

From the NCARC President *Joe Hawley KDØTYU*

Well, it is getting a little colder outside and I guess that means more indoor hobbies; that's where ham radio can be your best friend. November 28 and 29 is the CQ Worldwide DX CW Contest. If you are a CW guy or gal, this is the one you should attend.

I would like to thank everyone for allowing us the use of the Horsetooth repeaters on October 3rd. This was an ARES event that's usually held the first week in October. If any of you are interested in joining ARES, please contact me, and I will help you with the process.

In the coming months, we will have more information about our 2021 Tech Fest. This will replace our January 2021 Ham Fest. The Tech Fest is coming together rather well and it should be a lot of fun for everybody. Do remember - it is free to everyone. We hope to still have a 2021 Ham Fest sometime that year.

Remember if you have any comments or questions or would like to see something special please send me a note.

Public Affairs Office *Dave Winnett WØDDZ*

Numbers as of November 10, 2020 **YouTube**

Views (last 28 days): 4.986
Watch time (last 28 days): 951 hours
Subscribers: 1,420
New Subscribers (last 28 days): 57

Facebook

Members: 363
New Members: 13

From the Editor

Ann Donoghue KOARD

Apologies for no newsletter last month, got tied up visiting family. This newsletter contains information on last month's speaker (for posterity) as well as info on this month's.

The trip home to Michigan included passing by Kalmbach Rd! Yep, that Kalmbach; it's named after Darren's family.



Traveling eastbound on I-94 in Michigan, Exit 156

Club Meeting and Speaker

Next meeting

Saturday, November 21, via Zoom.

8:30 am socialize, 9 am club meeting, followed by our speaker:

Software Defined Radio

Greg Ella, N0EMP

Greg Ella has been a lifelong radio monitoring hobbyist. He began using Software Defined Radio receivers in 2005. He was licensed as an amateur radio operator, AD0JP, in 2014. He obtained his current vanity call sign, N0EMP, in 2018.

Greg's presentation on SDR receivers will cover:

- What is an SDR,
- What can they be used for,
- A brief history of "affordable" SDR receivers,
- Some online resources for software and education,
- Using online Kiwi SDR receivers.



Last meeting
Saturday, October 17
Ionospheric Sounding

Jim Dixon, KA5ETE

Research Associate, University of Colorado
Cooperative Institute for Research in Environmental Sciences
Chief Engineer, World Data Center A Ionosonde Program

My primary career interest is making observations with ionosondes and their application to solve scientific and engineering problems of radio wave propagation in the ionosphere and to study space weather and space climate. Over the last 30 years, I have installed or upgraded almost three dozen ionosondes around the world.

I started this adventure at the University of Massachusetts Lowell, where I obtained my BS in Electrical Engineering (1984), MS in Radar Systems Engineering, and my Doctorate of Engineering by measuring ionosphere plasma motions with ionosondes. I was hired by the US Air Force Research Laboratory in 1989 and soon led their ionosonde program. I experienced all aspects of ionospheric sounding, including instrument design, antenna design, installation, operation, data analysis, and use of real time data for applications such as HF propagation and ionospheric forecasting. I also gained familiarity with numerous other ionosphere sensing techniques, including space-based sensors, space-based beacons, ground-based radars and especially sounding rockets. I have supported 12 sounding rocket launches with ionosonde data.

In 2000 I started and lead a project to create a new generation ionosonde with modern technology. This has developed into the Vertical Incidence Pulsed Ionospheric Radar (VIPIR) which first operated in 2006 at Wallops Island, USA. This MF-HF radar is oriented toward research and discovery. With 20 instruments now operating

and another 10 in various planning stages, the discoveries from the owners of these instruments are just starting to be published.

In 2007, I joined the World Data Center ionosphere group as Chief Engineer, where I now work in cooperation with NOAA, promoting real time space weather and long term space climate data collection worldwide.

My current interests include operating and improving a small network of ionosondes in the US, improving the quality of data from all types of ionosondes, antenna design, preservation of the long-term climate record of ionosonde observations, real time international data exchange, multi-sensor ionospheric studies, open source software development and teaching the next generation of ionosonde scientists.



I am a General class radio amateur operating under the call sign W0ASP in the US and HL2ZJM in Korea. My recent volunteer efforts include being the Chief Scientist for the Radio Astronomy program at the Little Thompson Observatory in my home town of Berthoud, Colorado. This all-volunteer group teaches astronomy to all ages. Our radio telescope has measured the temperature around the black hole at the center of our galaxy.

Technical Report

James Cizek KIØKN

Horsetooth

Several visits to Horsetooth were made recently. The GPS system was completely replaced with a new, more sensitive GPS board feeding the distribution board I designed. An active amplified outdoor antenna was placed there to feed the GPS a more reliable signal. All the voting receivers were fed this new signal and it's much more stable now. After the fire-related power outage, a new set of batteries were donated to us and placed there to power portions of our equipment during power outage. There are now 200 amp/hours of cellular site style batteries there. The generator was inspected and a large rat nest removed from the top of the engine. We ran the generator for 5 days during the fire-related power outage. It was found that the rat ate through a large bundle of control wires which is why the generator doesn't auto-start anymore. I am working on the best way to rectify this (either having the owner fix it, or fix it for them for the use of the generator). The generator was once again started on Friday, November 6 due to a corporate

mix-up at the tower company headquarters not getting and paying the power bill in a timely manner. The generator started out with 75% propane fill, but between the fire outage and the meter mix-up outage, it's expected to be completely exhausted by Monday, November 9. I am working on plans to provide a more

robust power backup solution for this site. We must work within some pretty tight boundaries to stay in compliance with our lease. There has been evidence of someone tampering with our microwave dishes on the roof of the building. Multiple times we've found them pointed WAY off where they should be, but tightened down very tight (ie, the wind didn't do it!) We've installed a high resolution PTZ (pan, tilt, zoom) camera above the roof now that is able to watch our antenna installations (as well as provide some nice photos of Fort Collins!) All the misaligned dishes have been fixed and are now being watched with the camera. We can also observe the exhaust stacks on the generator with this camera giving us a visible confirmation of it running (or not).

Buckhorn East

The GPS system was completely replaced with a new, more sensitive GPS board feeding the distribution board I designed. An active amplified outdoor antenna was placed there to feed the GPS a more reliable signal. All the voting receivers were fed this new signal and it's much more stable now. We started having microwave dropouts at this site. Investigation revealed that the supposedly "outdoor rated" Cat5 Ethernet cable was horribly damaged from the sun and in many places the insulation had fallen off all the way to bare copper. This was all replaced with brand new high quality outdoor shielded Cat5 cable and this fixed the issues. I have gotten some additional advice on troubleshooting the 220 mhz repeater for this site and have started working on that again. With any luck, we'll be able to get through this and have it reinstalled. When the power was temporarily cut to Buckhorn for the fires, all of our equipment was fine (battery and generator backup all work properly!), the same was not true for a local ISP that is present at Buckhorn West that provides us a backdoor connection to that site in case of catastrophic microwave failure (which we had when Horsetooth went down and drained the battery). Because they dropped their connection, and Horsetooth was down, Buckhorn was its own island. The repeaters worked fine, but no linking, no control and (most importantly) no voting receivers to help folks along the western edges of Fort Collins and Loveland. To rectify this in the future, we are working to install an additional microwave link from Rattlesnake Ranch to Buckhorn to provide that redundant path without relying on commercial providers.

Technical Report Continued



The new camera at Horsetooth



The view from the camera at Horsetooth

Technical Report Continued

Buckhorn West

Our collaborative site with RMHAM and Colorado Connection. Although additional work has not happened here recently, it's on deck. This is currently the location of a VHF Colorado Connection repeater, a UHF DMR repeater on the RMHAM "Rocky wide" and "North" talkgroups, and a 900mhz P25 system that linked across the front range. Coming soon are NCARC supported VHF DMR system, and a UHF multi-mode repeater that can be operated as DMR, Fusion, P25, DStar, NXDN, etc...

Rattlesnake Ranch

A new GPS board and outdoor antenna were placed at this site also. The masts on the side of the enclosure have been re-done. New antennas for the "voter hotel" were placed and feedlines run. A new, proper professional entrance panel was cut into the enclosure and sealed up. The dome cameras at the site were replaced with "bullet" style that see better at night. The network router was replaced from a 10 port version to a 24 port version as we ran out of ports. The "voter hotel" was placed and wired in, it needs more work for configuration, but it's partly running and things are working well. Eventually it will have a full suite of 9 receivers running voting for a LOT of repeaters up and down the front range and providing some deeper coverage to the East and South East. It also will have a low power transmitter backup to some of the Horsetooth repeaters. Barbed wire fence was placed around the solar panels to protect them from a herd of cows that occasionally wander through. We are working on a new microwave link from Rattlesnake to Buckhorn.



Rattlesnake - new antennas for voter hotel

Technical Report Continued



Voter Hotel at Rattlesnake

Technical Report Continued

Budweiser

This repeater is working fine in both analog and Fusion digital mode, but the WIRES-X continues to be a problem. After sending all the parts in to Yaesu to fix, it runs for a few days and then fails. Over and over and over. Yaesu has basically said they don't know what to do about it anymore. They keep blaming it on the network connection, but the problem is actually with the USB connection between the HRI-200 and the computer. Everything has been replaced multiple times, still no help. The board will be meeting to discuss future directions on this and then come to the club for approval/input. This repeater worked very well to provide backup communications to Estes Park while Horsetooth was unavailable.

Greeley

I don't hear much about this site. It's a pretty low coverage site so I have to rely on folks in the Greeley area to provide feedback. I've not received any in quite some time so assume things are pretty OK. If you use this site, please know that I rely on your feedback to know if there are any issues (I have remote monitoring on the network there, but I can't monitor RF problems with the repeater). Hope it's still providing a valuable service to those that can use it.

CSU

Much of the network infrastructure that "help" with monitoring lives at CSU. I have been busy upgrading and replacing aging hardware (it's all donated so I replaced very old donated with much more recently donated hardware). There are some big upgrades happening right now with the Camera server that records security camera footage from our sites, as well as the virtualization infrastructure that runs some of the camera, monitoring, and other sites, including running the ARES website. Hoping to get some functionality activated soon that will provide some close-to-live views of some of our mountain top cameras to the NCARC website in conjunction with Darren's help!

Interference

We've not had any known intentional interference, but continue to track down the occasional problem we have with the 145.115 repeater. I did some testing while Horsetooth was without power and believe that the source of the signal that is mixing with our repeater to cause the problems probably IS on Horsetooth mountain also. More detective work in progress, but we are hopeful we can at least identify whose gear is causing the mixing product and hopefully work with them to come to a successful conclusion of that issue.



Tech Net Corner

Jim Dixon KA6ETE

Knife Edge Refraction

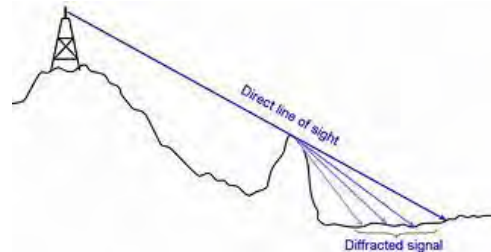
There are many different types of propagation associated with ham radio. One that is especially common in our area with the high peaks and mountainous terrain is “Knife Edge” propagation. Knife Edge propagation occurs when the transmitted signal is refracted off a corner of a hard surface such as a granite mountain top, building roof or canyon rim. While this can be accomplished with nearly any type of antenna, it is most commonly associated with a directional antenna due to being the easiest to aim and control. Often when this is accomplished with an omnidirectional (vertical) antenna it is simply a byproduct of normal operation with a little luck mixed in.

Items needed in order to make this type of propagation work is:

1. Know your surroundings or have a TOPO map of the area.
2. Radio and directional antenna.
3. Willingness to experiment and try new things.
4. Do not be afraid of not succeeding.

To get started and try knife edge refraction for the first time you can either pick a location to try or simply look at your surrounding area to see if there are any possibilities to attempt it. Now that you have your location picked out start by trying to reach the repeater or other station with your normal omnidirectional antenna for a base line report, yes this can also be used for simplex communications. Once you have that completed switch to your directional antenna

and point it in the general direction of the location you are trying to reach. If you do not make contact on the first attempt, do not worry and try moving the antenna slightly, first by changing the elevation slightly then rotating right or left. This may take a few attempts depending on how defined the lobe of the antenna is. Basic understanding of using a map and compass can be beneficial and aid in the aiming of the antenna. One thing to remember is that as with all forms of propagation it does not always work, and local condition may not be conducive to knife edge refraction. Regardless of the outcome get out and experiment, have fun and keep trying.



My Experiment:

This past week I did a little experiment using knife edge refraction to access our Horsetooth Mtn 145.115 repeater (7,208') from CR 43 between Drake and Glen haven. I stopped in a pull off along CR 43 approximately 2.5 miles west of Drake and tested access to the repeater using just my 5/8 wave vertical antenna mounted in the center of my roof. I was able to hear the repeater with about 50% quieting with a signal strength of S-4 and able to transmit into the repeater with less than 50% quieting with the power at 50 watts (full output power). I attribute this to lucky partial knife edge propagation. I then switched to using my HT, which with the above result of a mobile radio I should not be able to get into the repeater with only 5 watts which turned out to be true using the same vertical antenna. I proceeded to connect my 3-element portable Yagi antenna to my HT and aimed it at the top of Spruce Mountain (7779'). In doing this I was able to refract my transmitted signal in the direction of the Horsetooth repeaters. I was not only able to access the repeater with 5 watts of power, I also got a full quieting signal report.

Treasurer's Report

Darren Kalmbach KCØZIE

November 2020 Account Balances

Account	Checking	Raffle	Savings	PayPal	WWV	Total
Beginning Balance	\$1,261	\$2,081	\$2,099	\$6,686	\$569	\$12,697
Deposits	\$0	\$0	\$0	\$52	\$0	\$183
Transfers	\$0	\$0	\$0	\$569	-\$569	\$0
Withdrawals	\$832	\$0	\$0	\$6	\$0	\$838
Ending Balance	\$483	\$2,081	\$2,099	\$7,432	\$569	\$12,042
Outstanding Items	\$0	\$0	\$0	\$0	\$0	\$0
Net Balance	\$430	\$2,081	\$2,099	\$7,432	\$0	\$12,042
Net Change	-\$832	\$0	\$0	\$746	-\$569	-\$655

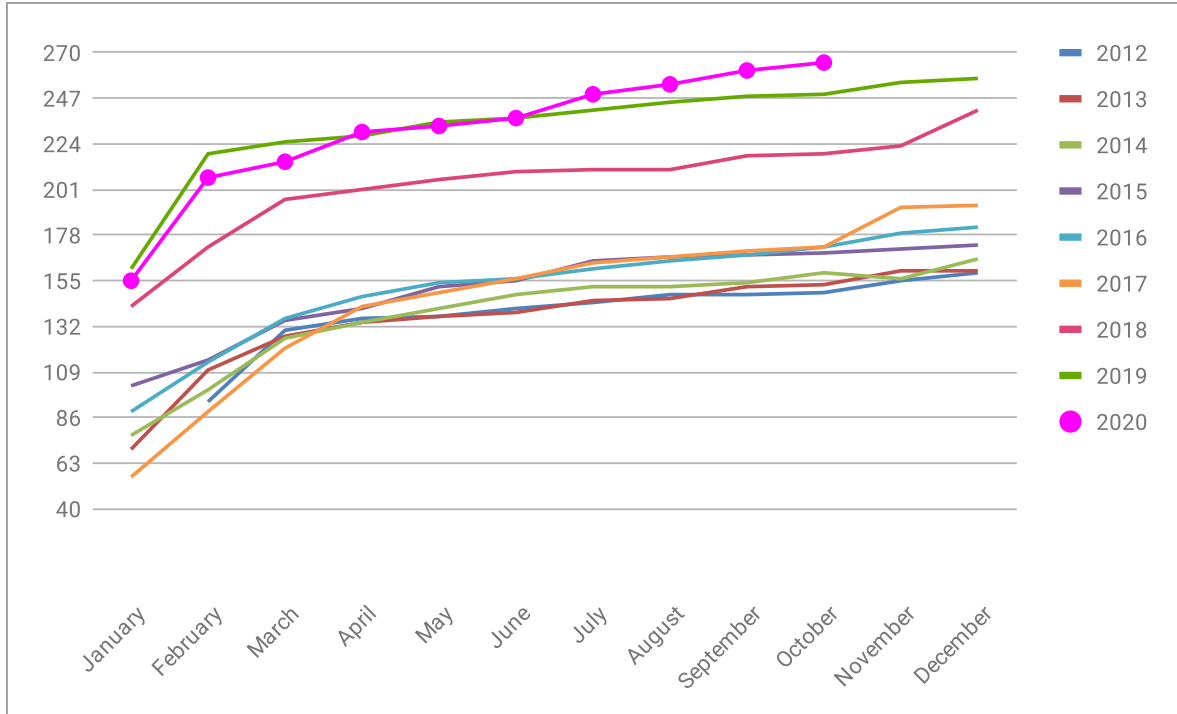
Expenses: Storage, Liability Insurance, Equipment Insurance, CO Secretary of State renewal

Revenue: Memberships

Membership Activity

October 2020: 265 (4 new)

October 2019: 249



General Announcements

Hamlet Class

November 14, 9 am via Zoom

Topics to be covered include radio terms and repeater usage guidelines, radio protocols, radios, equipment and antennae basics, SOTA and radio modes, programming radios.

Contact Joe pres@ncarc.net asap for info on how to connect to the class.

Test Session

Saturday, December 5

Two sessions: 9 am and 10:30 am

Watch your email for an announcement on how to sign up.

Radio Loan Program

If you are an NCARC member, and have an amateur radio license, you may borrow a radio from the club! The club has three Baofeng UV5 radios that are programmed and ready for use. The club will also supply someone to coach you on how to use it! You may sign out a radio for up to 6 months and will be required to sign the NCARC Equipment Loan Agreement. To receive a radio, contact Joe at president@ncarc.net. What are you waiting for?

Newsletter Articles Requested

If you have an idea for an article, or an announcement or other items for the Newsletter, please contact Ann Donoghue KØARD at newsletter@ncarc.net. We welcome any topic related to amateur radio!

NCARC Logo Items

Hats, polo shirts and jackets embroidered with the club logo, your name/call sign are available. You can place an order at any time. Details on colors, sizes and how to order are available on the website under the "Our Club" drop-down menu.

Slinky HF Antenna Building Class

This class was cancelled due to too few people signing up.

