NCARC Tri-Bander

Volume 7, Number 2 February 2026

From the NCARC President

Joe Hawley KDØTYU
president@ncarc.co

This month at our club meeting, we're excited to welcome **Mooner Salem**, who will present **Live DV**, an HF-based digital voice mode. It should be an interesting and informative talk, especially for anyone curious about digital voice on HF.

We also have a **Technician Class** coming up the following weekend on **February 28 and March 8** (two Saturdays). If you or someone you know is interested in getting licensed, please visit our website to sign up.

We have many more activities and events planned in the coming months, so be sure to check the website regularly to see what's coming up.

Thank you for your continued support of the **Northern Colorado Amateur Radio Club**!



NCARC Club Meeting

February 21, 2026

8:30 am Golden Corral opens- breakfast and socialize, **9:00 am** club meeting

In Person and online

Zoom streaming - All members will receive a link to the online broadcast.
If you don't receive a link by Friday before the meeting, please email treasurer@ncarc.net
You choose what you feel comfortable doing: attend in person or online.

Topic:

Live DV

Moneer Salem, K6AQ

Location:
The Golden Corral
1360 Sculptor Dr, Loveland CO 80537

Officer Elections

The Northern Colorado Amateur Radio Club currently has two open office positions: Public Affairs Officer (PAO) and Treasurer. We must fill these positions as soon as possible to maintain the smooth operation of our club.

The Public Affairs Officer will be responsible for all information shared with external sources, managing club advertising and social media, and managing technical aspects of our Zoom meetings.

The Treasurer is responsible for managing finances, creating a budget, and purchasing equipment and/or services the club may need.

We will hold a special election for both positions at our club meeting on February 21st to fill these positions, which will run until the May election. Those elected in February will serve until July 1st.

If you are interested in running for either the Public Affairs Officer or Treasurer role, please email Joe Hawley, president@ncarc.co, to be added to the candidate list.

Your involvement and support are crucial to the continued success of our club. Thank you so much for your dedication to the Northern Colorado Amateur Radio Club.

Hamfest 2026

Hamfest was a success! About 270 people attended and it was great to see so many attendees. The forums were really well received, in fact a couple of speakers were so enjoyed, that we hope to ask them to speak at a club meeting!

Our newly appointed Treasurer, Pete Robbins, won the grand prize in the raffle – the Yaesu FT991 radio. He was over the moon with the win (Ed. Note: So was I when I won it about 5 years ago!)

Hamfest is a great way to meet other operators, learn new things, buy a lot of stuff (that you probably really don't need) and just enjoy the camaraderie of ham radio enthusiasts. We hope you enjoyed it and will plan to attend next year!

Treasurer's Report

Bob Nauta WØBNC
treasurer@ncarc.co

January 2026

Account	Checking	Raffle	Savings	PayPal	Total
Beginning Balance	$982.00	$2,784.00	$5,043.00	$3,849.00	12658
Deposits	$6,439.00	1262	0	($112.00)	$7,590.00
Transfers	0	0	0	0	$0.00
Withdrawals	$3,279.00	0	0	$0.00	$3,279.00
Ending Balance	$4,142.00	$4,046.00	$5,043.00	$3,737.00	16969
Outstanding Items	0	0	0	0	$0.00
Net Balance	$4,142.00	$4,046.00	$5,043.00	$3,737.00	16969
Net Change	$3,161.00	$1,262.00	$0.00	($112.00)	$4,311.00

Expenses: Storage, Hamfest

Revenue: Memberships

Please Renew Your Membership for 2026!

Renew your NCARC membership.
It's quick and easy.
Click here!

Did You Know?

A regular contribution from Bob Schmid, WA9FBO

Rare Earth Elements

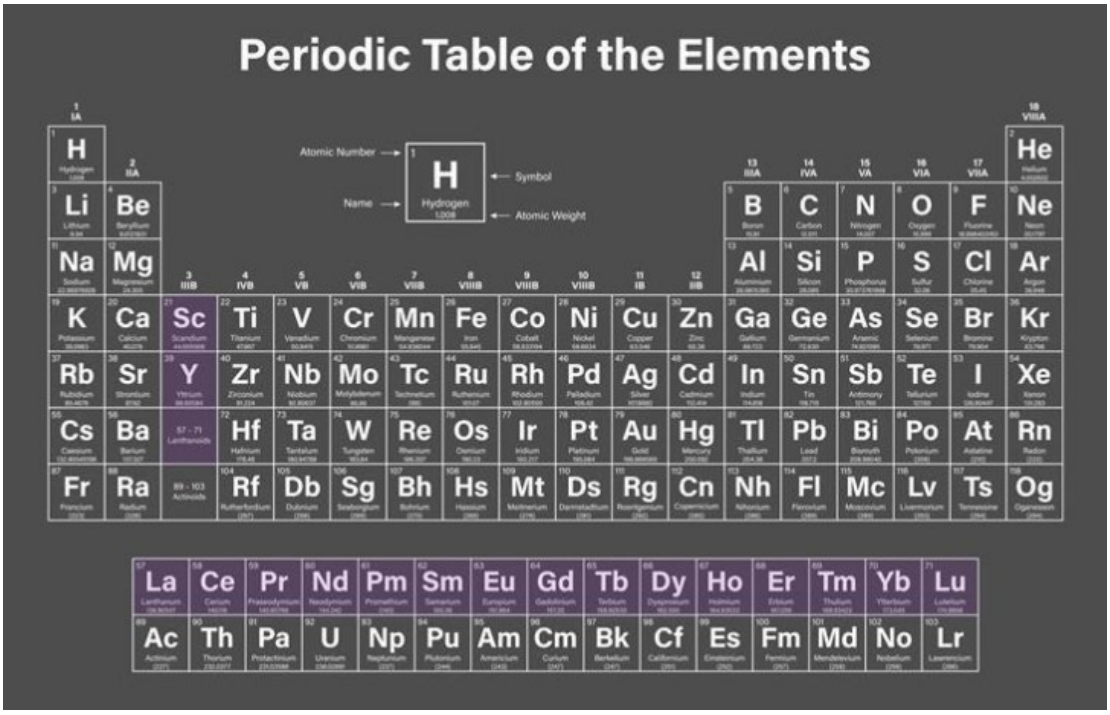
Introduction

We don't often think about it, but some of the most exotic materials on Earth—**rare earth elements**—play a role in everything from hard drives and hybrid cars to ham gear.

Despite the name, most rare earths aren't actually rare in the Earth's crust. The term comes from the fact that they're seldom found in concentrated, mineable form. Worse, they tend to appear together, and separating them is a slow, chemically intensive process. That makes refining expensive and environmentally challenging.

Lanthanides

Remember the periodic table from chemistry class? It helps make sense of where rare earth elements (purple shaded) fit in. Most belong to a group called the **lanthanides**: 15 elements from lanthanum (La, atomic number 57) to lutetium (Lu, 71). They have similar properties because of their unusual electron arrangements—specifically, electrons that occupy a deep, inner layer of the atom called an **f-orbital**. This hidden structure doesn't exist in common metals like copper or iron, and it gives rare earths their unusual and valuable effects in electronics. Two more elements, scandium (Sc, 21) and yttrium (Y, 39), are usually included as well. They're found in the same ores and act chemically like the lanthanides.



Why We Care

Rare earths aren't particularly good conductors, and they're not used much for wiring. Instead, their usefulness comes from their magnetic, optical, and chemical properties. Some examples:

Magnets

Neodymium (Nd) and dysprosium (Dy) are used in neodymium-iron-boron (NdFeB) magnets, which make it possible to replace bulky, heavy designs with compact ones suitable for portable or mobile use. Even small NdFeB magnets can grip many times their weight in metal—far beyond what ordinary iron magnets can do. They're critical in EV motors, generators, and wind turbines, and in ham gear such as compact speakers, microphone elements, and antenna rotators.

Samarium (Sm) is used in samarium-cobalt magnets, which are more heat-resistant than neodymium—important for aerospace or harsh environments. They also resist corrosion better than many other magnet types, making them ideal for outdoor gear or long-term use without sealing or coatings.

Superconductors

In rare-earth barium copper oxide (REBCO) superconductors, yttrium or a similar element serves as the rare earth. Combined with barium, copper, and oxygen, it forms a crystal structure that can carry current with zero resistance at surprisingly high temperatures. Superconductors open possibilities for ultra-low-noise receivers, highly efficient magnetic loops, and compact high-field magnets.

Resistors and Capacitors

Cerium (Ce) and lanthanum (La) are used as additives in the manufacture of specialty materials for resistors and capacitors. These elements help improve stability, temperature tolerance, and long-term reliability—key features in both high-end audio equipment and precision RF circuits.

Phosphors in Displays

Europium (Eu), terbium (Tb), and yttrium (Y) are key for creating phosphors that produce red, green, and blue light in LED screens, TVs, and smartphones. Without them, display colors would be dull and inaccurate—your waterfall display, spectrum analyzer, or rig's LCD would lose much of its crisp, bright look.

Batteries

Lanthanum (La) is found in some high-capacity NiMH batteries for hybrid vehicles and handheld radios. These rare-earth-enhanced cells can offer better cycle life and performance in extreme temperatures compared to standard rechargeable batteries.

Optoelectronics

Ytterbium (Yb) and praseodymium (Pr) are used in lasers, optical amplifiers, and fiber-optic communications. They help enable low-loss signal transmission over long distances—critical in modern telecoms and handy for ham digital and optical experiments.

RF and Microwaves

Yttrium is used in YIG (yttrium iron garnet) spheres, found in filters and oscillators for microwave and GHz-range equipment. For hams, that means high-end spectrum analyzers, tunable RF and microwave front-ends, SDRs, and advanced receive systems. A YIG filter's precision tuning and low loss make it possible to cover wide frequency ranges without swapping hardware—perfect for lab-grade gear or contest stations.

Conclusion

Rare earth elements aren't actually all that rare—the tricky part is getting them separated and purified. They're important in tech because of their unique electron setup, which gives them special magnetic and light-related properties. Copper is still the go-to metal for most electronics, but rare earths are used for specific jobs where their unique features really matter, even though they can be tough to work with.

Tech Report

James Cizek, KIØKN
techchair@ncarc.co

February 2026

Red Feather

The outdoor enclosure is fully built, the analog repeater is installed, the DC power plant is installed and working. The solar charge system is installed in the cabinet as well. The microwave dishes to connect it to Buckhorn are built and configured. We have received the cabling and fiber optic cable to install the Buckhorn end. The solar panels and all needed steel to construct the frame was delivered to my house this morning (19 Feb). We'll be putting together a small team to fabricate, then move, then install all of this. The only missing pieces at this point are a VHF duplexer that will fit in the outdoor cabinet (I am working on this) and the RigRunner 4005i that allows us to remotely control power. It's been on backorder since October or November so we are hoping to hear more on that soon. If our weather continues cooperating, we should be able to have this repeater installed and on air before spring arrives.

Nunn

The new antenna was received this week. I'll get it installed very soon, just watching for a spot of good weather to do it (i.e., less wind and a little bit warmer). With the weather we've been having, it should not be hard to find a time!

All Other Sites

The project to move our repeater controller software to a much upgraded platform is beginning now. Between health issues and a busy schedule, some things didn't progress as fast as I had hoped this winter, but we're getting back on track now. I'll be eyeing the Grover hardware upgrades/frequency change soon too. I want to get Nunn squared away and the Red Feather repeater deployed first, but it will be quick in tow behind those projects.

Stay tuned for club requests for help on these projects!

Technician Class – from NCARC

If you know someone who might want to get their license or be interested in taking our class, please send them this information.

We're getting close to our upcoming Technician class, and we'd love to have you join us!

Class Dates:

- Saturday, February 28, 8 am to 4 pm
- Saturday, March 7, 8 am until testing session is complete

Location: Larimer County Emergency Operations Center, 4872 Endeavor Dr, Johnstown, CO 80534

Cost: **Free** (lunch provided both days)

On February 28 you'll get a full day of learning and preparation. March 7 will include additional class time in the morning, followed by the test session.

The **test session is on March 7, in the afternoon** (if you want to take your exam). Testing is optional - but if you choose to test, we can help you finish up, get your license, and get you all squared away.

What's included?

- **Free instruction** from experienced hams
- **Free lunch** both days
- **Free PDF study materials** (slides from the class)
- A free list of websites to help you practice with sample tests

Please **sign up as soon as possible**. To register, go to **Exam Tools**.

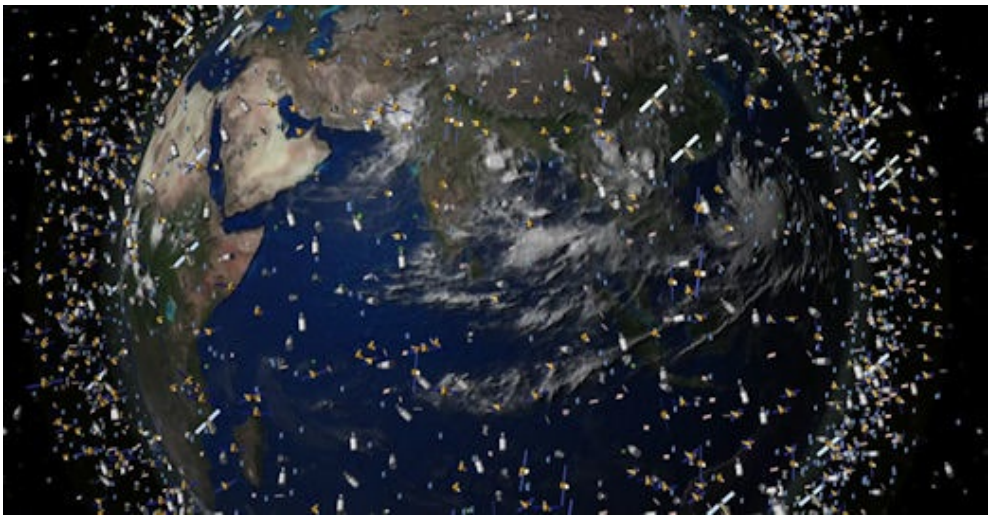
If you run into any issues with registration, feel free to reach out to Joe Hawley at **president@ncarc.co**, and he'll walk you through the process.

Thanks so much—we hope to see you there!

AN ORBITAL HOUSE OF CARDS

From Dr. Tony Philips, SpaceWeather.com, 19 Dec 2025, with permission

Earth's orbital environment has become dangerously fragile. A new study led by Sarah Thiele of Princeton University warns that if satellite collision-avoidance systems were knocked offline by a major solar storm, a catastrophic collision in low-Earth orbit could occur in as little as 2.8 days.



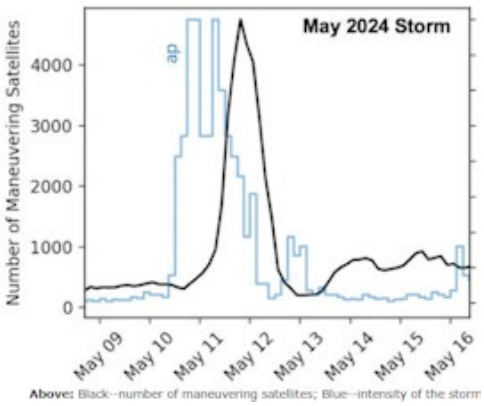
Researchers call this ticking countdown the CRASH Clock (short for Collision Realization And Significant Harm). It measures how long it would take, on average, for a debris-producing collision to occur if satellites suddenly lost situational awareness and stopped maneuvering.

In 2018, before today's megaconstellations filled the skies, the CRASH Clock stood at 121 days. Today, it's less than three.

Orbital traffic is now at unprecedented levels, especially in dense shells of Starlink spacecraft near 550 km altitude. The study shows that close encounters between space objects happen every 20 seconds across low-Earth orbit. According to SpaceX's most recent biannual report, Starlink satellites alone executed 144,404 collision-avoidance maneuvers between Dec. 1, 2024, and May 31, 2025.

At the best of times, avoiding collisions requires constant, precise maneuvering. But what would happen if satellite operators no longer knew exactly where their spacecraft were?

That scenario is not hypothetical. During the geomagnetic superstorm of May 10-11, 2024, more than 5,000 satellites made emergency maneuvers to maintain their orbits (full story). Most were Starlinks. Position uncertainties grew to kilometers--exactly the kind of disruption envisioned by the CRASH Clock. Fortunately, the storm subsided before a major collision occurred.



Above: Black--number of maneuvering satellites; Blue--intensity of the storm

Satellite operators have long feared a doomsday scenario called the Kessler Syndrome--a runaway cascade of satellite destruction triggered by a single debris-producing impact. This paper argues we may not be in a Kessler cascade yet, but we are operating in conditions where one bad solar storm or software failure could start the CRASH Clock ticking.

Enjoy your Starlink--while you can.

My First QSO

From Dick Doutt, KEØME

I was a junior in high school when I passed my Novice license test in 1966. The license allowed me to send 40 watts of CW over the air on a small slice of three bands: 80, 40 and 15 meters!

However, the FCC decided I must not be trusted with a VFO; I had to buy a crystal to control each frequency I wanted to use.

Armed with 2 crystals for 40 meters (7165 and 7198 kHz) and my brother's Hallicrafters vacuum tube transmitter and receiver (see ad!), I was ready.

I called my friend from high school who also had a Novice license and lived about 3/4 of a mile away. We agreed on a time to contact each other.

But I had no antenna. What could I do? From somewhere I got the idea to use a 75 watt light bulb for the antenna. I had no worries about impedance matching, SWR, or common mode current. I just hooked up the transmitter to 10 feet of coax and the light bulb.

The bulb flashed as I keyed the transmitter and I hoped that some of the energy was going to RF and not light waves.

I completed the contact with a jury-rigged antenna and a low power simple station. Pretty inventive for a first QSO!



Upcoming Ham Radio Events

Technician License Class: Feb 28, Mar 7, 2026, Larimer County EOC Facility, Johnstown, CO. More info here.

Quad Rock Race Event: May 9, 2026, Lory State Park, Fort Collins, CO. More info here. Contact Ron KØAZA

Never Summer Race Event: Jul 24-26, 2026, Gould, CO. More info here. Contact Wayne ADØKE

Red Feather Trail Jamboree: Sep 25-27, 2026, Red Feather, CO. More info here. Contact Bryan NØBCB

Blue Sky Marathon: Oct 17, 2026, Fort Collins, CO. More info here. Contact Ron KØAZA

Weekly On Air Events

FoCo CW Round Table, Tuesdays, 8:00 pm MT, 7.118 +/- for QRM. More info here.
NCARC Tech Net, Mondays, 6:00 pm MT, 447.275 (100 Hz tone)
NCARC Club Net, Wednesdays, 6:30 pm MT, 447.275 (100 Hz tone)

Biweekly Get Together

Martinez-Clarke Luncheon: every other Wednesday, 11:30 am, (next one Mar 3, 2026) Perkins Restaurant, 2222 W Eisenhower Blvd, Loveland, CO

From the Editor

Ann Donoghue KØARD
newsletter@ncarc.net

I'm sorry to have missed Hamfest, Karen Roberts took charge of the Forums and did a great job! Thank you so much for stepping in for me, Karen! I hope you all enjoyed the day and will plan to attend next year's!