



Technician License Class 2026 - Completed

By Allen Le Vie KH7AL

Your CCARC recently completed a six-week Technician License Class. Planning for this class began back in June after the club approved the Membership Growth Initiative – aimed at making entry into the ham radio hobby more accessible to members in our community.

To promote the class we did a little Facebook advertising (spending under \$20). We quickly had 21 people sign up by the end of August, interested in learning more about ham radio. The first class began with 16 students, while a few others decided to wait until the next class offering.

We didn't design this as spoon-fed lectures. From day one, students carried the bulk of the work through self-study. Our job was to demystify the confusing parts, make the theory approachable, and act as accountability partners.

Upcoming Events - 2026
CCARC monthly meeting – Nov. 2, and Dec. 7, 7 p.m. at the Salvation Army, 1330 Hudson St. or the Google Meet link available on our n7rb.org/meetings-nets page
VEC Test Sessions - Nov. 4, and Dec. 2, 6:30 p.m. at Lewis and Clark Library. Sign up at https://www.n7rb.org/testing
Nerds on A Hike - Nov. 7, 10 a.m., Tumbleweed Trailhead. POC - N7SKI
Coffee Net – Every Saturday at 9 a.m. on 147.22, Belmont Repeater. Eyeball @ Red Atlas at 9:30 a.m.
Trivia Net - Every Sunday, 7:30 p.m. on 147.22. John Monson AJ7MT

The six session themes covered:

1. Introduction to Amateur Radio and FCC Rules
2. Radio Fundamentals and Electronics Basics
3. Antennas, Feedlines, and Propagation
4. Operating Practices and Emergency Communications
5. Station Setup, Safety, and Digital Modes
6. First Station Guidance, SOTA/POTA Overview, and Exam Review Preparation

Each session featured guest mentors from the club who shared their own ham radio stories: Devin Felix N7HNT, Bill McGuire N7MSI, Zhaun Paddock AI7BM, Al Simons WA1TYB, Dan

Hawkins N7SHM, and Rob Kingery AE7AP.

Exam Night - 21 October

The club's trusty VEC, John KS7R, was going to be out of state for our special test session on 21 October, but he ensured the supporting VEs had everything they needed. Of the 11 students who took the test on 21 October, 10 passed. Three of them also tried their luck at the General exam and passed that as well.

Please congratulate the following students when you get a chance to meet and welcome them into our hobby.

- KM7IFH – Technician – Clayton
- KM7IFI – Technician – John
- KM7IFJ – Technician – Josh
- KM7IFK – Technician – Kurt
- KM7IFL – Technician – Dennis
- KM7IFR – Technician – Jacob
- KM7IFS – General – Neil
- KM7IFT – General – Charlie
- KM7IFU – General – Kendall
- Pending – Technician – Shawn

Special thanks to The Salvation Army for allowing us to use their facility for the classes at no charge. And a big thank you to Lyle Hill KJ7EBX, who volunteered his time every week with getting us access into the building to hold class.

Thanks to everyone's efforts we now have a new group of licensed ham radio operators in our community. Let's make sure we welcome them into the fold and

continue to help them with their respective ham radio journeys.

Nerds on a Hike

A new monthly adventure opportunity

Come join some adventurous CCARC members for the inaugural Nerds on a Hike. This new club member activity, open to anyone, will take place the first Saturday of the month to get you out of the shack and into some outdoor radio fun.



For this first outing, Trail Master Brett (N7SKI) will lead the pack at Scratchgravel Hills. We planned a short, easy walk (about ¼ mile each way, and 200 feet elevation gain), to set up a portable HF radio station. We'll make contacts (on VHF, UHF, and HF) while participating in Parks On The Air (POTA). If you've never tried POTA before we welcome you to step up to the

mic to try and make some contacts yourself.

New hams: this is your chance to get on the air with experienced operators beside you.

Dress appropriately for the weather and bring your sense of adventure. Along the way, expect experienced hams sharing tips about portable operating, good conversation, fresh air, and plenty of nerdiness.

Nerds on a Hike

When: Saturday, November 7, 10:00 a.m. – 1:00 p.m.

Where: Tumbleweed Trailhead, Scratchgravel Hills

Weather Call: Go/no-go posted by 9 a.m. on the club Facebook page, Slack channel, and Belmont repeater during the coffee net. Rain date: Saturday, November 14.

Depending on the weather and seasons we will likely alternate between POTA and SOTA activities.

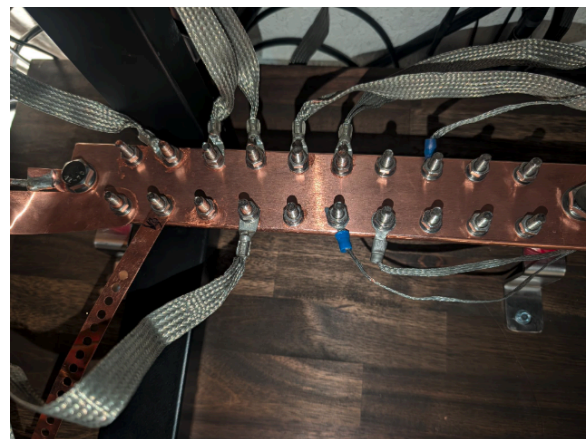
Questions? Contact Brett N7SKI for more information.

Get Yourself Grounded

By Bill McGuire N7MSI

Every amateur radio operator understands the importance of an external lightning ground, but an equally vital component of station safety and performance is the internal single-point ground (SPG) system. A well-designed shack ground ties all equipment chassis together to eliminate stray RF, reduce the local noise floor, and ensure that any unexpected voltage spikes have an immediate, safe path out of the room.

The heart of my upgraded station ground is a heavy, solid copper bus bar mounted horizontally along the rear edge of the workbench. Rather than daisy-chaining gear—which creates long, high-impedance paths that act as antennas for RFI—every piece of equipment connects independently to this single bus bar.



To prevent copper oxidation and ensure an airtight, low-resistance

metal-to-metal connection, all joints and hardware stack-ups on the bar are treated with Jet-Lube SS-30 pure copper anti-seize joint compound before being firmly bolted down.

When it comes to handling RF currents, conductor shape matters just as much as cross-sectional area. Because of the



skin effect, high-frequency currents travel exclusively on the outside surface of a conductor. For my heavy-duty Ameritron AL-80B amplifier, a one-inch-wide solid copper flat strap connects directly to the bus bar. This wide strap is positioned closest to the main ground exit wire to provide the lowest possible impedance path for high currents.

The rest of the station—HF radios, antenna switches, rotor controller, tuner, and power supply—is bonded to the bus bar with 5/8-inch flat copper braid. All connections are kept as short, taut, and direct as possible to minimize unwanted inductance.



Beyond RF grounding, the bench features a clever dual-purpose electrostatic discharge (ESD) system, inspired by a tip from the late Don Heidi, W7MRI. A two-inch-wide strip of solid



copper tape runs cleanly along the front edge of the wooden operating workbench. Tied directly back to the main ground strap, this tape serves as a mandatory first stop when walking into the shack: a simple touch instantly discharges any built-up body static before reaching for a sensitive transceiver VFO knob. The tape's tie-in

point also anchors an ESD wristband for repair work.

The final leg of the system is the path outside. A heavy 6 AWG solid copper wire runs directly from the central internal bus bar, taking the shortest possible route straight through the wall



to the external ground rod array. This external array is subsequently bonded back to the main house utility electrical ground. Taking the time to build a robust, single-point internal ground takes the guesswork out of station troubleshooting, quiets a noisy receiver, and ensures the operator and the electronics stay safe from static and stray RF alike.

Communications on Thunder on the Snake River Jetboat Race in Idaho

By Rob Hooper KI4NCT

Over Labor Day weekend, I was fortunate to answer the call for assistance from the Jetboat Race Amateur Radio Club (JBRARC - N7JBR) as a Safety Boat Radio Communicator. I believe I traveled the furthest to help out running comms on a safety boat. Friday evening was orientation, met with boat captains, and planned for where to meet to get on their boats in the morning. The JBRARC stepped things up from prior years by issuing credentials, and of course, what would an event be without a custom t-shirt!!



Rooster tail - jetboat running 100+ mph

Saturday consists of two round-trips on the long 26-mile course from Lewiston, ID. Sunday is a once, up and back, on

the complete course then shorter circuit races in the afternoon. Think of it as drag racing on the water. This year there were two turbine-powered jetboats (1400 hp) but only one cooperated by actually running. Turbines can go up to 140 mph on the smooth water sections of the Snake. Turbine jetboats are pretty quiet on approach until they pass then you hear the jet exhaust. The V8 powered boats you can hear echoing several miles in the canyon! Typically, a safety boat has 4 people on-board: pilot-captain, assistant to the pilot, an EMS certified medic, and a radio operator. Since I'm also a First Responder, I can assist the medic but my first job is comms.

What do amateur radio operators do in the race? First and foremost we are providing Emergency Communications if there are any incidents on the river. Once you are about 7-10 miles up the canyon, cell comms are out. They set up two cross-band repeaters on peaks that enable comms back to Lewiston Hill repeater that can be heard throughout the north river valley. Radio operators are also selected to relay boats passing certain points so if there is a boat that has gone AWOL, it can be tracked down by locally stationed boats. For the most part it's just passing traffic to control to keep things moving.

In 2019, there was an unfortunate fatal boat accident. The comms were very intense and heavy trying to get help to the crash site. I had to relay to the Asotin Fire Boat as they were across the

river from our location. Their paramedics were needed ASAP about 2 miles downstream but they didn't hear the message so I relayed direct simplex.

For antennas, normally the club issues antennas to radio operators using a u-bolt bracket like the older CB radio truck mirror mounts, which also have a dual-band base loaded antenna.



Those mounts take time and a wrench and they can shake loose and mar the railings. A number of years back I made a unique antenna mount that enables clamping to any round or square horizontal railing on a boat without damaging the surface finish of the

railing. I mounted an NMO mount to a 80/20™ connector plate and used my Comet 2x4 dual band antenna. This was my sixth time on jetboat races. In this race, I was put on Safety Boat 15 (out of 16), located second to the last location furthest upstream.



Coming next month: Rob's build of the radio go-box he used on this year's race.

Badger Pass Trip

By Bill Erhardt K7MT

Tim KB7DMK, Bill N7MSI, and I went to the Badger Pass Repeater site west of Dillon, Montana. Tom WR7AGT gave the club some really nice equipment for

the club's repeater on Belmont. The three of us took all the equipment down and brought it back to Helena and stored it at Tom's KE7VUX.

Equipment included 6 x 2 volt 1255 Ah Trojan Batteries, 4 135 Watt Solar Panels, and a Morning Star Solar Controller with all the power cables. Club's repeater will have a nice solar powered battery backup for the repeater.

We stopped at Sparky's cafe and all had a Smoked Philly Cheese lunch which was excellent before heading home.

Fire Prevention Week

By Stacy Webb KK7CJV

Lee Barrett K7NM, who normally leads the effort for the 7th calling district for Fire Prevention Week, had suffered antenna damage from a recent weather event. He was busy rebuilding the antenna and was expecting delivery of his new tower during Fire Prevention Week. So he asked if I would take the lead for Fire Prevention Week.

I had never led an event like this before, just operated Special Events. I asked Bob Lightner W4GJ (who is the head honcho of Fire Prevention Week) for help hosting a time-slot sign-up spreadsheet and he graciously accommodated. In my correspondence with Bob, he explained he was lead in 4-



land and had 55 high school students licensed and ready to get on the air and operate. He had originally worried that the 7th calling district would not have operators.

Well, our 7-land operators did not disappoint! Operators from Montana to Utah to Arizona racked up 4,747 QSOs for Fire Prevention Week, taking the top spot for the MOST QSOs!!! The 7th calling district beat the runner-up by more than 1,100 QSOs. Way to go operators!! Fire Prevention Week is a great Special Event that helps to remind us to check the batteries in those smoke alarms. Thank you operators for your support in this year's Fire Prevention Week!

EME Antenna Build – Part Deux

By Tom Mandera KE7VUX

Last month I mentioned my first attempt at an EME contact. It ended with half of the milestone achieved. I may not have heard my signal come back from the moon, but I learned some new skills building the antenna I used.



Usually we build small-ish antennas. Dipoles. Moxons. Two, three element Yagis.

This time, I was building a 3.5 wavelength or 12 element antenna, and to squeeze the most performance out of it, the dimensions had to be “right on” or the gain, and more importantly the pattern, would be off and the antenna wouldn’t work as well. For VHF, that means measuring to better than 1mm. It gets worse as you move up the frequency band.

3.5 wavelength or 12 elements on VHF works out to just under 24 feet overall length.

I sourced 1.5-inch, 0.083-wall aluminum tubing for the boom, 1 3/8-inch solid rod for splices, 5/16-inch rod for the elements, and 3/8-inch tubing for the driven element.

I researched several designs. I found several noteworthy ones, but after deciding that ultimately I should build a cross-polarization (or at least, a Horizontal and Vertical capable) antenna, I settled on a DG7YBN GTV2 12 element design.

The metric 8mm and 10mm rods had to be converted to 5/16" and 3/8" and some slight adjustments were made.



If you build a common “through boom” antenna, you drill a hole through the boom, and then slide the directors (and reflector) through it, usually with an insulator. The close presence of the

boom still requires a “boom correction factor” to adjust the element lengths. To avoid this, I put my new-to-me 3D printer to work, designing a modular two part system.

First, a mount for the 1.5” diameter aluminum boom. This includes lowered shoulders that are drilled and riveted to the boom, with a raised center dovetail with a cross securing pin.

To that, I added a mating dovetail that then holds the 5/16” director/reflector

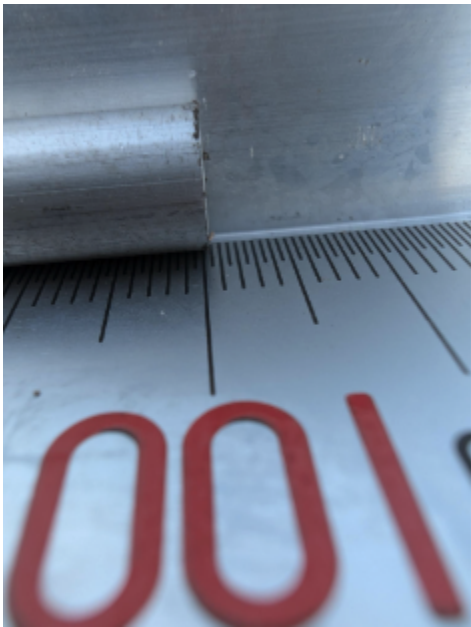


passing through with a pinch bolt to provide just enough friction to lock it in place. You can look through the split and see a center line mark on the elements before tightening the bolts to make sure you have the element centered.

New skills and tools were brought to bear – precision metric rules and tape measures were needed to get +/- 1/2mm – a new Class 1 Tape Measure arrived from Germany, and a good metal

precision meter stick was purchased for the shorter distances. I built a simple fixture with the meter stick, aluminum angle, and a 1-2-3 block to measure each element precisely.

I first faced each element, to clean up the ends. I then used the bandsaw to get it to the rough size, then I used the lathe to shave the elements repeatedly until I had the right lengths – as close to the measurements as I could manage. I could have used a hacksaw and a file or grinder to get pretty close.



The 1 3/8 solid rod was turned down and cut to length to make a ~12" long splice for the boom. It was placed inside and then two holes on each section were drilled to pin it in place. I placed my 3D printed boom mounts in about the right spots, then clamped a 20' long piece of 2x2 angle steel to them to keep them all level. Then the reflector was drilled and riveted.

Now it was time to use the new tape measure to space each successive mount the right distance.

With the mounts on the boom, I finished making the driven element. It had to be bent at the right dimensions. I first used a propane torch to heat and anneal the 6061-T6 tubing so I could bend it, and then it bent fairly easily.

A different mount was built for the driven element – it's almost flat on top with some clamps that come down over the top to hold the driven elements in place. A short piece of RG-400 received an N connector on one end, and was split to a pair of ring terminals on the other end, secured to the driven element with short stainless steel bolts.

I added a king post near the middle of the boom with some non-conductive guys to either end. The boom is too flexible otherwise. I also affixed a temporary mast adapter – some muffler clamps and a piece of plate did the job.

I finished things off with a length of LDF4 hardline, placed it on a temporary mast, and then checked things with the NanoVNA. 47.8 ohms impedance, and 1.07:1 SWR at 144.200 MHz.

This antenna is good for about 15.5 dBi gain, and has a "clean" pattern that rejects local noise sources and focuses on the sky.

Next up – build 3 more of these, and use the dovetail mounts to replace the horizontal elements with a dual-mount

for an “X” of elements, to cover both horizontal and vertical polarization without having to rebuild the boom.



That will require me to make sure that all 8 reflectors are the same length, and each of the 8 directors are also exactly the same length, along with some precise measuring of the feedpoint assembly coax jumpers and the low loss coax that will run down the boom to the mast and power dividers. Everything has to be in phase and as perfectly matched as I can manage.

Vintage Radio up for Grabs

Someone in the area reached out through our website to ask if anyone is interested in a Hallicrafters SX-110. They inherited a radio and wanted to know if someone in the club would like it. There are also some original manuals

to go with it. If interested email membership@ccarc-info.org and we can put you in touch with the current owner.



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Capital City Amateur
Radio Club
Helena, Montana

