped at the bottom. This is the result of the space station passing below the horizon resulting in loss of signal before the transmission was complete.

Also in last month's article, I teased that I had success using the FT4 digital mode for a QSO on a linear (SSB) satellite. So, this month I will dig into the details. With the demise of the GreenCube (IO-117) digipeater satellite, I was inspired to explore digital modes on other satellites. GreenCube used the AX.25 communication protocol like APRS does. A QSO via this protocol typically uses a node in the middle to receive the message from one station and then retransmit the message to other stations, i.e., a digipeater. To use this protocol, the satellite must be built and configured to act as the digipeater in the middle. There are other satellites that are setup for the AX.25 protocol, most of them are configured for APRS messages. However, the FT4 protocol that is used by WSJT-X software does not need any specially configured satellite to digipeat the message. Therefore, any SSB-capable linear transponder satellite could theoretically allow for digital QSOs via WSJT-X using FT4. (I say "theoretically" because, as I learned through experimentation, not all linear transponder satellites will relay the uplinked signal with sufficient fidelity to be decoded by WSJT-X, even if the signal strength is good.) The FT8 protocol could also work; but its 15-second transmit/receive cycle makes it less suitable for satellites when compared to the 7.5-second cycle of FT4. So, figuring out how to use FT4 via satellite seemed like a great way to expand my digital repertoire.



The ARISS SSTV award issued to Bruce VE7PTN for successfully receiving an image during the November event, commemorating 40 years of human ham radio operations from space. Owen Garrett, W5LFL above, was the first NASA radio amateur in space in 1983.

I have lots of experience with WSJT-X and the FT8 protocol on HF using my IC-7300 and IC-705 radios. And it works very well using my MacBook laptop. So, getting WSJT-X configured to talk to my IC-9700 should be easy, right? Well, it did take a bit of trial and error (and Google/YouTube) but I got it working. I find the "Configurations" feature in WSJT-X very convenient for setting up and saving different configurations for each radio model. Similarly, the ICOM IC-9700 (and other ICOM SDR models like the 7300) has a "Preset" feature that allows for saving different setting configurations. The IC-9700 even comes with an FT8 configuration by default.

Once I had WSJT-X talking to the IC-9700, albeit in a "terrestrial" mode, the next step was to get it working for a "satellite" configuration. In terrestrial mode, WSJT-X is communicating audio to/from the radio as well as sending Computer-Aided Transceiver (CAT) commands to control the radio tuning and PTT. Because satellites are moving at high speeds, the radio signals between ground stations and satellites experience the Doppler Effect and therefore the radio tuning must be constantly adjusted to compensate. The satellite tracking and tuning software that I use, MacDoppler (https:// www.dogparksoftware.com/MacDoppler.html), does this quite well. But WSJT-X does not allow for Doppler tuning correction for satellites (though it does have a Moon mode that does this so perhaps one day...). So, to configure WSJT-X for satellite use, I needed to somehow configure it to send/receive audio with the radio and key the PTT but not send CAT commands that would conflict with the MacDoppler tuning. Again, YouTube to the rescue! AMSAT-UK has a great webpage on using FT4 via satellites: https://amsat-uk.org/2021/08/15/guide-tousing-ft4-on-satellites/. From this webpage I could see outline of what I needed to accomplish for an configuration. The article does focus on a two-radio solution though (one for TX and one for RX) and not the single radio approach that I was using. But it does have a link to an IC-9700 configuration video "IC-9700 using SatPC32 and WSJT-X" that was very similar to what I was trying to do: https://www.youtube.com/watch? v=QhfUSRUP910. This video was for a setup on a PC and not a Mac; but the concepts translated easily to the Mac. The basic learning from this was that if you set the radio model in WSJT-X configuration to "None" it won't send CAT tuning commands, but it will still send/receive audio and even key the PTT circuit! Seems odd I know but it works like a charm.

One of the presets that I had previously created for the

9700 is "Sat Mac", for when I operate satellites using the MacDoppler tuning software on my Mac. I cloned this one to a new preset (Sat Mac FT4) and made the radio setting changes necessary for FT4 using the FT8 preset and the YouTube video as guides. (As it turns out, the Sat Mac FT4 preset works just as well for FM and SSB satellite modes so it wasn't necessary to clone the Sat Mac preset.) Once this was done, I had WSJT-X and MacDoppler working together, and I was ready to try working a satellite. I knew that other operators were using FT4 on the linear satellite RS-44, and I planned to make this bird my first attempt. I wasn't sure where in the satellite's wide passband I would find other FT4 operators. I knew by convention most of the voice QSOs occur in the upper half of the passband and CW is mostly in the lower half. Since the FT4 signal bandwidth is much narrower than SSB voice, I thought it would be more compatible with the lower part of the passband along with CW. When the satellite came into view and I started looking for FT4 signals, I discovered that my hunch was correct. There was at least one other station working FT4 on the lower passband. Just as I would on HF terrestrial FT8, I called CQ in an empty part of the WSJT-X waterfall. Then I saw a decode from the station N2YZH also calling CQ. I replied to his CQ and was heard by him after a few calls, and we quickly completed a QSO. It worked! I know, it's supposed to work; but I am always pleasantly surprised when it actually does. I could see that my signal report was weak compared to his, so I might need to bump my transmit power a bit. Being wary of using too much of the satellite's transponder power, I had kept my power in the single digits. Voice QSOs on this satellite during a busy pass often need 50W to 75W to be heard even faintly on the downlink. But the weak signal mode of FT4 did not disappoint at <1W. As soon as my first QSO was logged, I had WD0GOL calling me and we completed my second QSO before the pass was over.



WSJT-X software showing Bruce VE7PTN's first and second FT4 QSO via satellite (RS-44).

One handy feature when working satellites is to operate with full duplex so that you can hear yourself on the downlink while simultaneously transmitting on the uplink frequency. The IC-9700 has full duplex capability while in satellite mode. Unfortunately, the WSJT-X software does not support full duplex. While transmitting on the output audio channel to the radio, WSJT-X does not listen on the input audio from the radio. For terrestrial operation, there is no need for WSJT-X to listen while transmitting. The AMSAT web article though has a tip for a workaround for this: start a second instance of the WSJT-X that will always be listening to the input audio. The way to do this on a PC is to create another shortcut for the WSJT-X executable file but with a parameter for a different rig name. This tricks the PC into starting a second instance of the software. Unfortunately, this trick doesn't work for the Mac as the operating system does not permit parameters in shortcuts. But Google came to the rescue, and I found a tip from someone trying the same thing. The solution for the Mac is to use its command line program, Terminal, to launch WSJT-X with the dummy rig name by using the command "open / Applications/wsjtx.app -n --args -r None". (I could probably put this command in some script file and execute that via a shortcut; but that is learning for another day.)

On the next RS-44 pass that I worked I had my second instance of WSJT-X running as listen-always. Now I was able to see my own transmission on the downlink and with how much signal strength I was making it into the satellite. It was variable as the satellite faded at times, just as it does for voice. (I did find that transmit power levels of 50W or more were required on the popular passes.) I was called by other stations but did not manage to complete any QSOs this time. Because the uplink to the satellite (VHF for RS-44) is retransmitted on a different band (UHF for RS-44), it is a bit tricky to figure out which transmit frequency to use so that I do not collide with another station on the downlink. The second instance of WSJT-X is helpful for this of course. Unfortunately, I was not able to repeat the success of my first attempt on my second. But I knew that my issue was probably with poor frequency selection and could be helped with a specific FT4 frequency setting for RS-44 in the MacDoppler software. With this implemented, the third pass went well; I could get into the satellite without trouble. But sadly, the satellite was to the west and there That's all for this month. 73. were no other operators on the pass.



A screenshot of WSJT-X software second (listen-always) instance showing Bruce VE7PTN's self-decodes of FT4 via satellite on a lonely western RS-44 pass with no other operators.

Over the next few days, I tried more RS-44 passes and other linear satellites. So far, my best pass was four QSOs on RS-44. I am getting things dialed-in and still learning. I tried the old AO-7 satellite a couple times; November was its 50<sup>th</sup> anniversary in orbit! The downlink from this old bird is somewhat distorted and although I could hear my downlink, it was not decoded by WSJT-X. I also tried AO-73 and was able to get a few decodes of myself but did not find any other operators. I have noticed on a few RS-44 passes that WSJT-X does not decode any messages (mine or others) for some period of the pass, even though the downlink is strong. I figured out that the issue is that when the satellite is at a high elevation (e.g. above about 30°) the Doppler shift is changing so fast that the downlink is not stable enough in frequency to be decoded, even for the short FT4 7.5-second cycle. I have tried a few different software settings for the tuning step but have yet to find one that solves this issue. At the beginning or the end of a high elevation pass the decodes are OK because the satellite frequency is relatively stable at that point. Similarly, for low elevation passes where the satellite stays below 30° from the horizon, the entire pass is decoded and workable.

There are still relatively few operators on satellite FT4, and I have worked most of them. But there are more trying it each week. A couple have reached out to me via direct message/email for advice and to schedule QSOs. I still have more experiments to do and learning to accomplish (one of my favorite features of this hobby). And now that I have WSJT-X talking to my ICOM IC-9700 I am one step closer to trying 70cm Earth-Moon-Earth (EME)!

#### NARA Meetings for December

December 2: NARA Exec. Meeting — Google Meet December 14: NARA Christmas Dinner - Cadets Building

#### NARA's VE7NA Station



For those intending to operate NARA's VE7NA station located at the cadets building here is a description of the station.

The main equipment is housed in a rack as shown in the picture below. The entire station is run from a large Canbat lithium battery bank, complete with safety disconnect and circuit breakers, plus the battery charging equipment mounted on the left side of the rack cabinet.

The rack cabinet also contains a remote breaker system, the Flex radio and the Green Heron rotator. Both the Flex radio and the rotator can be operated at the site by visiting members. However, remote operation of the station will only be possible once the internet system to the building has been upgraded. That upgrade will hopefully be completed by the end of the year. As you have read earlier in this Newsletter, the Telus fibre line to the building was finalized in late November.



The VE7NA station main equipment rack.

To operate the station in person you will need to be familiar with the computer system which controls the Flex radio and the beam rotator as pictured.



The computer control set up for VE7NA.

As you can see from this photo, the VE7NA station operation position uses a sophisticated computer control system, shown on the left screen. On the right screen is the software which controls the Green Heron rotator.

On the operating table is a small computer which links to the Flex radio, a mouse and keyboard. Both are used to control the Flex radio. NARA is developing some training material to guide those who wish to use the station in person.

The remote side of the station should be completed soon. The remote operation is very similar to operating the station at the VE7NA site, because on your remote screen you will see the same presentation.

Later VHF/UHF and AREDN equipment will be installed and developed.

The volunteer group of NARA members producing this newsletter would like to thank all those who provided material for this month's issue.

The deadline for the **January 2025** issue of the NARA Newsletter is noon on Saturday December 28 with an intended publication date of December 31.

News items and comments should be mailed to:

## news@ve7na.ca