



W5NC

Houston, Texas

Northwest Amateur Radio Society

A 501(c)(3) Organization
An ARRL Affiliated Club

Happy Thanksgiving!

NARS NEWS

NOVEMBER 2023

Northwest Amateur Radio Society

P.O. Box 11483

Spring, TX 77391

w5nc.club

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NARS News is published monthly by the Northwest Amateur Radio Society (NARS). Northwest Amateur Radio Society is a Special Services Club affiliated with the American Radio Relay League, ARRL Club No. 2120.

If you would like to contribute to the newsletter by publishing an article, adding calendar events, or any other contribution, please send all submissions before the end of the month to the newsletter editor:

Brandon Rogers (K5BLR), Newsletter Editor

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President's Message

BY RON MATUSEK, WA6TQH

Club Business

In keeping with our by-laws, we will be voting at the general meeting for the following:

1. One of our Board Directors (voting member) Sam Labarbera N6HB resigned couple months ago and as a result I appointed Jerry Davis, N5EKO to temporarily fill that position until our next election period, which is November whereby, we can confirm him in that position. If there is anyone that would like to challenge that position, please submit your name to Brandon Rogers, Paul Kent, or myself. This is the only board position up for election currently. Next year in November most all board members will be up for re-election.
2. At our November general meeting we will vote on "Ham of the Year". We have been asking since the October general meeting for members to submit names to Bandon Rogers, K5BLR. During the November meeting, we will vote on those submitted. The results will be announced at the January Awards banquet.

November's general meeting will be devoted to the status on the Antenna's being installed at HCESD 16 Admin. Along with that we will have an update on the proposed changes to all-star, echo link with diagrams of the proposed network currently in testing phase. This is a meeting you don't want to miss as we will go into plans for NARS to expand not only it's overall coverage but also provide and more robust access capabilities.

Below is an article that I thought we all should be aware of so please take time to read it.

According to a 2011 estimate shared by ARRL, there are over **600,000** radio amateurs in the United States and around two million people self-proclaimed amateur radio lovers across the world.

Amateur radio, also known as ham radio, has some specific frequency bands for their work which is called HAM radio bands. Ham radio band allocation can range from a few centimeters to **2200 meters**.

For many hams, amateur radio has been a stepping stone to a technical career. Many electronics engineers and software developers have gotten their start by first obtaining an amateur radio license.

What is the most important benefit of Amateur Radio?

| | |
|---------------------------|-----|
| World-wide communications | 39% |
| Community service | 23% |
| Personal development | 16% |
| Fun and entertainment | 22% |

Emergency Operations

The most important component of staying safe during an emergency is the ability to give and receive information. When the power goes out—which it often does, not only during wildfires but also during

hurricanes, blizzards, earthquakes, and tornados—the internet doesn’t work and cellular networks crash with increased demand. In Northern California, electricity is often cut to prevent fire during high-risk times, leaving millions of customers in both metaphorical and actual dark.

When people need information the most, they can’t get to it. So, what’s the solution?

FCC Wants to Bolster Amateur Radio

Commission will vote in November on plan to remove outdated technical restrictions

FCC Chairwoman Jessica Rosenworcel says the FCC plans to “incentivize innovation and experimentation in the amateur radio bands” by getting rid of outdated restrictions and providing licensees with the flexibility to use modern digital emissions.

The commission at its November meeting is expected to take action on a Report and Order that would eliminate the baud rate limitation and establish a bandwidth limitation in the amateur radio bands below 29.7 MHz.

The order being circulated for tentative consideration by the commission would remove the baud rate limitation — the rate at which the carrier waveform amplitude, frequency and/or phase is varied to transmit information — for data emissions in the amateur radio bands, the FCC says. The current baud rate limits were adopted in 1980.

The order would implement a 2.8 kilohertz bandwidth limitation in place of the baud rate in amateur radio bands. The 2.8 kHz limitation is consistent with the commission’s treatment of other wireless radio services, the FCC says.

The current rules limit the baud rate for high-frequency amateur radioteletype/data transmissions to 300 baud for frequencies below 28 MHz (except in the 60-meter band), and 1200 baud in the 10-meter (28-29.7 MHz) band.

The Wireless Telecommunications Bureau says the change in technical standards would allow the amateur radio service to operate more efficiently, including during times of emergency to support public safety.

The American Radio Relay League (ARRL) in 2013 asked the commission to delete references to the baud rate and to establish a bandwidth limitation of 2.8 kHz. The group argued the public safety benefits of making the change. ARRL stated: “[i]ncreasing speed is especially important when amateurs voluntarily assist during and after hurricanes, forest fires and other disasters.”

At the time, ARRL also told the FCC that eliminating the baud rate limitation will “incentivize innovation by allowing more data to be transmitted within each signal without increasing bandwidth from that currently used.”

In a subsequent Notice of Proposed Rulemaking in 2016 (WT Docket No. 16-239), the FCC tentatively concluded that a 2.8 kilohertz bandwidth limitation for radioteletype and data emissions in the MF/HF bands was not necessary, and sought comment.

A few commenters at the time of the NPRM opposed any rule change, arguing that the existing rules should be retained in order to protect access to amateur bands by Morse code and other narrowband transmissions.

However, the commission writes in the order: “Based on the record in this proceeding, we find that the baud rate limitation has become outdated and hampers, rather than promotes, innovation and robust use of the amateur bands.”

The commission continued in the new order: “We are persuaded by the weight of the record in this proceeding that, without a baud rate or bandwidth limit, data stations using a large amount of spectrum for a single emission could do so to the detriment of simultaneous use by other stations using narrowband emission modes.”

In essence, the technical change mean amateurs will require less time to transmit messages, which in turn will open up more spectrum in the time domain for more amateurs to use, said David Siddall, general counsel for ARRL.

“This is a very simple change. In 1980, at the inception of digital technologies that could be used by radio amateurs, the FCC adopted a speed limit of 300 baud for the stated purpose of limiting the amount of spectrum occupied by any single signal,” Siddall said. “Radio amateurs, being tinkerers and experimenters, worked to develop faster and faster speeds that still fit within the standard spectrum bandwidth. Eventually their innovations to the technology significantly increased spectrum efficiency but ran up against the FCC baud rate limit.”

One of the benefits of the changes will be allowing for “faster emergency communications” by volunteer ham radio operators during emergencies, the FCC says.

The agency says its Wireless Telecommunications Bureau’s Mobility Division has previously issued waivers allowing amateur operators directly involved with disaster relief efforts to exceed the baud rate limitation in the interest of public safety.

The FCC at its November meeting will also consider a Further Notice of Proposed Rulemaking (FNPRM) that proposes to remove the baud rate limitation in the 2200 meter and 630-meter bands. The commission also proposes to remove the baud rate limitation in the very high frequency (VHF) and ultra-high frequency (UHF) bands.

The commission says it expects to seek comment on the appropriate bandwidth limitation for the 2200-meter band, the 630-meter band, and the VHF and UHF bands.

Steve Stroh, editor of amateur radio newsletter Zero Retries, says the need for improved data communications in amateur radio also coincides with spectrum becoming more “noisy” due to “pollution” by systems such as LED lighting, small switching power supplies and even solar panels.

“That noise has an outsize impact on analog modes such as voice and very low power transmissions. Improved data communications modes, including digital voice modes, can overcome the noise issues,” Stroh said in an email to Radio World.

Stroh says he is happy to see the FCC address the same limitation on the amateur radio VHF and UHF bands — where there is arguably much greater potential for technological innovation in data communications technology — if it wasn’t for the data rate and mode limitations.

“Fortunately, in its proposal, the FCC recognizes that the symbol rate and mode issue does include the Amateur Radio VHF and UHF bands. Thus, the FCC’s proposal is a very good one that will significantly benefit Amateur Radio,” he said.

The FCC’s next meeting is scheduled for November 15. A comment period on the [FNPRM](#) will commence 30 days after the date of publication in the Federal Register.

Ham of The Year Award Nominations

Every year at the NARS Annual Banquet, a Ham of the Year award is presented to a member of the club that has been active in the club, helped other members, and has been an exemplary member of the club.

Nominations for the Ham of the Year are now being accepted for a vote near the end of the year. All nominations *must* be received no later than the General Meeting in November. Look for the “Ham of the Year” nomination box at our upcoming General Meeting in October and November. Alternatively, you can send nominations to Brandon Rogers (K5BLR) at k5blr@arrl.net, Paul Kent (KI5FJS), or Ron Matusek (WA6TQH).

Exam Practice

Are you new to the hobby and looking to pass your Technician exam? Are you preparing to level up your license by taking the next level exam? Check out the questions below to test your knowledge!

Technician (Element 2)

T8C04

Which of the following is good procedure when contacting another station in a contest?

- A. All these choices are correct
- B. Send only the minimum information needed for proper identification and the contest exchange
- C. Contact the station twice to be sure that you are in his log
- D. Sign only the last two letters of your call if there are many other stations calling

General (Element 3)

G7B07

Which of the following are basic components of a sine wave oscillator?

- A. A filter and an amplifier operating in a feedback loop
- B. A frequency multiplier and a mixer
- C. A circulator and a filter operating in a feed-forward loop
- D. An amplifier and a divider

Amateur Extra (Element 4)

E9A12

How much gain does an antenna have compared to a 1/2-wavelength dipole when it has 6 dB gain over an isotropic antenna?

- A. 2.79 dB
- B. 6.0 dB
- C. 8.15 dB
- D. 3.85 dB

See the answers on [Page 25](#).

The ARRL Letter

An excerpt from the weekly ARRL Letter

FCC to Vote on Removing Symbol Rate Restrictions

ARRL welcomes news of a scheduled vote by the Federal Communications Commission (FCC) to [consider removing symbol rate restrictions](#) that restrict digital modes, foster inefficient spectrum use, and dampen incentives for innovation. In the draft Commission decision, the FCC would replace the current HF restrictions with a 2.8 kHz bandwidth limit. The



Commission also announced that it will consider a Further Notice in which it will propose eliminating similar restrictions where they apply in other bands and consider relying on signal bandwidth limits. If both actions are adopted by the Commission, there will be a period for public comment on the Further Notice issues.

In announcing the proposed Commission actions, FCC Chairwoman Jessica Rosenworcel said that "We're bolstering amateur radio. We will vote on a proposal to incentivize innovation and experimentation in the amateur radio bands by



removing outdated restrictions and providing

Did you know...

that the ARRL sends a weekly letter describing some of the current events, activities, and policies that are taking shape in the Amateur Radio world? The following is an excerpt from these letters in January. View all the ARRL letters at <http://www.arrl.org/arrlletter>

licensees with the flexibility to use modern digital emissions."

ARRL requested and strongly supports replacing the symbol rate limits on the HF bands with a 2.8 kHz bandwidth limit. ARRL also supports eliminating the symbol rate limits in favor of the already-existing bandwidth limits where they apply on the VHF and UHF bands and eliminating the similar limits 2200 and 630-meter bands.

ARRL Director of Emergency Management Josh Johnston, KE5MHV, said the changes will result in a tremendous time savings during disasters, when every second counts. "We will be very pleased to have the FCC remove the restrictions on symbol rate for the amateur bands. This will eliminate the need for temporary waivers during an event and provide the ability to train and exercise using the higher symbol rate, allowing increased data capability to our served agencies and partners."

[Congresswoman Debbie Lesko \(AZ-08\) introduced The Amateur Radio Communications Improvement Act \(H.R. 3241\) on May 11, 2023](#), to require that the FCC eliminate the obsolete HF digital symbol rate limit with a 2.8 kHz bandwidth limit.

The Congresswoman subsequently addressed the issue with Chairwoman Rosenworcel in a Congressional oversight hearing. The changes are supported by many state emergency management officials.

ARRL will continue to engage on this matter.

Speak Up for Your Spectrum: 60-Meter-Band Comments Due to the FCC by November 28

Updated 10/30/23 to reflect a new deadline for comments of November 28, 2023.

Time is running out to take a stand in the effort to protect amateur allocations on the 60-meter band. At the time of writing, nearly 1,500 comments have been filed, many of them being from radio amateurs urging the FCC to protect our access to this critical band. The FCC proposal would take away several of the discreet channels and reduce power output from the current 100 W to less than 10 W.



ARRL asks that all amateurs file comments during the public comment period, which is open until November 28, 2023. ARRL encourages expressions of support to the FCC for the current 100 W ERP power limit (instead of reducing the power limit to 15 W EIRP) and continuing secondary access to the current channels.

ARRL has assembled a web page with instructions on how to submit your comments, that also includes background information on the issue: www.arrl.org/60-meter-band.

To submit your comments for the FCC's consideration in the rulemaking process, go to the FCC web page for the Notice of Proposed Rulemaking's (NPRM) Docket Number 23-120 at <https://www.fcc.gov/ecfs/search/docket-detail/23-120>.

The urgency of this matter is being seen around the amateur community. In a message to ARRL members in the Roanoke Division, Director Jim Bohner, N2ZZ, and Vice Director Bill Morine, N2COP, issued a call to action, stating:

"Even if you are not currently active on 60 meters, the proposed reduction in power from 100 W to an

equivalent of less than 10 W is the most sweeping reduction of HF privileges in decades. If amateur radio opposition to this proposed change is weak and the FCC goes through with the change, will a lackluster response from the Amateur Radio community embolden the FCC to remove or modify more HF privileges?

With just days left in the public comment period, ARRL hopes to see the docket filled with comments in support of keeping 60 meters as the vital resource it is.

Video: Amateur Radio STEM Education Takes Center Stage at Pacificon

ARRL Education and Learning Manager, and IARU Region 2 Youth Coordinator, Steve Goodgame, K5ATA, gave the keynote address at the 2023 ARRL Pacific Division Ham Radio Convention, also known as Pacificon.

Goodgame was a public-school teacher for 21 years. He carries his experience of bringing ham radio into the classroom into his role at ARRL. "It is safe to say I've learned a thing or two about reaching youth along the way," he quipped.



Thumbnail of the YouTube video. [See video on ARRLHQ YouTube channel.](#)

His presentation, to a packed audience, was a highlight of the convention. Goodgame's passion and vision for promoting youth involvement in the hobby shined in his speech as he discussed STEM education and the importance of inspiring youth and teachers to engage in amateur radio and wireless technology.

Watch "A Vision of the Future of Amateur Radio" on the ARRLHQ YouTube Channel https://youtu.be/fTi8LDz4dS4?si=GQfSd3k2BS_ERMMy to learn how to grow the next generation of radio amateurs from one of the leaders in the space.

\$31k Raised for Education from ARRL Online Auction

The 18th Annual ARRL Online Auction, sponsored by [RT Systems Inc.](#), raised \$31,000 in support of amateur radio. The auction took place during October 13 - 19, 2023.

In addition to hundreds of viewers, the auction saw 244 individual bidders vying for Product Review equipment, vintage books, mystery junk boxes from the ARRL Lab, and more.



There were 1,163 bids recorded, with 14 items finishing in overtime bidding. Proceeds from the yearly ARRL Online Auction go directly to ARRL's education programs, including promoting activities to license new hams, strengthening amateur radio's emergency service training, offering technical and operating education, and creating instructional materials.

ARRL sincerely appreciates our corporate partners and members for their generous donations.

Using Amateur Radio to Play Chess

Playing chess using amateur radio? The concept may have begun in 1912 when a group of college students from Case Western Reserve University (CWRU) wanted to challenge chess players at The Ohio State University (OSU). Though the official origin is still debated, clippings from a 1912 issue of The Case Tech, one of CWRU's former student newspapers, reveal that the challenge was made when the CWRU Wireless Club procured a Morse code transceiver.

Faculty Advisor to the Case Amateur Radio Club, W8EDU, David Kazdan, AD8Y, said there are no official records of the match, so the challenge was re-proposed this year by the [Case Amateur Radio Club](#). With the with the help of [OSU's Amateur Radio and RF Club](#), W8LT, the game was on. It started on September 26 as a round-robin tournament with other schools and is now moving into an elimination phase. The setup is the same as any chess game except the players are in different locations.

Chess moves are relayed over the air either by voice or Morse code.

CWRU started the tournament strong with a win against Rensselaer Polytechnic Institute (RPI), but they lost the long-anticipated game against OSU.

W8LT President Arvcuken Noquisi, KE8MXF, said the tournament is a series of test games to determine the best way to incorporate amateur radio into what is now referred to as HAMCHESS.

"Now we are using EchoLink through a Cleveland, Ohio, repeater with algebraic chess notation relayed by voice," said Noquisi. "In the future, each chess team will determine what method works best for them based on skill level and participation."

Noquisi added that blending the school's chess and amateur radio clubs makes for a great campus experience and opportunity for community involvement.



Members of the Texas A&M Amateur Radio Club, W5AC, playing HAMCHESS against Case Western Reserve University (from left to right) Hudson Spillers, KL4LJ; Braxton Wade, KJ5CPK; Ian T Duncan, AE5ID and chess player Ankush Rao. [Nayab Warach, K15YBE, photo

W8EDU President Adam Goodman, W7OKE, said collegiate amateur clubs are still recovering from the COVID-19 pandemic, and HAMCHESS is a great way to reenergize amateur radio clubs and involve other college organizations.

In 1945, the United States and the USSR squared off in a radio chess tournament using CW. In the 1980s, Chess and Amateur Radio International, a club with more than 200 members, used 20-meter SSB in a match between five US players and five players in Oceania, a geographical region spanning the Eastern and Western hemispheres.

Today, more than a dozen college amateur radio and chess clubs are participating in HAMCHESS events. College and university radio clubs, including those participating in the chess tournament, regularly network with each other through the [ARRL Collegiate Amateur Radio Program](#).

2023 Chicago Marathon Supported by Amateur Radio

On October 8, 2023, more than 140 amateur radio operators from five Midwest states assisted 2,000 volunteer medical personnel at the Bank of America Chicago Marathon. This is the 15th consecutive year that amateur radio operators have helped coordinate medical responses and arrange for medical resupplies at the Chicago Marathon. About 49,000 runners entered this year's event.

The city-wide marathon uses six main repeater channels and deploys four temporary repeaters. New this year was official use of the

Automatic Packet Reporting System (APRS) after organizers trialed it at their other events, including the Bank of America Shamrock Shuffle and the Chicago 13.1. APRS radios were deployed to amateur communication teams in Chicago's Grant Park after the race was finished.



A group of amateur radio volunteers at the 2023 Bank of America Chicago Marathon. [Rob Orr, K9RST, photo.]

A total of 30 radio operators worked in various capacities before and after the race. Also, there were 100 ham radio operators stationed at each of the 20 course medical tents and the medical hub. In Forward Command, 10 amateur radio operators served as net controls, traffic handlers, logging specialists, and expeditors.

Chicago's Office of Emergency Management and Communications has been nationally recognized for its ability to fully integrate all available resources, and amateur radio operators have been publicly recognized by Federal Emergency Management Agency observers for their performance during the event.

President of Ham Radio Chicago and former president of the North Shore Radio Club Rob Orr, K9RST, said that amateur radio has an important seat at the communications table. "Amateur radio is important to the event. However, it is just one small component [of] a very complex event that requires more than 10,000 volunteers to be successful. Amateur radio has a unique role and works alongside the other many specialty service groups required to support an event of this magnitude," he said. "This event has shown that amateur radio is very much alive and doing well."

A POTA Book for Park Activators and Hunters!

ARRL has a new book to help radio amateurs enjoy one of the fastest growing communities within the hobby.

Participants in Parks on the Air® (POTA) have built one of the most vibrant on-air communities in contemporary ham radio.

Park hunters comb the airwaves for activators operating from the lawns of sprawling public mansions, stoops at urban historic sites, forest glades, rocky mountaintops, seaside beaches, and just about any state or federal park in the country -- and many entities abroad.

[The Parks on the Air Book](#) gives you a look at the setups and processes of 14 operators from a variety of skill levels and backgrounds and offers advice and motivation for taking your radio out to a park. Each chapter includes a detailed gear list so you can see exactly what your fellow operators are using, whether they're leaders of the pack like Kerri Wright, KB3WAV, and Clint Sprott, W9AV, or folks just getting started with Parks on the Air. Setups cover satellite operating, QRP, urban backpack portable, activating tailgate-style, wire antennas for POTA, and more.

Whether you want to plan a multistate rove, toss a wire into a tree at a nearby park, or hunt activators from the comfort of your home station, The Parks on the Air Book provides insight and expertise in a beautiful, full-color format, brimming with photos that celebrate ham radio and the wonderful, shared resource of our state and national parks.



[The Parks on the Air Book](#) is now available and provides readers with all the information they need to be an activator or hunter.

The Parks on the Air Book may be purchased from the [ARRL Store](#) and from your [ARRL Dealer](#), or call (860) 594-0355 or toll-free in the US (888) 277-5289.

[The Parks on the Air Book](#), ARRL Item No. 1748, ISBN: 978-1-62595-174-8, \$22.95 retail; special ARRL Member price \$19.95.

Local Amateur Community Rallies to Support Collegiate Club for QSO Party

BY TODD EMMERT, W9TWE

[Indiana State University](#) Amateur Radio Club, W9ISU, had a successful [ARRL Collegiate QSO Party](#), held October 7 - 8, thanks to the support of local hams.

The club has faced challenges in recent months, including being displaced due to campus renovations and having minimal student involvement; they didn't even have a multimode, multiband transceiver. In an effort to boost interest and attention to amateur radio, Faculty Advisor Dr. Robert Girod, N9RNV, offered 10% extra credit to students who earned their Technician-class amateur radio license. That incentive, along with efforts from student leader and W9ISU President Rowan Eggert, WO1P, helped turn things around. The club received a grant from the school that allowed them to purchase three stations, Icom IC-7300s with Heil Pro 7 headsets, foot switches, and antennas. The gear made it possible for them to set a goal of having everything up and running for the 48 hours of the ARRL Collegiate QSO Party.



Seth Byas, K15QHD, prepares his amateur radio demonstration for a group of Boy Scouts during the ARRL Collegiate QSO Party. [Todd Emmert, W9TWE, photo.]

Eggert listed the event on the local radio club's social media pages to get the word out to any alumni that would be interested in helping or getting on the air.

She also got with the local Boy Scouts and set up a public demonstration during the QSO party for them. Eggert also invited other faculty to stop by and see what W9ISU was all about.



Indiana State University Amateur Radio Club President Rowan Eggert, WO1P, holds a Yagi for a satellite station. [Todd Emmert, W9TWE, photo.]

There was hurdle after hurdle during the week leading up to the event. After finding out the newly ordered antennas were not shipped, and there weren't any solid answers on when they would ship, Rowan went into crisis management mode and reached out to local hams and clubs --the amateur community rallied. Local radio amateurs provided use of a Yagi for satellite contacts, and three multiband, portable verticals and coax for the HF stations.

Friday night, as the operating event neared, Eggert; Seth Byas, KI5QHD, and Dr. Girod were unable to get the SWR correct on the antennas, so they reached out on a local repeater for assistance.

It just so happened that one of their supporting clubs and ARRL Affiliated Club, Wabash Valley Amateur Radio Association (WVARA), W9UUU, was having a dinner and meeting a few blocks away. After WVARA tended to their own club business, a calvary of hams showed up with an antenna analyzer and over a century of cumulative expertise to help get all three W9ISU stations on the air in less than 45 minutes. (They complied with the event rules, which stated operating only one transmitter at a time.)



The screen of an antenna analyzer after getting an 80-meter antenna adjusted properly. [Todd Emmert, W9TWE, photo.]

The W9ISU club went on to stay up day and night making contacts, eating food, talking radio, and hosting guests and alumni for the next 46 hours.

Faculty Advisor David Barber, KB9YDX, brought technical expertise and donuts on Saturday and Sunday.



Indiana State University Amateur Radio Club member Seth Byas, KI5QHD, takes a selfie while operating as W9ISU in the 2023 ARRL Collegiate QSO Party.

The club members were anxious to get the logs compiled and see how they ranked in points. Regardless, they learned a lot and felt the support of their amateur community.

ARRL has resources for collegiate amateur radio clubs. The ARRL Collegiate Amateur Radio Program (CARP) was established to support and promote Amateur Radio among students and ham radio clubs at colleges and universities. More information can be found at www.arrl.org/collegiate-amateur-radio.

ARRL Launches The NTS Letter

There's a new newsletter in the ARRL repertoire as of this week. The first issue of [The NTS Letter](#) was published on October 3, 2023. The NTS Letter is a monthly digest of all things related to the ARRL National Traffic System®. It is edited by Marcia Forde, KW1U, who is a veteran traffic handler and serves as the Section Traffic Manager for the ARRL Eastern and Western Massachusetts and Rhode Island Sections.

The NTS is network that allows for rapid movement of messages, referred to as "traffic," from origin to destination, and for training amateur operators to handle written traffic and to participate in directed nets. The network consists of the layering and sequencing of both voice and CW traffic nets, as well as a digital system that operates 24/7. This nationwide system operates 365 days a year, generally relaying routine message traffic for training purposes and for maintaining readiness if called upon in an emergency. If called upon, these operators stand ready to assist emergency communications personnel and served-agency partners in relaying welfare and other messages. It is the modern continuation of the historic "radio relay" from ARRL's founding in 1914.



Director of the ARRL New England Division, Fred Kemmerer, AB1OC, said the NTS is a great way to get involved in emergency communications. "Newly licensed and experienced amateurs alike who participate in NTS find satisfaction and enjoyment in learning the skills of sending and receiving concise written voice and CW traffic in an organized, on-air network. It's a natural complement to the skills and training one needs to become an effective emergency communicator and Amateur Radio Emergency Service® volunteer. Plus, it's an

opportunity to meet new friends, and it's fun!" said Kemmerer.

[The NTS Letter](#) is published monthly and is free of charge to ARRL members. Members can subscribe at arrl.org/opt-in-out by selecting "edit" to view all of their subscription preferences (members need to be logged in to their ARRL website account to do this).

WestFest STEM Event Offers Hands-On Experience

Amateur radio was represented at the seventh annual WestFest event at The Ohio State University in Columbus, Ohio, on Saturday, September 30, 2023. WestFest is a public engagement event that highlights science, technology, engineering and mathematics (STEM) research, sustainability initiatives, and outreach programs at The Ohio State University. The event featured three behind-the-scenes tours and 39 activity booths.

The Amateur Radio and RF Club at The Ohio State University, [W8LT](#), and the [All Things Amateur Radio Association](#), W8ATR, provided information and hands-on STEM experiences for nearly 400 attendees. The W8ATR Mobile STEM Trailer, funded by a grant from the ARRL Foundation, included a CW oscillator, a display about the history of Morse code, and signage explaining the history of wireless technology and radios. Three Snap Circuits® stations were set up for visitors to build an FM radio, and there was a working replica of a spark-gap transmitter. The trailer also featured a complete amateur



Members from W8LT and W8ATR outside the ATARA STEM trailer. [John Ross, KD8IDJ, photo.]

station with a telescoping mast and a quarter-wave vertical ground-plane antenna.

"It's important to have amateur radio [be] a part of the STEM experience," said Lawrence L. Feth, PhD, Professor Emeritus and Faculty Advisor to W8LT.



Griffin, Eve, and Celeste try out some hands-on STEM activities at the ATARA trailer. [ATARA photo.]

ATARA Activities Director Diane Warner, KE8HLD, said throughout the day the STEM trailer hosted 52 adults and 80 children. "Watching the children's faces as they experience the sounds and sights of amateur radio technology is always rewarding," she said.

Additional information about WestFest is available at [The Ohio State University](https://www.ohio-state.edu/~w5nc/) website.

ARRL Podcasts Schedule

The latest episode of the ARRL [On the Air](#) podcast (Episode 28) features a discussion of digital multimeters with practical usage examples and shopping tips.



The latest edition (Episode 58) of the ARRL [Eclectic Tech](#) podcast features a discussion with author Nick Tusa, K5EF, about his new book *Wes Schum - Amateur Radio's Unsung Hero*.

The On the Air and Eclectic Tech podcasts are sponsored by Icom. Both podcasts are available on iTunes (iOS) and Stitcher (Android) as well as on Blubrry -- [On the Air](#) | [Eclectic Tech](#).

Amateur Radio in the News

ARRL Public Information Officers, Coordinators, and many other member-volunteers help keep amateur radio and ARRL in the news.

["County amateur radio now a FEMA-certified communications team"](#) / Wiscasset Newspaper (Maine) October 18, 2023 -- The Lincoln County Emergency Management Agency amateur radio team.

["From Baton Rouge to Belize, local ham radio operators talk around the globe"](#) / The Advocate (Louisiana) October 23, 2023 -- The Baton Rouge Amateur Radio Club is an ARRL Affiliated Club.

["Lookout Mountain Wildfire Also Affected Ham Radio Operators; Fire Said To Be Contained"](#) / Chattanooga.com (Tennessee) October 23, 2023 - The Tri-States Amateur Radio Club is an ARRL Affiliated Club.

["Fruitful Partnerships are Paying Off"](#) / East Texas News (Texas) October 5, 2023 -- Upper Alke Livingston Wireless Association ARES®.

["Man Stands Outside with a Strange Antenna and Repeats This Phrase - Minutes Later He Gets a Call Nobody Expected"](#) / The Western Journal (Arizona) October 11, 2023 -- KB8M makes contact with the International Space Station.

["10-4 Boy Scouts: Local amateur radio club helps scouts participate in event"](#) / Daily Journal (Minnesota) October 12, 2023 -- The Lake Region Amateur Radio Club is an ARRL Affiliated Club.

["How Ham Radio Operators Do Eclipse Science"](#) / Science Friday (New York) October 13, 2023 -- The University of Scranton Amateur Radio Club, W3USR.

["Stafford radio operators plan park event"](#) / The Free Lance Star (Virginia) October 15, 2023 -- The

Stafford Amateur Radio Association is an ARRL Affiliated Club.

"Covenant Christian Academy students speak with International Space Station through Ham Radio" / The Salem News (Massachusetts) October 16, 2023 - Covenant Christian Academy.

"Amateur Radio club tunes in to chess tournament" / The MSU Exponent (Montana) October 5, 2023 -- Montana State University Amateur Radio Club Radio Club, W7YB.

"Local ham radio group trains to support hospital system during cyber attack" / Point/Plover Metro

Wire (Wisconsin) October 8, 2023 -- Portage County Amateur Radio Emergency Service.

"Ham radio more than a hobby for Hoosier Energy employees" / Hoosier Energy (Indiana) August 7, 2023 -- Hoosier Energy amateur radio operators.

"How to get started with a ham radio license" / Donald W. Reynolds Journalism Institute (Missouri) October 5, 2023 -- Missouri School of Journalism.

Arrl.org. 2023. ARRL Letter. [online] Available at: <http://www.arrl.org/arrlletter?issue=current> [Accessed 30 Sept 2023]

NARS Monthly Club Meeting

October's Monthly Meeting

The October meeting featured Joe Ross, W5BSA, who presented on his activities using amateur radio for remote controlled aircraft. Joe brought a number of vehicles that he has flown, fired up a few of the engines, and shared video showing his flights. Joe's stories to launch his space shuttle vehicle and his activities flying across Texas were an excellent session for our club!

Next Club Meeting

Our next club meeting will be November 17th at HCESD 16 Admin – 18606 Stuebner Airline Rd, Spring, TX 77379. We look forward to seeing you there!

November's general meeting will be devoted to the status on the Antenna's being installed at HCESD 16 Admin. Along with that we will have an update on the proposed changes to All-star and EchoLink with diagrams of the proposed network currently in testing phase. This is a meeting you don't want to miss as we will go into plans for NARS to expand not only it's overall coverage but also provide and more robust access capabilities.

NARS General Club Meetings

NARS holds monthly club meetings where a variety of topics are presented from a number of guests. Come learn anything from antenna design, phasing, emergency response, and more!

Who: All club members, friends, or anyone interested in the Amateur Radio hobby

When: The Third Friday of the Month at 7:30pm

Where: HCESD 16 Admin, [18606 Stuebner Airline Rd, Spring, TX 77379](https://www.google.com/maps/place/18606+Stuebner+Airline+Rd,+Spring,+TX+77379)
Zoom Conference Call, Meeting ID: 2815436502, Passcode: 123456

NARS Club Documents and Minutes



Did you know that you can find all of the club's public documents, including board meeting minutes, financial statements, and newsletters on the [club website](http://www.w5nc.club/doc_repos/) at http://www.w5nc.club/doc_repos/?

NARS Name Badges: Get Yours Today!

Cindy (KM4YGG) and Art (KM4YGH) Grant are offering the club a deal for the NARS club on getting membership name badges. Each badge costs \$10 and can be delivered at the next NARS meeting (if ordered two weeks or more before the next meeting).



To order, go to <https://badgesunlimitedllc.com/#!/4-2-NARS-CLUB-MEMBERS-ONLY/p/104217140/category=13635038> and pay the fees using the checkout capability on the website.

NARS Announces a Dues Increase

NARS has made the difficult decision to increase its annual membership dues for the first time in its history. While this was a difficult choice for the Board, it has become necessary to sustain the provision of our numerous services to the community. Over the years, prices on goods and services have risen, and we have faced these increases while maintaining our membership fees, despite enhancing our repeater system and other services to our members.

Effective January 2024, the dues will increase by \$5.00 across the board. The new dues structure will be as follows:

- Individual Membership \$25.00
- Family Membership \$30.00
- Student Membership \$17.50

We will continue to offer new licensees a \$5.00 discount upon their initial sign-up.

Members who need to renew their membership before January 1 will pay the current dues, while those renewing after January 1 will see the increase. Membership terms run for one year from the day of joining, so many members will not experience the increase until sometime next year.

Amateur Radio Activities

The “Amateur Radio Activities” feature of NARS News highlights various activities related to ham radio. Each issue provides a quick overview for those who may be interested in the learning new aspects of the amateur radio hobby.

This month, the ARRL “QST” magazine features several antennas that you can build to extend the operating capabilities of your station. See the magazine online by [clicking on this link](#) (ARRL members only).

In the world of amateur radio, enthusiasts and operators continuously seek ways to improve their station's performance and expand their communication range. One key component that plays a pivotal role in achieving these goals is the antenna. Antennas are the heroes of amateur radio, quietly enhancing station capabilities and connecting radio enthusiasts to a broader world of communication. In this article, we'll delve into the fascinating realm of amateur radio antennas and explore how they can substantially increase the capabilities of your station.

The Importance of the Antenna

When it comes to amateur radio, the antenna is often overlooked by newcomers, who may focus more on the radio transceiver and other equipment. However, seasoned operators understand that the choice of antenna can have a profound impact on the station's effectiveness. Antennas act as the interface between your radio and the electromagnetic waves carrying your signal, making them crucial for both transmitting and receiving.

Extending Range

One of the most significant benefits of a well-designed antenna is the ability to extend your station's communication range. A high-quality antenna can dramatically increase your station's coverage area, allowing you to reach other operators both near and far. By choosing the right antenna, you can communicate across town, across the country, or even across the globe. It's all about harnessing the power of radio waves efficiently.

Better Signal Quality

Antennas not only expand your reach but also improve the quality of your transmissions. A good antenna minimizes signal distortion, interference, and noise, resulting in clearer and more reliable communications. This means you'll be able to understand and be understood even in challenging conditions.

Gain Directionality

Many amateur radio operators find themselves wanting to communicate with specific stations while minimizing interference from unwanted signals. Directional antennas, like Yagi-Uda antennas, allow you to focus your signal in a specific direction, effectively "pointing" your communication to your intended target. This capability is invaluable for contesting, emergency communication, or working with satellites.

Types of Antennas

Amateur radio operators have a wide variety of antenna types to choose from, each with its own advantages and limitations. The choice of antenna largely depends on your goals, available space, and budget. Here are a few common types:

- **Dipole Antennas:** A simple, cost-effective design that is excellent for beginners and can be easily built and deployed. They are known for their versatility and are suitable for a wide range of frequencies.
- **Vertical Antennas:** These antennas are designed for ground-wave propagation and work well for local and regional communication. They are also popular for portable or mobile setups.
- **Yagi-Uda Antennas:** Directional antennas with high gain, making them ideal for long-distance communication or working with satellites. They have multiple elements and require precise aiming.
- **Wire Antennas:** Including long-wire, random wire, or end-fed antennas, they are efficient and can be easily configured to fit various spaces and frequency bands.
- **Loop Antennas:** Compact and great for limited spaces, loop antennas come in various shapes, such as magnetic loops or delta loops.

The art of choosing the right antenna lies in matching the antenna type to your specific operating conditions, desired frequencies, and communication objectives.

The Key to Success: Proper Installation and Tuning

Selecting the right antenna is just the beginning. Proper installation, tuning, and maintenance are equally critical to maximizing your station's capabilities. These steps may involve adjusting the antenna's length, height, and orientation to optimize its performance for your chosen frequency band. Tuning your antenna ensures that it resonates at the desired frequency, which leads to better efficiency and transmission.

Conclusion

Amateur radio enthusiasts know that the journey to becoming a proficient operator involves mastering various aspects of the hobby, with antennas playing a pivotal role in enhancing station capabilities. With the right antenna, you can extend your communication range, improve signal quality, and gain control over your communication directionality. So, if you're looking to take your amateur radio station to the next level, start with your antenna. It's the key to unlocking a world of possibilities in amateur radio communication.

Did you know...

There are several members of the NARS club that are interested in setting up a regular ARDF/foxhunting activity with the club. If you have interest in being a part of this, please contact the newsletter editor (k5blr@arrl.net) or post on the club Groups.io email reflector.

Radio In the Park + Fox Hunt!

Saturday, Nov. 11th 10am—4pm

San Jacinto Battleground

North side of Monument circle

Come and Join us for a day of radio , meet & greet, public education, and Portable Stations. Amateur Radio (HAM), GMRS, REACT, FRS and other Radio Communications! Plus a hidden transmitter Hunt (aka Fox Hunt).

Directions:

From 610 Loop—Take SH 225 East, exit Independence Parkway, look for signs directing you to the Monument, we will be on the North side of the monument circle drive.

Look for our Radio Communication banner, and the antennas!

Talk in Frequency 146.60 Simplex!

SETAC—South East Texas Amateur Club

Texas GMRS

Houston/Galveston React

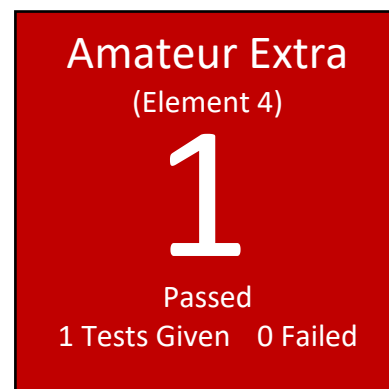
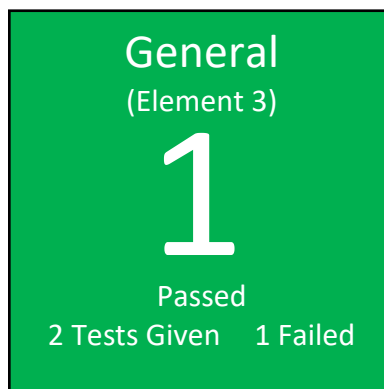
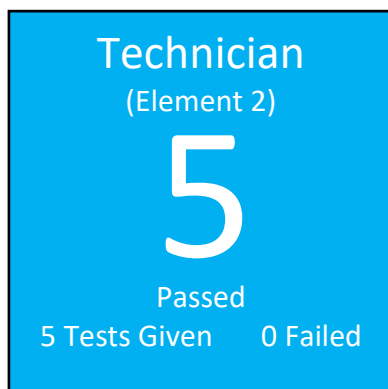
And more! All are welcome! **OPEN TO THE PUBLIC**

VE Sessions and Results

PROVIDED BY SHEREE HORTON, WM5N

Attendees

On Saturday, October 21, 2023, a VE Test Session was held at HCESD 16 Admin, 18606 Stuebner Airline Rd, Spring, TX 77379. During the testing session, 6 candidates took 8 tests.



Congratulations!

Congratulations to the following for passing their new license exams¹:

- Greg Ham – Technician
- Jackson P Ham – Technician (youth)
- Kevin E Kalinowski – Technician
- Mike Lawson – Technician
- Varit (Henry) Kobutra – New General

Congratulations to the following for passing their upgrade exams:

- Richard A McCauley Jr KJ4EAG – Upgrade to Extra

Did you know...

NARS now has the ability to run computer-aided tests through [Ham.Study](https://hamstudy.org). Computer-aided tests provides many benefits, including the ability to make the tests easier to administer, quicker to get results, easier for many test-takers, and many more!

Pre-registration for Testing Sessions

To pre-register for an upcoming testing session, you can use one of the following links:

HamStudy.org page link: <https://hamstudy.org/sessions/arrl/77070/inperson>

The next session will be November 18, 2023 at the HCESD 16 Admin Building. Please visit www.w5nc.club for the announcement.

¹ Successful candidates will only receive their **NEW** licenses if they pay the \$35 fee to the FCC within 10 days of receipt of their notification emails. They will have to request the ARRL VEC to resubmit their paperwork if they miss the 10-day deadline. They do **NOT** have to retest.

Thanks and Gratitude

Thanks to the following VE's for serving as Assistant Session Managers:

- Ed Messman KT5EM

Thanks to the Exam VE's in attendance:

- Synomen Hebert KG5IRS
- Brett Hebert KG5IQU
- Kyle Vann K5KNV
- Paul Owen N5NXS

VE Session Guidelines

If you have a temperature or feel ill – DO NOT attend.

Wear masks if you are not fully vaccinated or feel the need to wear them.

Please send an email to either of the following if you plan on attending the test session:

Sheree Horton - wm5n@arrl.net or vec@w5nc.net

Volunteering and Becoming a Volunteer Examiner

Anyone who wants to observe and/or participate in a session is always welcome. Please let Sheree Horton know if you want to learn more about becoming a volunteer examiner.

Renewing Club Members

New Club Members

Welcome to the following new members of NARS!

- James Freeman, WN5BSA
- Greg Ham, KJ5DBD
- Varit (Henry) Kobutra, KJ5DBO
- Scott Seifert, KA2EEU

Renewing Club Members

Thank you to all the members who renewed their NARS membership this past month:

- Ron Brooks, K5TDF
- August Canik, KI5YPD
- Rich Jones, W5VEK
- David Peirce, KI5YPL

NARS Membership – Due Dates and More

DID YOU
KNOW



Did you know that you can find your membership expiration date on the club website? Simply click the "Membership Reports" link on the home page or visit this link: <http://www.w5nc.club/nars/index.php/2014-03-30-18-23-31/membership-reports/club-roster>. Find your name in the list and look at the "Expires" column of the table!

Training and Education

NARS

NARS Meeting Presentations - <http://w5nc.club/nars/index.php/club-info/technical-presentations>

ARRL

ARRL Online Course Catalog - <http://www.arrl.org/online-course-catalog>

ARRL Emergency Communications Training -
<http://www.arrl.org/emergency-communications-training>

ARRL Webinars - <http://www.arrl.org/ARRL-Learning-Network#schedule>

Exam Review for Ham Radio - <http://www.arrl.org/examreview>

Find an Amateur Radio License Class -
<http://www.arrl.org/find-an-amateur-radio-license-class>



Free Study Guides

A [study guide](#) for Technician license preparation, Dan Romanchik, KB6NU

A [study guide](#) for Technician license preparation on the Inland Empire VHF Radio Club website, Jack Tiley, AD7FO (Click on "Training Links" and go to the Technician training link)

Online Video/Audio Courses

[Online Technician license exam self-study course](#), Fred Benson, NC4FB - The purpose of the resources developed for this course is to provide candidates in geographical areas that do not provide classes and candidates who cannot attend a class with the means to prepare for the Technician license exam. The materials cover all questions in the question pool with explanations, sub element tests, and sample license exams. Help is available upon request via email.

Benson also offers a ["kid friendly" self-study course](#) and a self-study program especially designed for [emergency services personnel](#).

"The Ham Whisperer" [Video Course](#), Andy Vallenga, KE4GKP – This course is based on the FCC question pool sequence to assist with Technician license preparation.

[A Self-Study Video Course](#), Dave Casler, KE0OG – This course provides a guided self-study [video course](#) based on ARRL's Ham Radio License Manual curriculum.

[Online Technician License Preparation Course](#) – Chris Johnson, N1IR

Study Tools

[HamStudy.org: Cutting edge amateur radio study tools](#) - Free ham radio flash cards, practice tests, and question pools as well as introduction to ham radio and explanations for questions.

[HamTestOnline](#) – Study Tips for the Ham Radio License Exams

[HamExam.org](#) - Free Amateur Radio Practice Tests with Flash Cards

[eHam.net Ham Radio Practice Exams](#)

Paid Resources

[W5YI Group](#) - Your Resource for Ham Radio and Commercial Radio Licensing

[HamRadioPrep](#) - Enroll in Ham Radio Prep, the industry's #1 online test prep and training program, and pass your FCC Amateur Radio License exam on the first try - or your money back.

[HamTestOnline](#) - Study for your Ham Radio License Exam!

Exam Practice Answers

Technician: T8C04 - B. Send only the minimum information needed for proper identification and the contest exchange

General: G7B07 - A. A filter and an amplifier operating in a feedback loop

Amateur Extra: E9A12 - D. 3.85 dB

Of Interest to the Club

Houston Local Traffic Net

The Houston Local Traffic Net (HLTN) was formed July 14, 2020 in preparation for ARRL Field Day 2020. Originally called the Fort Bend County Traffic Net, the HLTN has been in continuous operation since then.

The nets ran on Monday nights for one hour with training sessions during the net. Because of the volume and interest in the Traffic Net, on April 15, 2021 an additional session was added on Thursday nights for 30 minutes and in 2020 the time was increased for up to an hour to also accommodate training.

The Houston Local Traffic Net currently meets from 6:30pm – 7:30pm twice a week handling National Traffic System (NTS) traffic (Radiograms) into and around the Houston Metro area and also includes, time permitted, traffic handling/training.

Monday's net: 146.940 (-) PL 167.9
Thursday's Net: 147.000 (+) PL 103.5

Backup repeater for both:

- 146.660 (-) PL 100.0,
- 444.375 (+) PL 100.0
- Echolink Node W5NC-R (all linked)

A complete schedule of Area Traffic Nets is located on the HLTN.org 'Nets' web tab with the times and frequencies. Visitors are welcome and encouraged to check-in to listen and learn this important Amateur Radio skill.

Direct any questions, via phone or email, about the Houston Local Traffic Net, Radiograms, and Traffic handling to: Sheree Horton WM5N, ARRL South Texas Section Traffic Manager

GHSN monthly Simplex Propagation Net

Beginning January 2022, the [Greater Houston Simplex Network](#) will return to its regular schedule of the 4th Thursday evening of the month, with 6:15pm for the Zoom meeting and 7:00pm for the beginning of the net. Simplex frequencies are 146.540 MHz.

I would also like to restart the relay nets for the 2nd week of each month, so I need volunteer(s) to help out as Net Control Operator. I am just swamped with developing our cool new propagation application. Please contact me if you can help with this. The script is fully developed, and can be found on [the website](#).
Contact Mark - N5PRD@yahoo.com

Calendar

Club Activities and Events

Monthly Club Meeting – November 17, 2023 - HCESD 16 Admin – [18606 Stuebner Airline Rd, Spring, TX 77379](#)

VE Test Session – November 18, 2023 – [18606 Stuebner Airline Rd, Spring, TX 77379](#) - Check-in will start at 8:30am with testing lasting from 9:00am - 11:30am. All testing activities will be completed by noon.

The full NARS calendar can be viewed at: <https://w5nc.groups.io/g/main/calendar>

Social Events

Lunch Break – North

Take a break with fellow radio operators and enjoy a lunch together!

Locations are announced weekly on the NARS email reflector!

Lunch Break – Medical Center

Near the Medical Center and want to take a break with fellow radio operators and enjoy a lunch together?

Watch the NARS email reflector for details!

Saturday Breakfast

Saturdays at 7 am Broken Yolk Café, 16803 Stuebner Airline Road, Spring, TX 77379

Monday Lunch (Taildraggers Lunch)

Mondays at 11 am; Aviator's Grill at Hooks Airport Terminal

Did you know...

NARS has a social media presence! Thanks to Sam Labarbera, N6HB, we have a Facebook page for those who would like to follow us there. Visit the [W5NC Facebook page](#) and join! It is open to ham radio operators, so there is a short quiz to qualify new members.

Hamfests and Conventions

November 18 - 19 | [Fort Wayne Hamfest and Computer Expo](#), hosting the ARRL Central Division Convention, Fort Wayne, Indiana.

December 8 - 9 | [Tampa Bay Hamfest](#), hosting the ARRL West Central Florida Section Convention, Plant City, Florida

Contests and Radiosport

ARRL Contest Corral

November 2023 - <http://www.arrl.org/files/file/Contest%20Corral/2023/November%202023%20Corral.pdf>

For a calendar of ARRL contests, please see <http://www.arrl.org/contest-calendar>.

For resources and results for all ARRL contests, please see <https://contests.arrl.org>.

NARS Club Officers and Information

Board Officers with Voting Privileges

President: Ron Matussek, WA6TQH, 713-825-9606, officers@w5nc.net

Vice President: Paul Kent, KI5FJS, officers@w5nc.net

Treasurer: Tom Hoherd, KK5YU, 713-828-8630, treasurer@w5nc.net

Secretary: Brandon Rogers, K5BLR, 713-294-6630, officers@w5nc.net

Director: Rich Jones, W5VEK, officers@w5nc.net

Director: Jerry Davis, N5EKO, officers@w5nc.net

Board Non-Voting Associate Members

Administrative Secretary: Neal Naumann, N5EN

Social Media Liaison: Sam Labarbera, N6HB

Newsletter Editor: Brandon Rogers, K5BLR

Public Information Liaison: Sheree Horton, WM5N

ARRL/VEC Liaison: Sheree Horton, WM5N

Repeater Team Lead: Marty Fitzgerald, W5MF

Webmaster: Bill Buoy, N5BIA, webmaster@w5nc.net

Trustee: Paul Owen, N5NXS

Club Nets

DMR Weekly Net – Every Tuesday at 7pm. Tune in on Talkgroup 3146211 for information on configuring codeplugs, see the DMR pages on the Club website (<http://w5nc.clubs>) or contact a club Elmer. Sam Labarbera, N6HB, coordinates this Net.

The Weekly Wednesday Evening Net - Every Wednesday at 8:00 pm. Join us on one of the W5NC repeaters: 146.660 MHz, -600kHz offset, PL 100.0 - wide area centered on downtown Houston and/or 444.375, + 5 MHz offset, PL 100 best in the Spring / Klein area. You can also join from anywhere in the world by connecting to EchoLink node W5NC-R. Kirc Breden, N5XJB, coordinates this Net.

Repeaters

For information on NARS-managed repeaters, please see the club website at <http://w5nc.club/nars/index.php/repeaters/nars-repeaters>

Did you know...

that NARS has a messaging service, called Groups.io, that allows you to connect with a giant group of experts, club members, and resources. Get more information on our club website at <http://w5nc.club/nars/index.php/social-media/email-reflector-groups>