

NCARC



Tri-Bander

Volume 5, Number 6

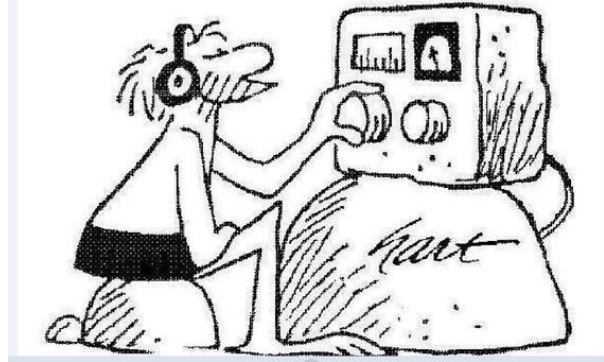
June 2024

From the NCARC President

Joe Hawley KDØTYU
 president@ncarc.net

Summer is here, and we have some exciting events coming up. This month, our field day will be on June 22nd and 23rd. I'm also looking into scheduling our HF in the park in July. In August, we are gearing up for another Rosin Corps event; this one should be interesting. The NCARC picnic will be in September for all of our club members. All of these events will be on the website, and I will e-mail everyone on our mailing list, letting them know when these events are and how to contact someone with more information.

For this month's club meeting, we have Bob Nauta, who will do our presentation. I think you'll find this interesting: with only addresses how you can discover how far your destination is from one road to another. It doesn't sound straightforward, but when he explains it, it's relatively simple. Well, I hope to see everybody at the club meeting this coming weekend, and thanks for supporting the Northern Colorado Amateur Radio club.



Public Affairs Office

Dave Winnett WØDDZ
 pao@ncarc.net

Numbers as of Jun 1, 2024

YouTube

Views (last 28 days): 1,157
 Watch time (hours, last 28 days): 130.9
 Subscribers: 2,868
 New Subscribers (last 28 days): 14

Top Video Views

Stealth Antennas – 722
Repeater 101 – 109
GridTracker - 61

Facebook

Members: 586
 New Members: 2

NCARC Club Meeting

June 15, 2024

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

LIVE and IN PERSON at

The Golden Corral
1360 Sculptor Dr, Loveland CO 80537

PLUS

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:

Do You Know How To Get There?

Bob Nauta, WØBNC

Next meeting:

**July 20, 2024
Golden Corral
Loveland CO**

Treasurer's Report

Darren Kalmbach KCØZIE

treasurer@ncarc.net

May 2024

Account	Checking	Raffle	Savings	PayPal	Total
Beginning Balance	\$6,987	\$2,668	\$10,001	\$8,752	\$28,408
Deposits	\$0	\$0	\$0	\$440	\$440
Transfers	\$0	\$0	\$0	\$0	\$0
Withdrawals	\$1,970	\$0	\$0	\$17	\$1,987
Ending Balance	\$5,017	\$2,668	\$10,001	\$9,175	\$26,861
Outstanding Items	\$0	\$0	\$0	\$0	\$0
Net Balance	\$5,017	\$2,668	\$10,001	\$9,175	\$26,861
Net Change	(\$1,970)	\$0	\$0	\$423	(\$1,547)

Expenses: Storage, General Class, Rosin Corps

Revenue: Memberships, Donation

Membership Activity:

May 2024:: 147 (10 new)

May 2023: 224

HF in the Park

Back by popular demand, come learn more about operating HF! Join us for a free seminar/presentation/demonstration/hands-on get together on July 26, 6:30 pm at North Lake Park, Shelter No. 2, Loveland CO. A short briefing on what to do and what not to do on HF, plus demonstrations of the HF frequencies. Several different radios will be set up for you to try. Free to attend but please sign up so we can get a headcount. [Sign up here](#).

Rosin Corps was a success!

Once again, the Rosin Corps session was a great success. Ten people (young and old!) attended, and all were successful in building an AM/FM radio that actually works! Thanks again to Greg Ella NØEMP for hosting in his garage!



Amateur – Extra-class: New Question Pool

From the *The ARRL Letter*, June 13, 2024

The 2024 – 2028 question pool is now available as an MS Word document and as a pdf. The 10 graphics required are also available in the document or separately. ARRL VEC Manager Maria Somma, AB1FM said, “The new pool incorporates significant changes compared to the 2020 – 2024 version: 82 new questions were created, 101 questions were eliminated, 350 questions were modified, resulting in a total of 603 questions.

ARRL Field Day 2024

From Greg Ella, NØEMP

Field Day is almost upon us. This year it is **Saturday, June 22nd and Sunday, June 23rd**. We can begin transmitting at noon local time on Saturday and continue until noon local time on Sunday.

Here are two useful links that everyone planning to participate should review:

<http://www.arrl.org/field-day>

<http://www.arrl.org/field-day-rules>

This year, Mike Backlund, KEØSOR, has offered to host us on his property. His address is 7784 CR 72, Windsor. If you are on Main Street in Windsor (Highway 392) at 7th Street (Highway 257), just east of the High School, go north on 7th Street for 2 miles and turn left (west) onto CR 72. Go west about 1,000 feet, and Mike's place will be on the left (south).

Mike has an agricultural gate facing CR 72 that he plans to have open for Field Day traffic. Ralph Towers has generously offered the use of his RV as restroom facilities this year, saving the club its biggest Field Day expense, which has been rental of portable toilets and wash station. Thank you Ralph.

I believe that there will be commercial power available on the property. In the past, we have always done Field Day off grid, and gotten bonus points for emergency power. We have never really been about maxing out points, though, so if, as a group, you want to use commercial power, go for it.

As usual, NCARC is planning to provide a pop up shelter, tables and chairs, and coolers with water and soft drinks.

Last year, we had a dry erase board (or was it paper?, I don't remember), and participants wrote down what band and mode they were operating on. They erased or crossed off their entry when they were done on that band. This helped with coordination between operators, and we will do it again this year.

Please keep logs of your contacts either on paper or in an electronic format that you can email to me after the event. I will consolidate them and submit them to ARRL.

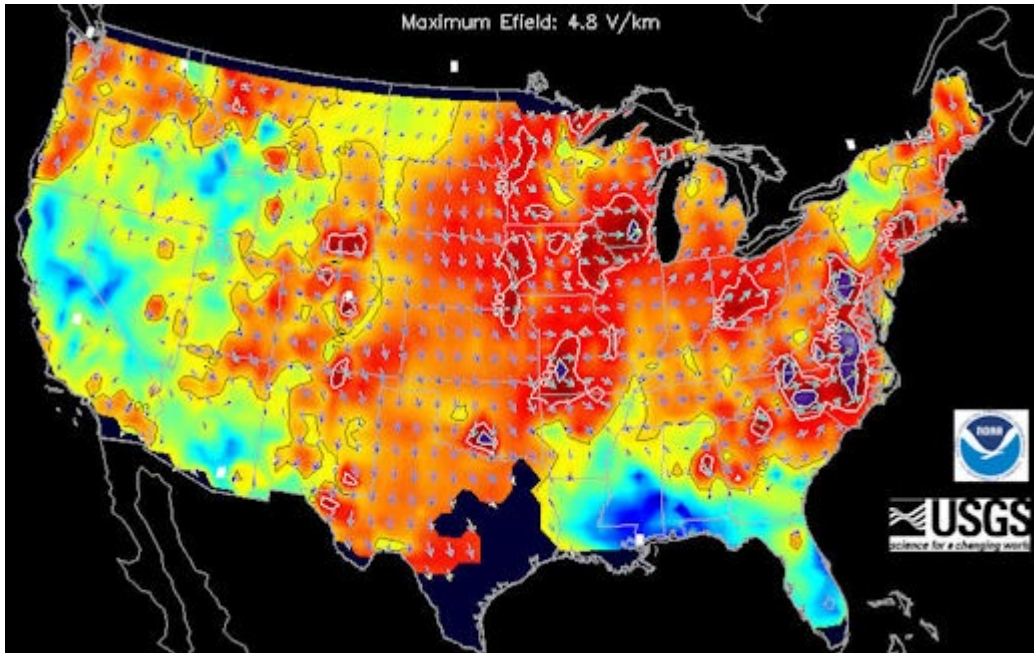
I plan to be on site about an hour before start time on Saturday, and also on Sunday morning. If anyone has any questions while I'm not on site, I can be reached at 925-321-7994.

Rocks and Soil Electrified by the Solar Superstorm

Used with permission from Spaceweather.com May 24, 2024 by Dr. Tony Phillips

Across the USA on May 10th and 11th, sky watchers marveled at bright displays of aurora borealis during the biggest geomagnetic storm in decades. Little did they know, something was also happening underfoot.

Strong electrical currents were surging through rocks and soil. The biggest voltages along the US eastern seaboard and in the Midwest were as much as 10,000 times normal. A map from NOAA and the US Geological Survey shows some of the 'hot spots' during the early hours of May 11th:



Back in March 1989, voltages only a little stronger than the ones shown above brought down the entire Hydro-Québec power system. The resulting Great Québec Blackout plunged millions of Canadians into darkness.

This time, however, power grids stayed up. "We haven't heard of any serious problems so far," reports Christopher Balch of NOAA's Space Weather Prediction Center.

Balch leads an effort at NOAA to model geoelectric fields during solar storms. The map, above, is a snapshot from a real-time display that takes into account the 3D conductivity of the Earth and ongoing geomagnetic activity. A computer at the Space Weather Prediction Center crunches the data to produce minute-by-minute estimates of electricity in the ground.

"I started working on this in 2011 after a NOAA Space Weather Workshop where representatives from the power industry asked for a geoelectric field model," recalls Balch. "It's a collaboration between NOAA, the US Geological Survey and others; we now have a version that covers much of Canada and the United States".

Rocks and Soil Electrified by the Solar Superstorm (continued from page 6)



A power blackout (left) and transformer damage (right) during the March 1989 storm.

When researchers talk about geoelectric fields they use units of volts per km (V/km). Earth's crust naturally contains quiet-time fields measuring as little as 0.01 V/km. During geomagnetic storms, these values skyrocket.

"On May 10-11, geoelectric amplitudes exceeded 10 V/km in Virginia and 9 V/km in the upper Midwest," says Jeffrey Love, a key member of the collaboration at the USGS. "These are very high. For comparison, we estimate that geoelectric amplitudes reached almost 22 V/km in Virginia during the March 1989 storm."

This means the May 2024 storm was, electrically speaking, about half as intense as the storm that blacked out Québec 35 years ago. That's too close for comfort. "Although power companies have taken measures to improve the resilience of their systems, no one would welcome another storm as intense as that of March 1989," says Love.

Realtime electric field maps are published 24/7 on the NOAA website. During the next geomagnetic storm, click here to see what's happening underfoot!

It's Never Too Late (or Too Early) to Renew!

Renew your NCARC membership.

It's quick and easy.

[Click here!](#)

Get the Goods!

The [NCARC Store](#) is always open for business! We have stickers, T-shirts, patches, water bottles and keychains. We have monogrammed clothing too.

Did You Know?

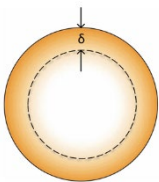
A regular contribution from Bob Schmid,
WA9FBO

Skin Effect

You've heard of *skin effect*, the tendency for AC current to concentrate near the surface of a conductor. Here's a quick overview.

Why It Occurs

Current in a conductor creates a magnetic field within the conductor. With DC, this magnetic field is constant and the current is spread evenly – no skin effect. But with AC, the changing magnetic field creates opposing forces that tend to drive the current away from the center and toward the outer portion. In fact, in some applications a hollow tube can replace a solid conductor to save cost and weight.



Skin Depth

Skin depth, δ , is measured from the surface to where the current is reduced to $1/e$ (about 37%). That means about 63% of the current flows in the skin depth area, effectively increasing the

resistance of the conductor.

Skin depth depends not only on **frequency** (skin depth is thinner at higher frequencies), but also on **resistivity** (it's thinner in lower-resistance materials) and **permeability** (it's thinner in materials that magnetize easily). For example, copper has lower resistance than iron so we might assume it has less skin depth. But iron's permeability is 10,000 times greater, so its skin depth is far shallower than copper. That makes iron and steel useless for things like high frequency welding rods, or for power transmission cable even at the low frequency of 60 Hz. (The steel cores seen in aluminum cable are used for reinforcement, not for carrying current.)

The Best Conductors

At 1 MHz, the skin depth for silver, copper, gold and aluminum is about 0.003 inches (the width of a human hair). It decreases to less than 0.0001 inches at 1 GHz. Since silver plating is easily made thicker than skin depth at RF, one reason we silver-plate RF connectors, components, waveguide surfaces, and coaxial cable braid is to inexpensively reduce the loss presented by the base metal (usually stainless steel or brass in connectors).

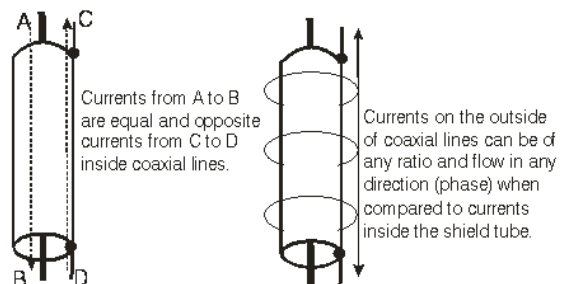
Gold plating, despite its higher price and slightly higher resistance than copper and silver, is used when tarnishing is an issue.

Ham Radio Examples

Skin depth affects the distance into a material that a given radio wave will penetrate. There are formulas and graphs online for finding the skin depths of various materials at various frequencies. A rule of thumb is 15 skin depths yields about 130 dB of shielding, so each unit of skin depth is good for about 8.7 dB of attenuation.

Vertical antenna experimenters in particular are interested in skin depths associated with different kinds of soil (a narrow skin depth means less loss and better reflection). For example, at 1.8 MHz, the skin depth for sea water is 16 cm. It's 5 m for wet soil and 15 m for poor soil.

And speaking of antennas: With skin depth so thin at radio frequencies, it's easy to see that there can be two totally independent currents flowing in a coax braid at the same time: One in the inside skin (left) and one in the outside skin (right).



Thus, skin effect allows current reflected at the coax/antenna connection to travel back down the coax via the outside of the braid and be radiated. Likewise, the outside of the braid can pick up RF from the antenna and re-radiate it, possibly modifying the antenna's radiation pattern.

Upcoming Ham Radio Events

ARRL Field Day: Jun 22-23, 2024. Location: 7784 County Road 72, Windsor CO

Never Summer Race Event: Jul 26-28, 2024, Gould, CO. [More info here.](#)
Contact Wayne ADØKE

Megafest: Jul 27, 2024, Monument, CO. [More info here.](#)

Red Feather Trail Jamboree: Sep 20-22, 2024, Red Feather, CO. [More info here.](#) Contact Brian NØBCB

Equinox Marathon: Sep 22, 2024, Fort Collins, CO. [More info here.](#) Contact Marty KCØQLK@gmail.com

Blue Sky Marathon: Oct 19, 2024, 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, Perkins Restaurant, 2222 W Eisenhower Blvd, Loveland,

From the Editor

Ann Donoghue KØARD
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I'm always seeking contributions to the Newsletter!
Please send your news and bits of info!