THE ROUND TABLE
Monthly Newsletter Of The Denver Radio Club
Since 1917 May 2022

President's Message

By Gerry Villhauer, W0GV

Hello DRC Members,

Finally, some good weather, but, so very dry and so many fires. So much for the April Showers.

Please keep the dates of our next two big events in mind and especially on your calendar. ARRL Field Day, June 25-26, 2022. And the Big One! Our DRC Hamfest, August 28, 2022. See the DRC webpage, W0TX.org for details.

And for sure…Do Not Forget May 8th, MOTHERS DAY. Happy Mother's Day to all of the moms out there!

Thanks to John Ackermann (N8UR) for his presentation on SatNav. Unfortunately, the program was interrupted by a technical problem with his microphone, and we had to abort. You can view this presentation (and many other DRC programs) on Doron's YouTube channel; youtube.com/k1dbc.

By Bill Rinker, W6OAV
Plan to attend the May video meeting. Tom, N5HYP, will discuss ham radio in space which began in 1961. He will cover how to get started in amateur satellites and what resources are available for getting active in satellites. Tom will answer questions such as: What equipment is needed, what is the satellite frequency band plan, how to track satellites, best operating practices, etc. Mark your calendar for our monthly meeting, Wednesday May 18th 2022.

Thanks to all of our new members who have recently joined the DRC. Your support is very much appreciated. Please come to meetings and events and stay active. Your name and call will be posted in this edition of the Round Table.

73 for now,

Gerry
W0GV
President

Who's New In The DRC?

By Bob Willson, KC0CZ

The DRC is a very active club in the Denver metro area and we'd like to have all of our members listen for these new calls and welcome them to the club and repeaters. Welcome to our newest members:

David Tzouanakis	-	Desiree Baccus - KM6HRW

We have a number of activities throughout the year and we'd like very much for you to participate in serving your community. If you have questions please feel free to ask on any of the repeaters or see the contact information on the last page of this publication.

Also, please join us once a month at the regular club meeting on the 3rd Wednesday at 7:00 p.m. For new hams we have the Elmer session which starts at 6:00 p.m. before the regular meeting.

Learning Net Report

By Fred Hart, AA0JK

Purpose:

We are here to help introduce, and promote, a variety of topics of interest to all amateur radio operators.

Our intent is to help participants get more active, involved, and engaged in amateur radio.

Topics of interest we encourage:

Personal Communications
-Getting started in the various modes, of communications.

Emergency communications
- Participation in public service.
- Training in emergency communication for volunteers.

Radio electronics, and technology
- Kit building, understanding signal propagation. and building antennas.

We strive to put experienced members / volunteers, at the forefront, as a regular source of knowledge-sharing in the Denver Radio Club. We hope members participating in the DRC learning net will find it rewarding to share experiences, and learning, that will motivate more of our amateur radio community toward lifelong journeys as Hams.

If you have experience in, and have a passion for, any amateur radio related topics, please consider providing the DRC with presentations that will motivate other Hams to share your interests.

April topics we discussed:
- ARRL Publications late distribution due to printers experiencing paper shortages.
- HOA Antennas – Chameleon MPAS 2.0
- Fox Hunt – N0CFM
- Linear Amplifiers vs 100 watts and QRP
- Study guides for the new prospective Ham
- Kits QRP Labs QRP Labs Kits (qrp-labs.com)
- Field Day DRC Field Day (w0tx.org)

Great topics from our group. We certainly enjoy everyone's participation. Thanks to all.

If you are listening and don't yet have your license, you can contact us at the W0TX web-site, w0tx@w0tx.org, or elmer@w0tx.org.

If we don't have the answer here on the net, we have a lot of experienced Hams in the club that can help.

Getting that first Technician license? Upgrading to General or Extra? We're here to help.

You may also find Dave Casler's Amateur Radio Licensing Guides helpful: https://dcasler.com/ham-radio/

We would encourage those who have been Hams for several years to also join us. Your experience and input is welcomed.

Finding your place in the amateur radio community - -> Are you looking to be more involved, learn new skills, find a mentor or friends to share your amateur radio interest? Check out your local Denver Radio Club, and start making the most of your amateur radio license.

arrl.org/public-service

Use your communication skills to help keep your community safe!

weather.gov/marine/ham
warrenares.org/home/skywarn-weather-spotting
SKYWARN Spotter Training Updates: weather.gov/bou/spot_training

During severe weather events, amateur radio operators bring significant resources to storm spotting, including an established communications system that can function in an emergency. They provide real-time information to partners like emergency management and forecasters at the national weather service. The data received from hams helps issue weather watches, warnings, and advisories.

What topics would you like to discuss? Join us Wednesday nights, 7:30 PM, 145.490, 100 Hz PL tone & linked to 448.625, 100Hz PL tone.

73,

Fred
AA0JK
elmer@w0tx.org

May 11th - Lakewood Siren Test

By Brennan Pate, AD0UZ

The Lakewood siren test that DRC members and other Hams help with will be on May 11th. If you would like to help with the Lakewood test or next year's test(s), let me know. emcomm@w0tx.org. Reimbursement is in the form of pizza, not cash.

The Wheat Ridge test was on 4/20 and was a successful event. The following is a captivating transcript from an interview I conducted after the test:

Interviewer: Was it a good event overall?
Interviewee: Yes.

May 18th Video Meeting Announcement

By Bill Rinker, W6OAV

Plan to attend the May video meeting. Tom, N5HYP, will discuss ham radio in space which began in 1961. He will cover how to get started in amateur satellites and what resources are available for getting active in satellites. Tom will answer questions such as: What equipment is needed, what is the satellite frequency band plan, how to track satellites, best operating practices, etc.

Bio
Tom has been licensed since 1985 and has enjoyed many facets of the hobby including HF voice/digital modes, rag chewing, contesting, especially Field Day and others. He is a member of ARRL and a member of both the Irving, Texas and Dallas, Texas Amateur Radio Clubs. Tom became interested in Amateur Radio satellite communications in 2010 and is a member of and supports AMSAT activities in the North Texas area. He is an AMSAT Ambassador and so is open to speak at clubs and hamfests and enjoys mentoring others in this fun aspect of the hobby.

Field Day 2022

By Doron Ben Chaim, K1DBC

Start: June 25 @ 12:00 pm
End: June 26 @ 12:00 pm
w0tx.org/fieldday.htm
k1dbc.com/fd
arrl.org/field-day

Organizers:
Doron – K1DBC – k1dbc@arrl.net or drcfest@w0tx.org
Mark – N0XRX

Venue
Prospect Arena
13805 West 52nd Avenue
Arvada, CO 80002 United States
Google Map
View Venue Website
2022 DRC Field Day Radio Operations Sign Up
2022 DRC Field Day Volunteer Sign Up

Hello all,

It's that time again for Field Day, it's a great family friendly event, a way to exercise our equipment and services. Please stop by to attend a free camping (tent/car/RV) event, we are grateful enough to have the Salvation Army canteen vehicle to provide meals throughout the event. Everyone is welcome to attend, regardless of license or membership status. You can view our video from last year to get an idea of what to expect, but hopefully with better weather.

Field Day is ham radio's open house. Every June, more than 40,000 hams throughout North America set up temporary transmitting stations in public places to demonstrate ham radio's science, skill and service to our communities and our nation. It combines public service, emergency preparedness, community outreach, and technical skills all in a single event. Field Day has been an annual event since 1933, and remains the most popular event in ham radio.(arrl.org/field-day)

We have 2 signup forms, the first is for the radio operations schedule, we will have 3 stations setup, for now we have 10-20 meters, 40 meters and 80 meters. It's first come first serve, you can sign up for as many or as few as you would like. The bands we will operate are subject to change.

The second is for volunteer shift sign up, we will have 1 hour shifts, some may vary and not need to be filled. You aren't obligated to stay the entire shift, or attend even if you signed up. We are incredibly grateful for any and all help we can get.

Lastly, if you have any comments, feedback or questions, please don't hesitate to email me or the club.

Thanks and 73,
Doron
K1DBC

Repeater Operating Practices

By Fred Hart, AA0JK, elmer@w0tx.org

Looking to make a contact on one of your local repeaters? Should you call CQ, or give your call sign followed by saying , “listening”, or “Monitoring”?

We hear this question from new hams. To best answer this question on repeater protocol, N3KZ has put together a good etiquette guide of using your repeaters. New comers should take the time to go over this guide to acquaint themselves with operating practices.

n3kz.com/repeater-etiquette-guide

What’s the Best Height for a HF Dipole?

By Bill Rinker, W6OAV

A question often heard is “What’s the best height for a HF dipole?” Well, there are two issues to consider. The first issue is how high can you install the dipole? The second issue is what type of operating do you plan to do? Before considering the second issue we need to review a few general rules of propagation and then examine dipole radiation patterns at various dipole heights above ground.

General Rules
The following provides general rules about antennas patterns and radiation angles.

Antenna patterns
As a dipole is *raised* above the ground the following occurs:

- The take off angle of the major radiation lobe lowers towards the horizon.
- The 3 dB beam width of the major radiation lobe narrows.
- The major lobe’s gain fluctuates.
- Additional higher angle lobes and nulls begin to develop at above 1.5 wavelength in height.
- The front to side radiation ratio (omni coverage) decreases.
- Note: As a dipole is raised, its length will have to be lengthened to maintain resonance. Also, the feed point impedance will vary between 50 and 95 ohms.

Radiation angles

- Radiation angles of 5 to 15 degrees above the horizon are ideal angles for working long range DX.
- Radiation angles of 20 to 40 degrees above the horizon are ideal angles for working out between 500 and 1500 miles (single hop).

There are many variables, such as the height of the reflective layer above earth, the number of skip bounces, etc., which can affect these general rules.

The higher an HF dipole is above ground, the farther it will provide effective communications because of the resulting lower radiation angle. However, at higher dipole heights (about 1.5 wavelength and above), nulls in the radiation pattern develop. These nulls can play an important role in lack of communications. If a signal arrives at an angle where the dipole radiation pattern exhibits a deep null, communication effectiveness will be greatly reduced. Thus it is quite possible that an antenna can be too high for good overall communications.

Analyzing Antenna Radiation Patterns

The following discusses the effects on a dipole's main radiation lobe gain, the lobe's 3 dB band width and the lobe's angle of radiation as the dipole is raised above ground. The Blue trace is the radiation pattern seen when looking down at the dipole. The Red trace is the radiation pattern seen when looking towards the end of the dipole. The green trace is the 3dB band width of the main lobe.

Figure 1

At 0.25 wavelength high, a dipole produces a single broad lobe aimed straight up. This radiation pattern is normally used for NVIS operations. What is NVIS? Below a certain critical frequency (usually 40 meters and below) a signal directed straight upward will be reflected back down into an area near the transmitter. This allows communications within a 100-300 mile radius of the transmitter, the area normally skipped over by signals transmitted from a dipole at higher elevations. This explains the frequently heard "rule" that a dipole at 0.25 wavelength above ground will not normally be heard very far away.

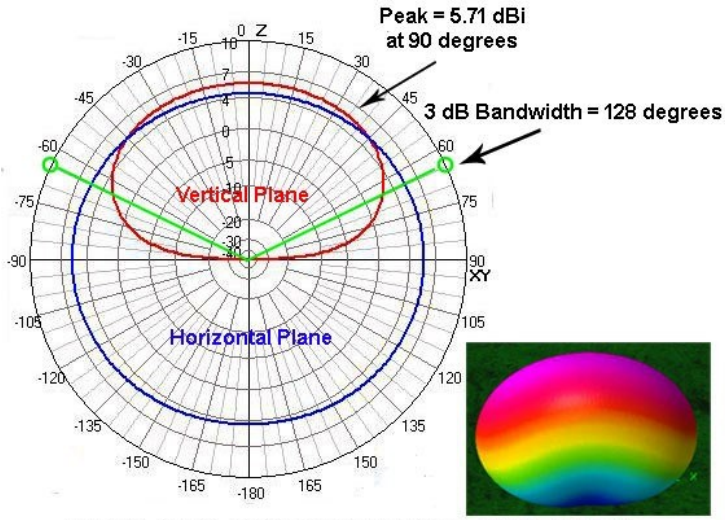


Figure 1 - Dipole at 0.25wavelength above average ground

Figure 2

At 0.5 wavelength high, a dipole produces a broad 3 dB beam width lobe with a radiation angle which is good for both for continental and DX coverage. There is fair amount of radiation off the ends of a dipole (front to side ratio) providing decent omni coverage.

Figure 3

At 0.60 wavelength high, a dipole produces a narrower slightly higher gain 3 dB beam width lobe with a lower radiation angle which favors DX and decent continental coverage. The omni coverage (front to side ratio) off the ends of a dipole is a bit weaker than that of the 0.5 wavelength high dipole.

Figure 4

At 0.75 wavelength high, a dipole produces both a lower, narrower 3 dB beam width lobe and a broad vertical lobe. The vertical lobe is about 2 dB below the low angle lobe,

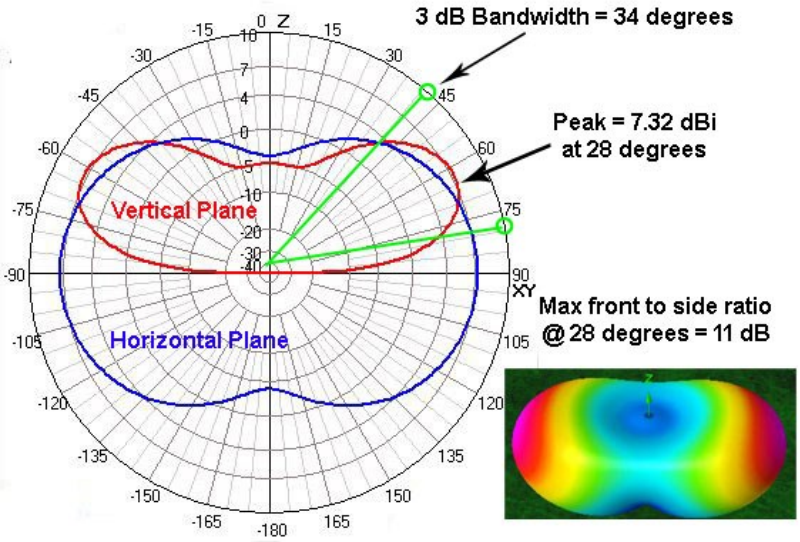


Figure 2 - Dipole at 0.50 wavelength above average ground

an almost insignificant difference in signal strength. It may be that a dipole at 0.75 wavelength height over ground provides both DX communications and NVIS communications at the same time. However, continental and omni coverage communica- tions will suffer.

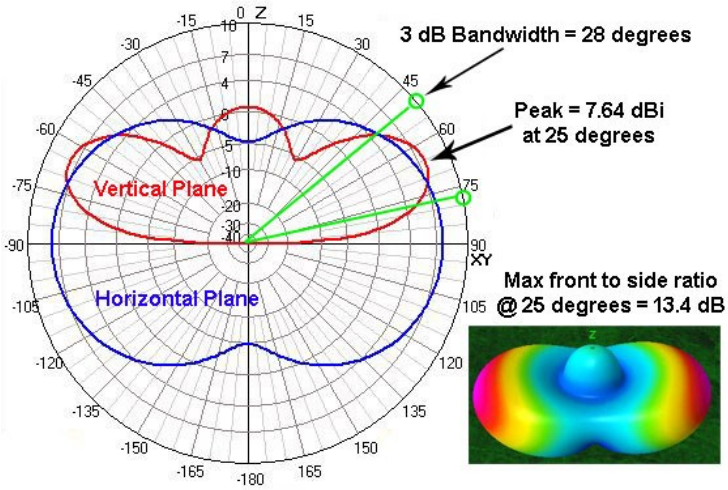


Figure 3 - Dipole at 0.60 wavelength above average ground

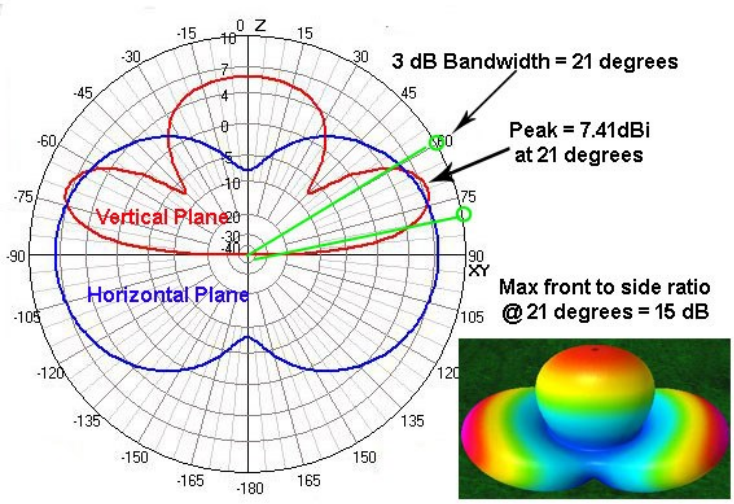


Figure 4 - Dipole at 0.75 wavelength above average ground

Figure 5
At 1.0 wavelength high, a dipole produces two lobes. The first lobe has a lower angle and narrower 3 dB beam width which might not favor all incoming DX angles. The second lobe is very high which favors close in continental coverage. Omni coverage communications will suffer.

Chart 1
This chart graphs the changes a dipole's dBi gain, its 3 dB lobe beam width and the lobe's angle (elevation) of radiation as the dipole is raised from 0.5 to 1.25 wavelengths above ground.

Summary
For local and DX work, a height of 0.60 wavelength is recommended. At this height the gain peaks and the 3 dB

band width of the main lobe is low enough and broad enough to favor both continental and most DX angles. The omni coverage is fairly decent as well.

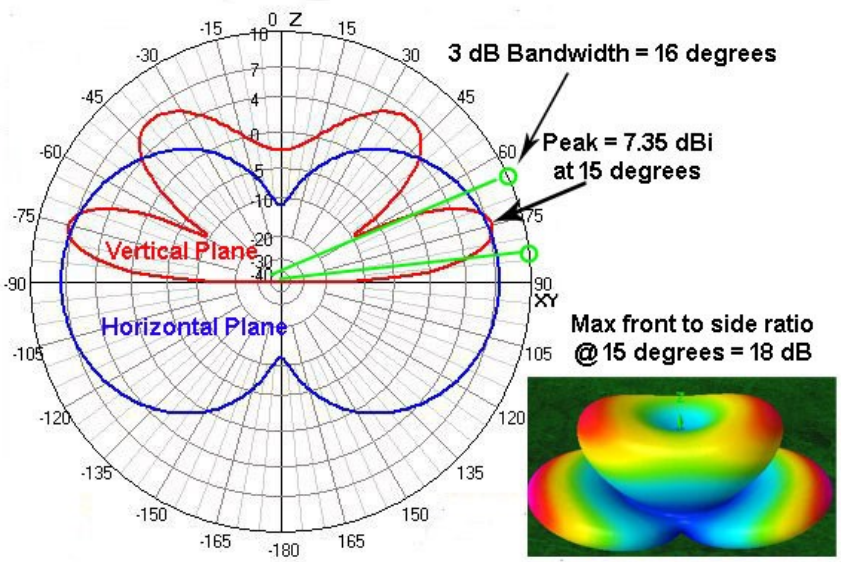


Figure 5 - Dipole at 1.00 wavelength above average ground

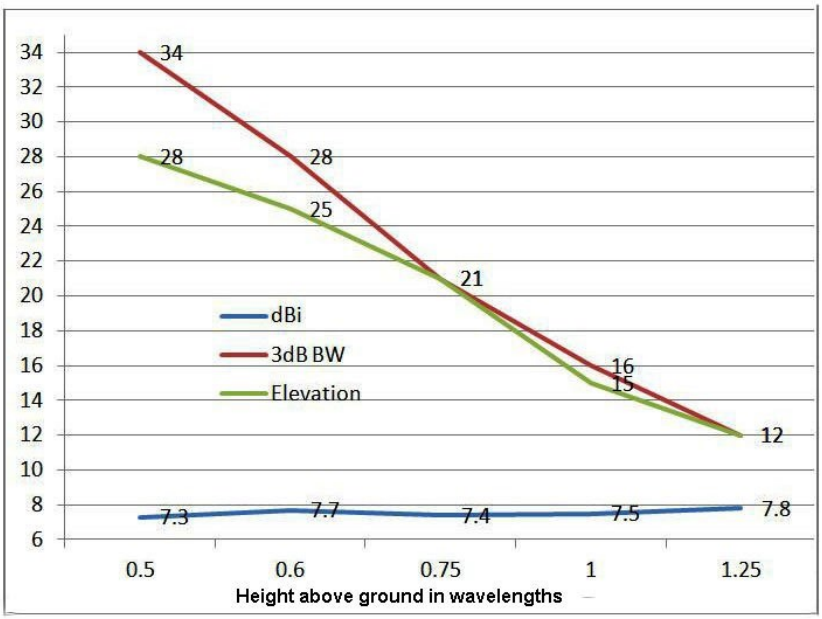


Chart 1 - Change of main radiation lobe as a dipole is raised above ground

For DX work, heights between 0.75 and 1.0 wavelengths are recommended. Heights above 1.0 wavelength have a very narrow 3 dB beam width lobe; will develop many narrow beam width lobes and many nulls between lobes. These heights won't be as effective for paths requiring efficiency at degrees higher than 15 degrees.

References:
"Effect of Antenna Radiation Angles Upon HF Radio Signals Propagated Over Long Distances":
https://nvlpubs.nist.gov/nistpubs/jres/65D/jresv65Dn2p167_A1b.pdf

"Antenna Height and Communications Effectiveness":
https://www.arrl.org/files/file/antplnr.pdf

"Skip the Skip Zone":
https://www.nonstopsystems.com/radio/pdf-hell/article-hell-skip-zone-fiedler.pdf

"How High Should a Dipole Be? A Look at Antenna Modeling":
https://www.youtube.com/watch?v=q1Lz-TjdJAY

Real Time Lightning

By Bill Rinker, W6OAV

As hams we are very concerned about lightning. If you want to monitor lightning strikes anywhere in the world in real time go to http://en.blitzortung.org/live_lightning_maps.php?map=30. Figure 1 shows a typical screen. A circle appears as a lightning strike occurs. There is even a sound affect for each lightning strike.

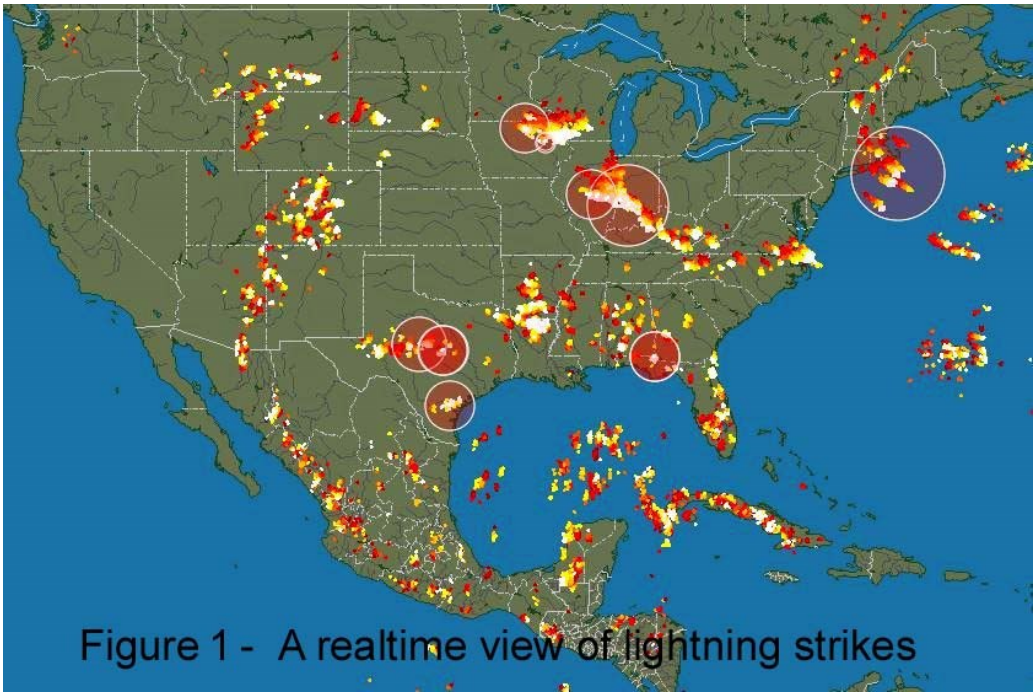


Figure 1 - A realtime view of lightning strikes

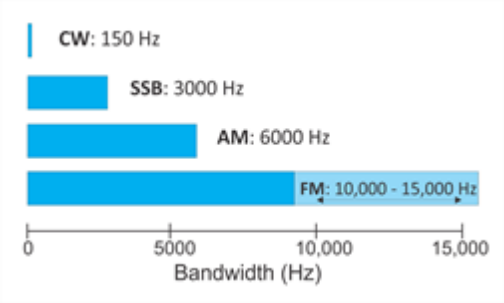
~ Get Published ~

We welcome and encourage all members to share their experiences and stories so that we can all learn from one another. It can be long or short. If we can't fit it into one newsletter, we can split it across multiple issues. Not a writer? We have volunteers that will listen to your story and put it into an article, and of course you will have the opportunity to review and approve prior to publication. Your contribution to the club is welcomed and appreciated. ~Editor

Single Side Band - Why Do We Use It?

Provided By Fred Hart, AA0JK.
Sourced from the Chameleon Antenna April 2022 Newsletter
Reprinted in Part, With Permission from Carl @ chameleonantenna.com

What is Single Sideband?
SSB ("sideband", Single Sideband Suppressed Carrier) modulation, is the descendant of the traditional AM mode. Compared to AM, SSB requires less than half the bandwidth.



It offers much more "talking power", since the unnecessary carrier and second sideband are not transmitted. SSB requires more frequency stability and somewhat more complex circuitry than AM. Today all mainstream amateur gear for the HF bands supports the SSB as one of its primary modes.

The history of SSB (Single Sideband Suppressed Carrier) dates back to 1915.

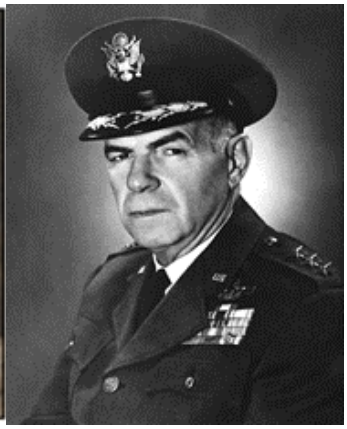
Arthur A. Collins - WØCXX ... 1909-1987

Art Collins used a military Project called, “Project Bird Call”, to demonstrate the superior performance of single sideband in 1956. This experiment changed long distance HF communications forever.

Major leaps forward need champions.

General Curtis LeMay, then K3JUY/K4RFA (left image).

Francis Griswold Lieutenant general Vice commander in chief, Strategic Air Command - KØDWC (right image).



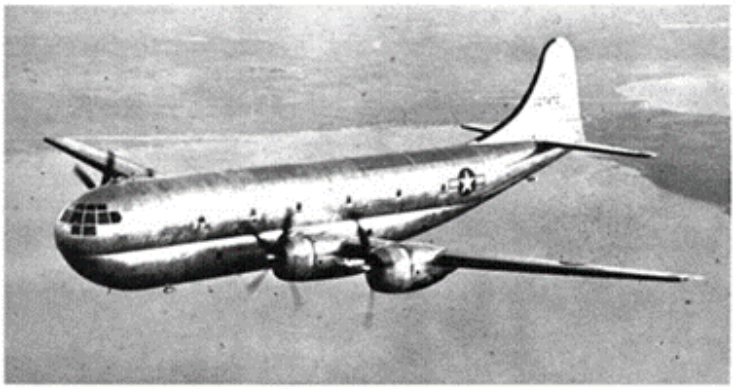
For single sideband, these were two U.S. Air Force Generals, Curtis LeMay, and Francis Griswald, on the customer side, and Art Collins, on the vendor side. All three were active hams. General LeMay, commanded the Strategic Air Command. He was looking for ways to improve HF communications with his B-52 Bombers.

The Boeing B-52 Stratofortress (image to right).

Griswald was Lemay's number two. Art ran Collins Radio, a major supplier of military communications and avionics.

Previously, Collins had invented the mechanical bandpass filter, and permeability tuned oscillator. These developments made SSB radio transmission practical for the first time. Reliable long distance HF radio was critical to Strategic Air Command in the 1950's. In particular, LeMay wanted to be sure that he could recall his bombers if necessary if their mission was to be safely aborted. So the three designed an experiment using Collins ham SSB gear, installing it in a C-97 aircraft.

The Boeing C-97 Stratofreighter:



The C-97 is a military cargo version of the Boeing Model 377 Stratocruiser, super-airliner.

This B-29 bomber, converted for passenger use, then made two very long distance flights from the U.S. One flight to Asia, the other to Greenland. All along the way, they tested SSB with amateurs and military bases. Their goal was to make sure they could communicate with SAC headquarters at Offutt Air Base in Omaha.

General LeMay's Project Bird Call experimental flights, were a success, and a landmark for single sideband radio. Project Bird Call clearly demonstrated the superiority of SSB over AM for long distance HF communications.

Collins installed off the shelf amateur radio gear for these tests, as shown (to the right). The receivers were the venerable 75A4 receiver, and KWS-1 600 watt sideband transmitter. These flights comprised over 120 hours of flight time, and made nearly 2,500 long distance radio contacts in the spring and summer of 1956.

Amateur Radio and SSB - SSB took off in the late 50's and early 60's. Many manufacturers slowly switched from AM to SSB production. Some of the companies survived, and many gradually went under.

One of the early companies producing SSB equipment was SWAN Engineering started by Herb Johnson.

Herbert G. Johnson, W6QKI, Founder of Swan Electronics and ATLAS Radio Co.

Herb Johnson was born November 10th, 1920, in Pittsburgh, PA. The son of Swan and Ruth Johnson, he spent his childhood in Astabula, OH. A lifelong amateur radio enthusiast, he designed his first radio at age 14, and at age 15 earned his amateur radio operator's license.

After moving to Benson, AZ, he founded Swan Engineering (later, Swan Electronics) in 1961. Working by himself out of his garage, Herb created a line of radios that became a favorite of amateurs around the world. Herb chose the brand name "Swan" in memory of his father, whose name in his native land of Sweden, was "Sven". Upon arrival in the USA, his name was Americanized to "Swan".

Swan Engineering grew rapidly, and its growth continued after Herb relocated the company to Oceanside, CA, in 1962. At its peak Swan produced as many as 400 radios per month.

Needing more capital and engineering resources for Swan's rapid expansion, the company merged with Cubic Corporation in 1967 and Herb continued managing the Swan subsidiary until 1973. The Swan line of equipment was mostly tube type design, and through the years more than 80,000 transceivers alone were sold. Many Swan radios remain in service today, a tribute to the quality that went into their design and construction.

Single sideband offers a broader range of radio contact opportunities, including long distance and international communications. SSB signals tend to propagate greater distances for over-the-horizon skip propagation via the ionosphere.

Digital modes, that use SSB, have become more and more popular on the amateur bands. Over the past few years, the number of operators using one of the numerous forms of data (or digimode) has exploded. For some, this has been the difference between being able to make contacts on air or not.

Thanks to SSB, it has made it possible for our now popular digital modes like FT8 and several others.

ATTENTION

The DRC Board of Directors meetings are held on the 4th Wednesday of the month and are open to any member. Due to scheduling of meeting space, the board does not always meet at the same location and on occasion meetings are held via Skype. Anyone wishing to attend, please contact a board member prior to meeting night for specific information.

The EFHW

By Bill Rinker, W6OAV

There is a very efficient antenna which is easy to setup (takes only one support point) making it ideal for portable and for base station operation. It occupies a minimum amount of space and is almost invisible (great for HOA issues!). This antenna is an end fed 1/2ʎ antenna (EFHW) which provides either single band or multiband operation without the use of traps or stubs.

Figure 1 shows a typical EFHW. For single band use a broad-band balun matching network transforms the high impedance of the EFHW's feed point to approximately 50Ω for standard coax cable. For multiband use the balun network provides an approximate 50Ω feed point on the even and odd harmonics of the fundamental 1/2ʎ antenna frequency. For example, an EFHW cut for 40 meters can be used on 20, 15 and 10 meters without a tuner. A tuner is required for use on 30, 12 and 24 meters.

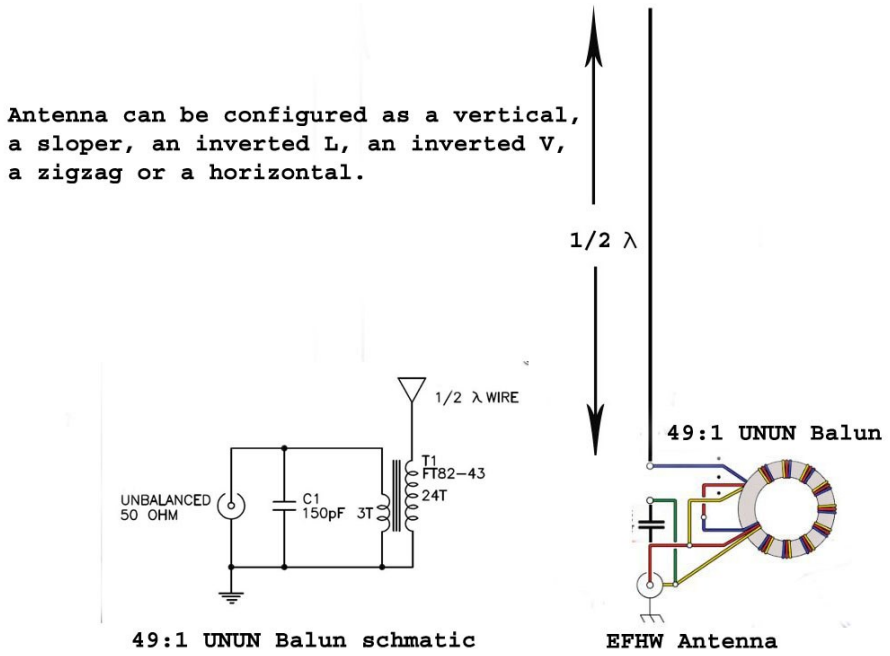


Figure 1 - A typical EFHW antenna

One might wonder how the EFHW compares to a ground mounted 1/4ʎ ground plane antenna. Let's compare the two antennas.

Space Requirements

The 1/4ʎ ground plane requires a fair amount of horizontal space and wire for radials. The radial-less EFHW requires minimal horizontal space. The latter is good for small yards.

Current Distribution

Figure 2 shows the current distribution on the two antennas. The 1/4ʎ ground plane's maximum radiation is from the base area of the antenna. The EFHW's maximum radiation is from the center of the antenna. This can be important as will be discussed later.

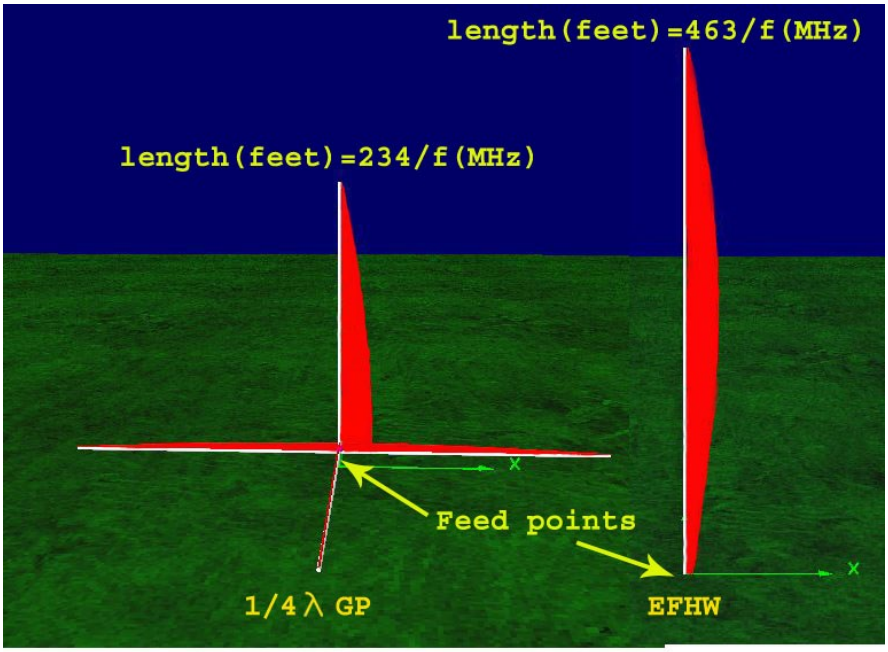


Figure 2 - Current distributions

Radiation Patterns

Figure 3 shows that the EFHW theoretically has 0.86 dB gain over a 1/4λ ground plane on average earth. On poor earth, the gain difference is larger since the 1/4λ ground plane is affected by the earth's conductivity around it. More importantly as shown in Figure 3, the EFHW on its 1/2λ frequency has a radiation angle of 18 degrees above the horizon compared to the 1/4λ ground plane's radiation angle of 27 degrees. The lower radiation angle will provide longer skip distances, important for working DX. A multiband EFHW will have higher radiation angles on bands above the fundamental 1/2λ frequency band.

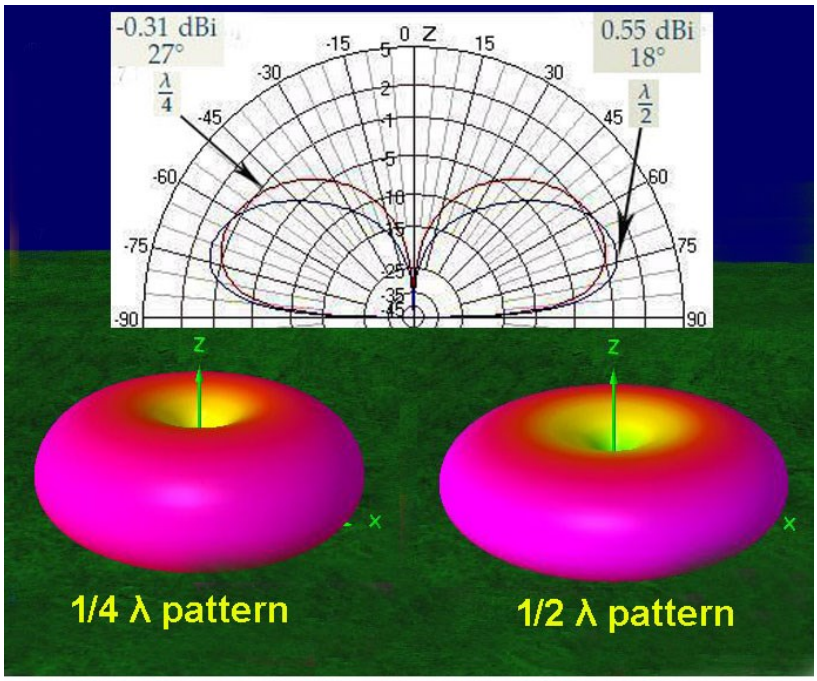


Figure 3 - Antenna radiation patterns

Noise
Unlike the 1/4 ʎ ground plane, the EFHW is DC grounded preventing static build up.

Test Results
I built both a ground mounted 20 meter 1/4ʎ ground plane and a 20 meter EFHW in my back yard, one on the north end of my yard and the other 75' to the south end of my yard. They were 75' apart. Both antennas had an SWR of close to 1.0 to1.4 in the middle of the 20 meter band.

I found that on both receive and transmit the ground waves and sky waves on the EFHW were generally one to two S units better than on the 1/4ʎ ground plane. I attribute this to two facts: 1). The maximum radiation from the EFHW was 16 feet above the ground and cleared the houses surrounding the yard whereas the 1/4ʎ ground plane's maximum radiation was from ground level and had to pass through the surrounding houses causing some RF absorption. 2). Unlike the EFHW, the 1/4ʎ ground plane's efficiency is affected by the ground loss around the base of the antenna. Since the lossy ground acts as the other half of the 1/4ʎ ground plane (Figure 2), some RF power is dissipated there.

There are many good EFHW references on the Internet, some of which are listed below:

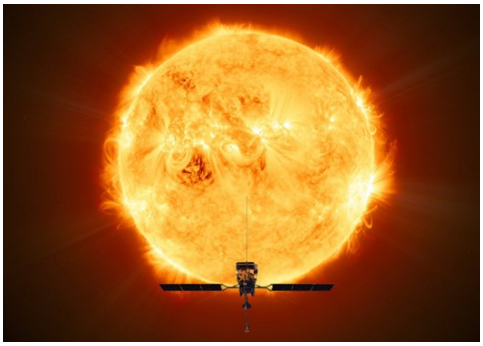
Theory
https://www.electronics-notes.com/articles/antennas-propagation/end-fed-wire-antenna/multiband-end-fed-half-wave-efhw-antenna.php
https://www.sotabeams.co.uk/efhw/
http://www.aa5tb.com/efha.html

Commercial Sources for EFHWs
http://www.vibroplex.com/contents/en-us/d9175.html
https://mfjenterprises.com/products/mfj-1982mp
https://myantennas.com/wp/product-category/antennas/

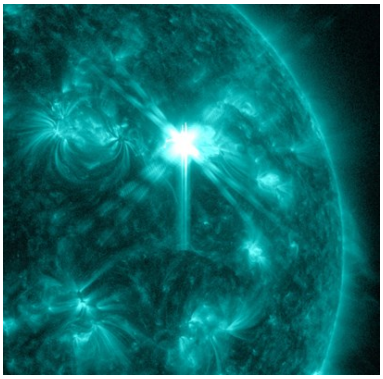
Home Brewing References
https://qrpguys.com/wp-content/uploads/2019/05/hwwa_assy_052919.pdf
https://www.norfolkamateurradio.org/pdf/G0KYA%20EFHW%20Ant%20+%20shopping%20list.pdf
https://www.youtube.com/watch?v=0zF7bDoqkG4
http://hamfest.w7yrc.org/wp-content/uploads/2019/06/EFHWslides.pdf
https://static1.squarespace.com/static/5b1576d036099b603985500c/t/5c5236b57924e85a9a1ccd62/1548891830343/19-End+Fed+Half+Wave.pdf

Solar Geophysical Activity Report

Provided By Fred Hart, AA0JK

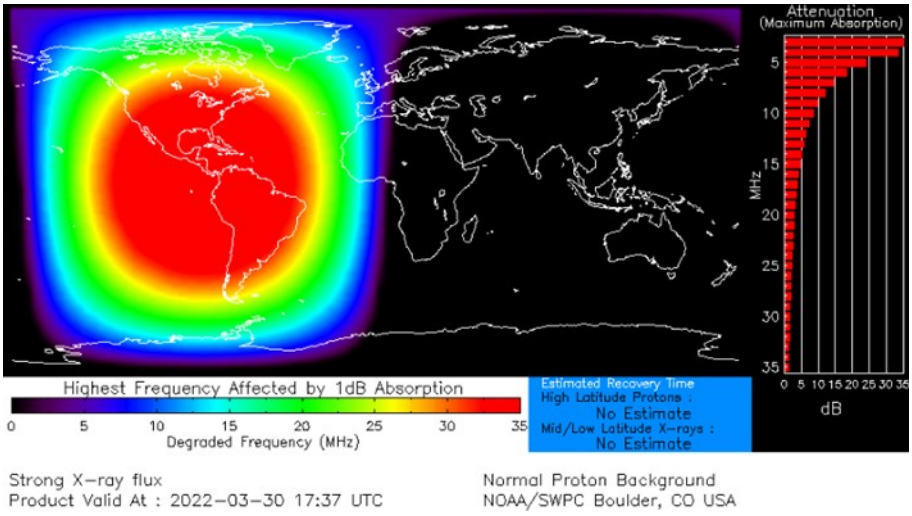


X-CLASS SOLAR FLARE: Active sunspot AR2975 erupted again on March 30th, producing its strongest flare yet, a X1.3-class explosion.

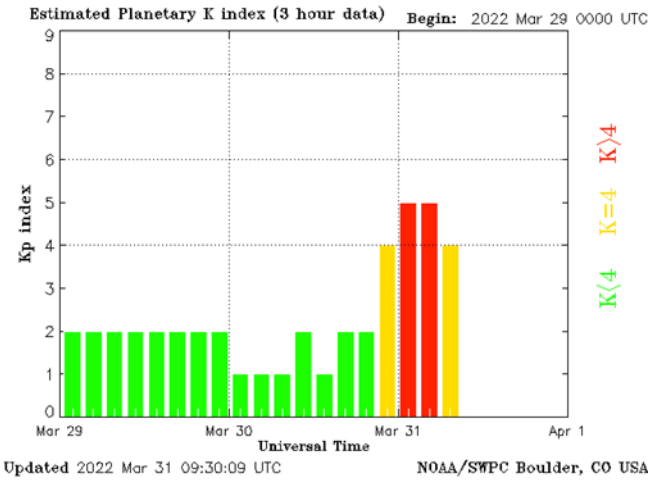


NASA's Solar Dynamics Observatory recorded the extreme ultraviolet flash.

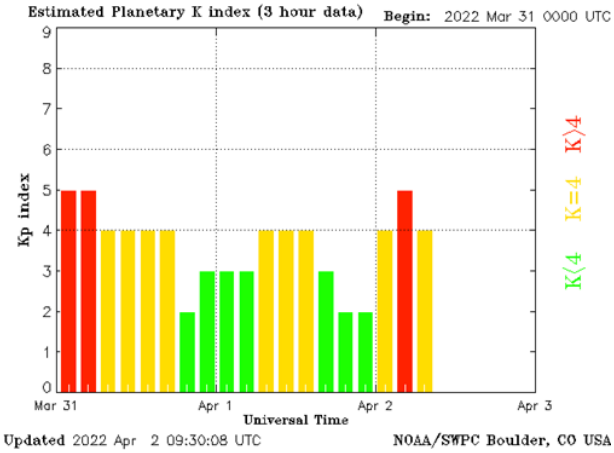
Radiation from the flare ionized the top of Earth's atmosphere, causing a shortwave radio blackout over the Americas. Aviators, mariners, and Ham Radio operators may have noticed unusual propagation effects at frequencies below 30 MHz.



The Radio Sun 10.7 cm flux: 151 sfl. Sunspot number: 73.



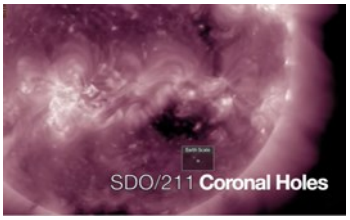
April 2nd - GRAZING CME IMPACT: A coronal mass ejection (CME) hit Earth on April 2nd @ 0100 UTC.



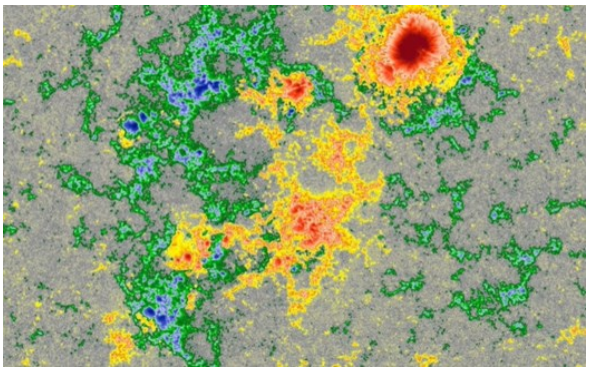
Earth's magnetic field was reverberating from the glancing blow, causing a deep radio blackout. Radiation from the flare ionized the top of Earth's atmosphere, preventing terrestrial radio stations from bouncing their signals over the horizon.

The Radio Sun 10.7 cm flux: 147 sfl.

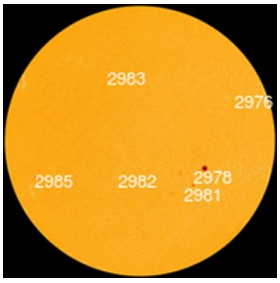
April 3rd - We were awaiting more CME impacts and monitoring growing sunspot groups. There was another M-1 class flare departing a northern group, but it had turned well out of earths heliographic longitudinal strike zone. Southern hemisphere regions appeared to be gearing up but had yet to fire off any significant plasma our way.



The growing number of sunspot groups were growing, but they were expected to take several days to develop.

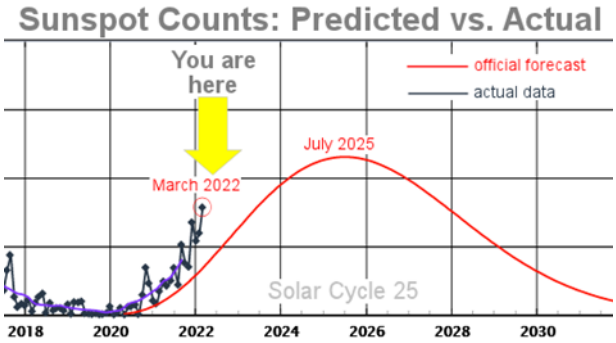


As the growing complex sunspot areas were being born, observers watched for several potential places for magnetic interaction as opposing polarity regions merged. When negative and positive magnetic areas come in contact with each other, they explode. Plasma jettisons out through the suns corona. (CME).



April 5th - Sunspot Count Number 86.

Sunspot counts from NOAA confirm that Solar Cycle 25 is racing ahead of the official forecasts.



They have now exceeded predictions for 18 straight months. The monthly value at the end of March was more than twice the forecast, and the highest in nearly 7 years.

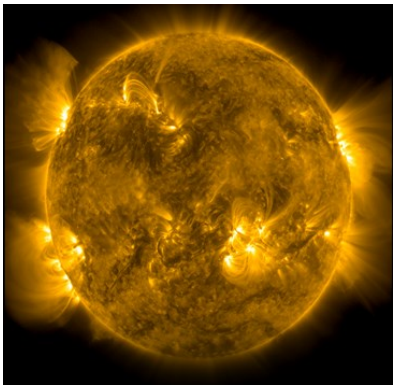
The sun has produced 146 solar flares, including one X-flare and 13 M-flares. Multiple shortwave radio blackouts disrupted communications on ships at sea, airplanes flying over the poles, and amateur radio.

The Radio Sun 10.7 cm flux: 128 sfl.

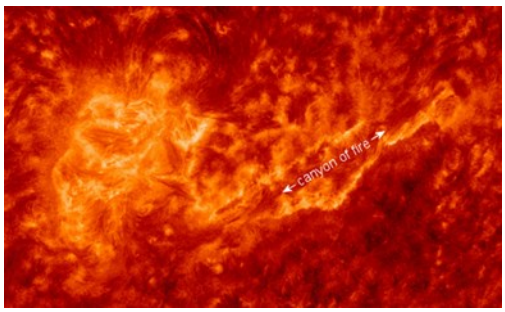
A pair of CMEs left the sun over the weekend, one propelled by a solar flare (M4-class), the other by an exploding magnetic filament. Neither CME was heading directly for Earth, but both could deliver glancing blows beginning midday on April 6th.

Sunspots aren't the only things on the sun that explode. So do filaments of magnetism. There were three of them on the sun April 5th.

Magnetic filaments are plasma-filled tubes of magnetism that meander through the sun's atmosphere. They easily become unstable and erupt, hurling fragments of themselves into space. A CME from just such an eruption was due to graze Earth's magnetic field on April 6th.

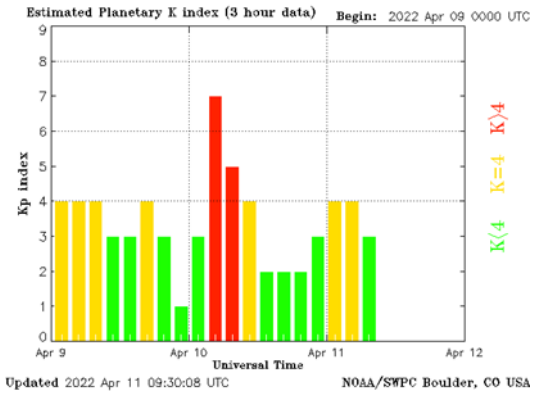


April 11th - Geomagnetic storms scrambled HF radio transmissions on the 10th. Earth's magnetic field was supposed to be quiet on April 10th. Instead a strong G3-class geomagnetic storm broke out.



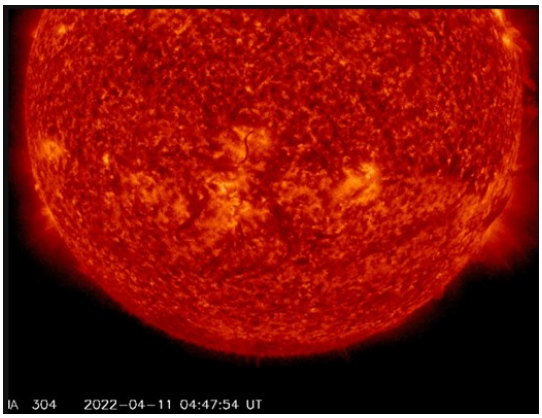
A filament of magnetism whipsawed out of the sun's atmosphere. Debris from the explosion formed a slow-moving coronal mass ejection.

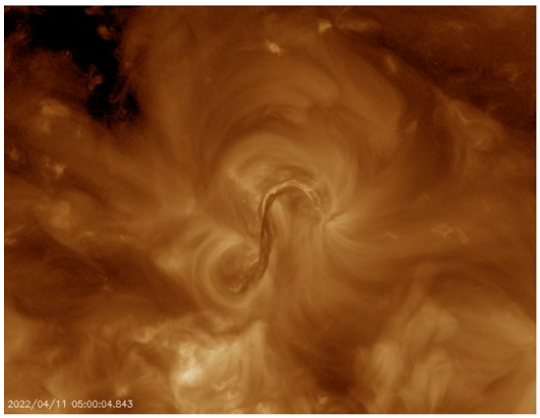
A canyon of fire CME, hit Earth's magnetic field on April 8th. The impact was weak and, at first, it seemed to have little effect. Geomagnetic unrest increased on April 9th as Earth passed into the CME's strongly magnetized wake. The arrival of an unrelated solar wind stream on April 10th tipped conditions into a G3-category storm.



April 12th - Strong geomagnetic storm scrambled HF radio transmissions in North America.

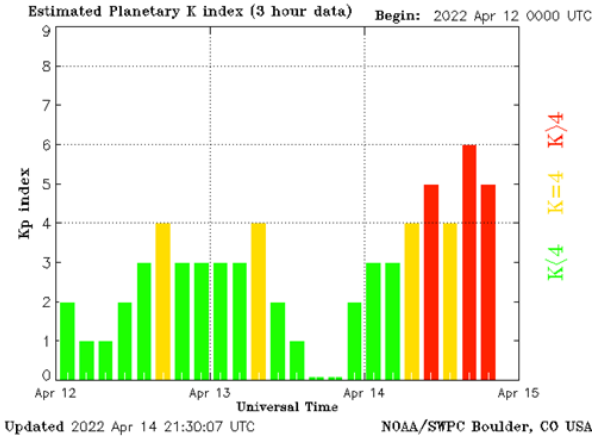
Dead sunspot explodes. The corpse of old sunspot AR2987 exploded, April 11th, hurling debris directly toward Earth. NASA's Solar Dynamics Observatory recorded the eruption.

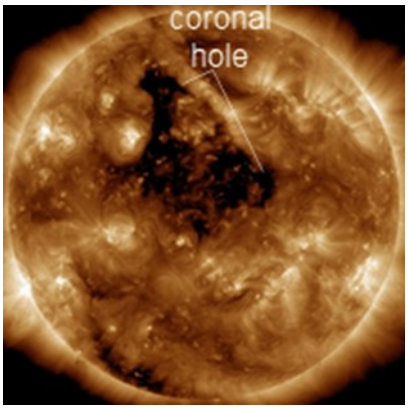




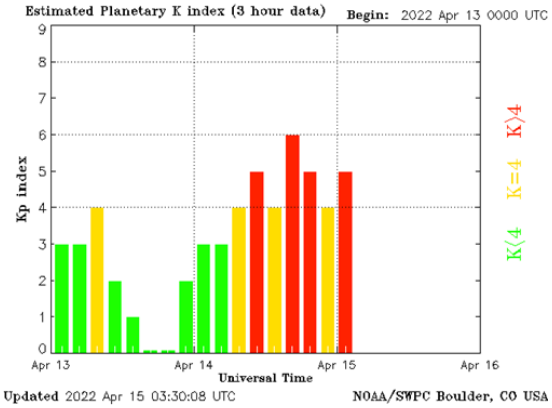
The S-shaped magnetic filament at the base of the explosion was a classic "sigmoid structure". Solar magnetic fields often assume this shape just before they explode.

April 14th - A CME hit Earth's magnetic field on April 14th. Its impact sparked a moderately strong G2- class geo-magnetic storm, which peaked around 1800 UTC. The storm was subsiding, to G1- storm level, but the respite was expected to be short-lived. Earth was moving into a CME's strongly magnetized wake; "tail effects", that could boost storm levels back to G2 during the night of April 14-15. Below right image credit: SDO/AIA

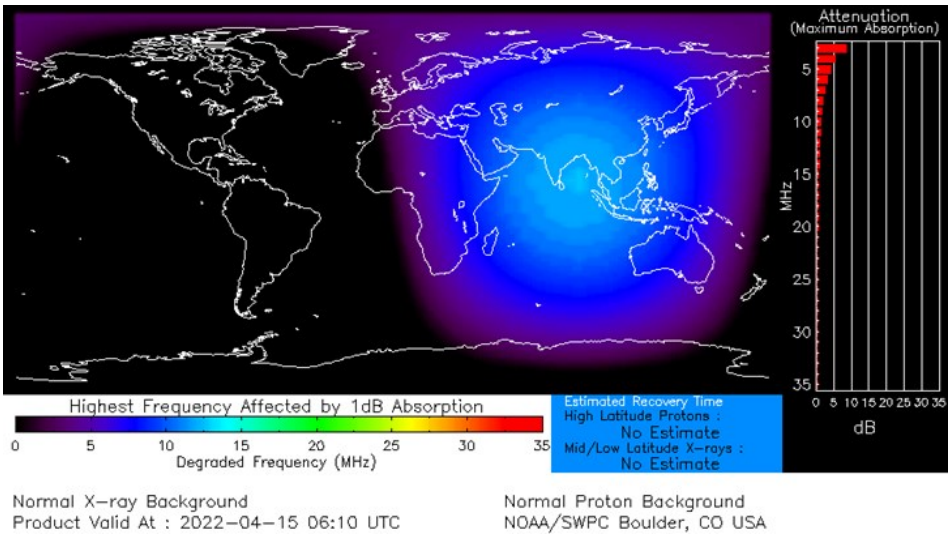


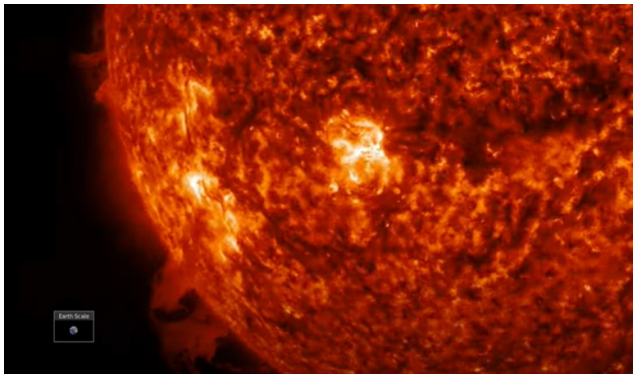


Solar wind flowing from this equatorial coronal hole was expected to reach Earth on April 17th

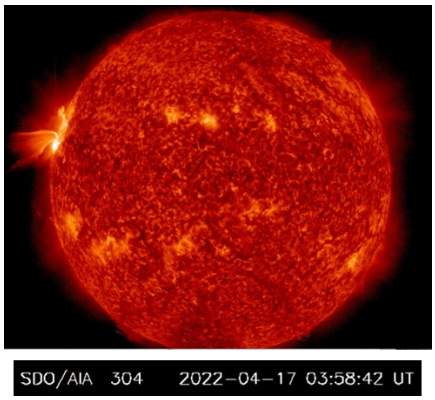


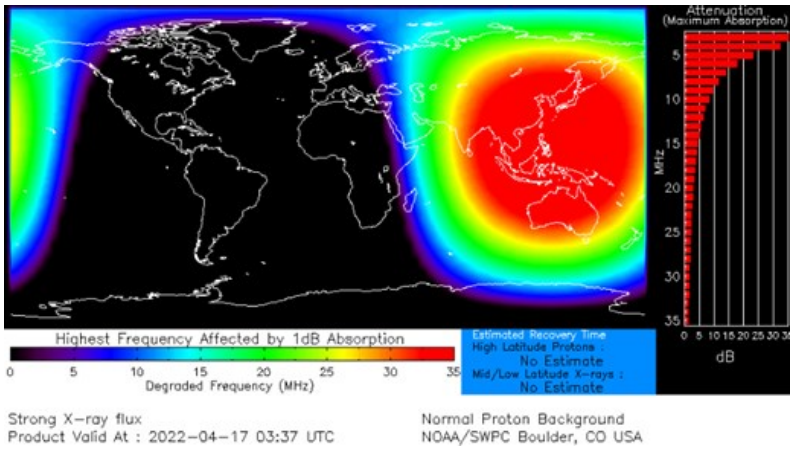
April 14th - HF radio wave signals, (3 - 30 MHz), suffered attenuation due to absorption of the ionosphere.





April 17th - X-CLASS SOLAR FLARE A big and very active sunspot complex emerged over the sun's northeastern limb. It produced an X1-class solar flare. NASA's Solar Dynamics Observatory recorded the blast on April 17th at 03:34 UT:





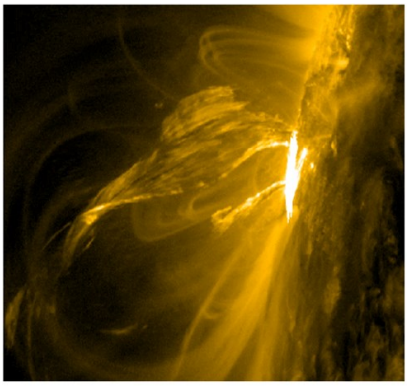
DRC's Trading Post

Don't forget you can find locally-sourced, ham-grown merchandise at:
https://www.w0tx.org/trade.htm

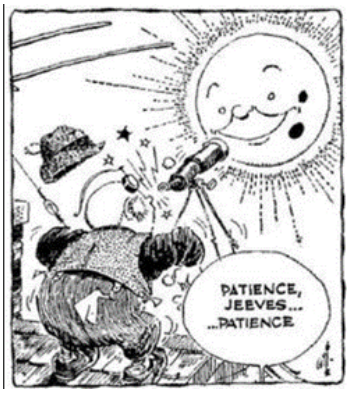
SPEAKING OF TRADING…

Wally, ACOT is looking for a used HT to buy. Email wallygamble37@gmail.com if you're interested in selling.

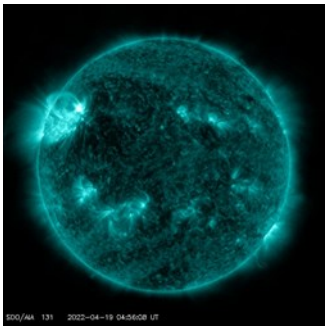
A pulse of X-rays from the flare produced a strong shortwave radio blackout over southeast Asia and Australia. Mariners, aviators, and Ham Radio operators may have noticed unusual propagation effects at frequencies below 30 MHz. The Radio Sun 10.7 cm flux: 135 sfu. Updated 18 Apr 2022

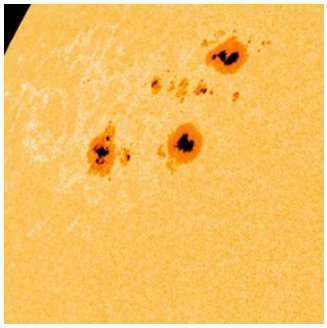


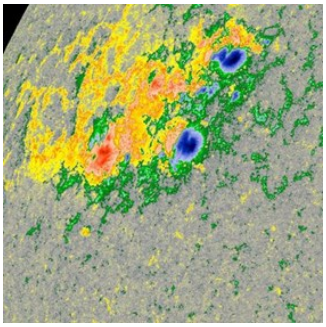
More potentially large active regions emerging over the northeastern limb.



Yes, we have been patient, waiting for those sun spots to bring us good DX propagation.

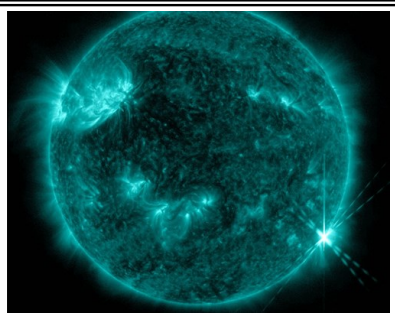






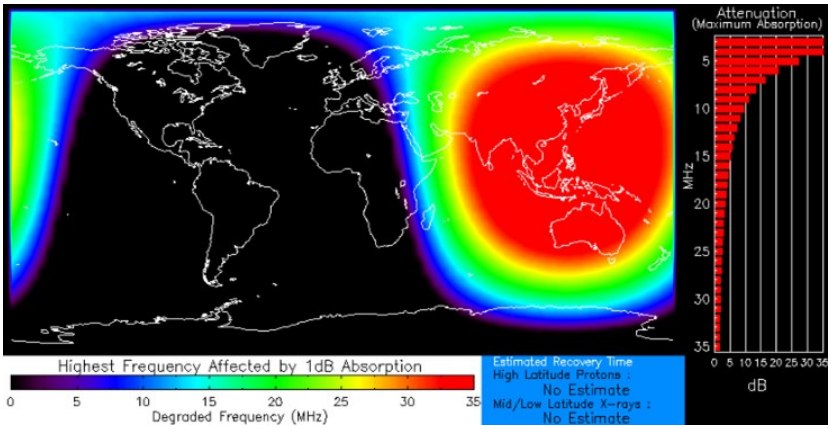
Monitoring the bright northern active region for flares. The massive sunspot group was technically labeled as two sunspot groups by the officials at NOAA, but this was wrong. It's one giant integrated system, and the bright fields tell us that. With the southern spots now departed, it becomes the primary focus on the sun and apparently it's still shy, not making any big flares, or CME's hopefully. It's not waiting until it's fully facing earth to do so. That's the primary watch this week. If this one had been properly labeled, as one massive active region, it would be pushing the limits for the largest one ever. It's certainly bigger than the biggest of cycle 24, and possibly a tad smaller than the great 1947 sunspots. It's spread was limiting its flaring power at the moment. Eyes on it as it turns.

April 20th - Solar activity was intensifying. In 24 hours alone, the sun produced more than 19 solar flares. The tally includes five M-class explosions and a powerful X2.2-class flare. The fusillade was expected to continue as colossal sunspot complex AR2993-94 turned toward Earth.



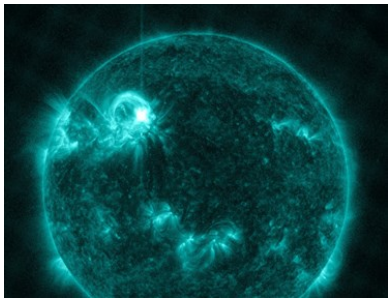
X-CLASS solar flare. The sun produced another X-flare. Earth-orbiting satellites detected the X2.2-class explosion on April 20th @ 0357 UT. Remarkably, it came from a far-side sunspot. The source of the flare was AR2992, which had rotated over the southwestern limb of the sun.

The sunspot was no longer visible. It was hidden behind the edge of the solar disk. Because the blast site was eclipsed, the actual flare was almost certainly stronger than its nominal rating of X2.2.

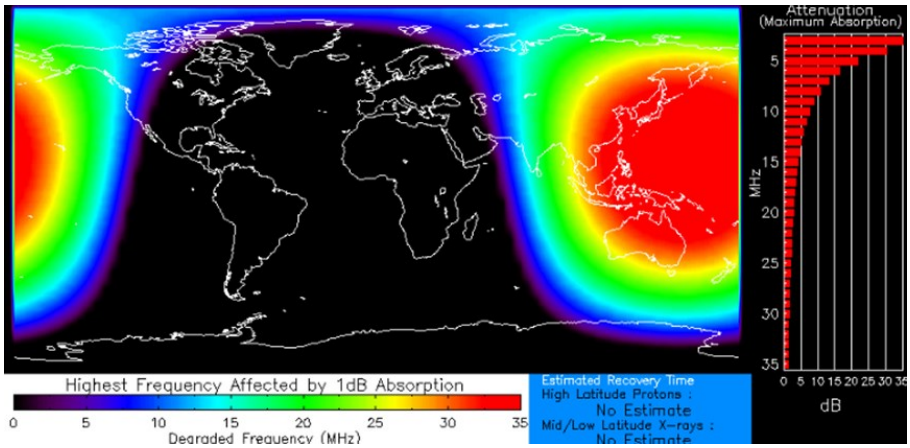


Shortly after the flare, the US Air Force reported a Type II solar radio burst. This suggests that a CME will emerge from the blast site. Type II radio bursts are caused by shock waves in the leading edges of CMEs, and this could be a big one.

Radiation from the flare caused a shortwave radio blackout over southeast Asia. Mariners and Ham Radio operators in the area may have noticed loss of radio contact at frequencies below 30 MHz for as much as an hour.

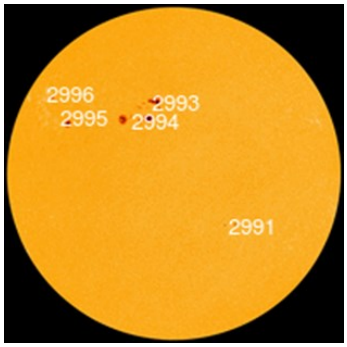


Remarkably, this is the second day in a row the same region of Earth has experienced a radio blackout. It happened yesterday, too, in response to an even stronger X2.2 flare.



Radiation from the flare caused a shortwave radio blackout over southeast Asia and Australia
The same region of Earth has experienced a radio blackout. It happened yesterday, too, in response to an even stronger X2.2 flare. Remarkably, this was the second day in a row.

April 22nd - Below image credit: SDO/HMI



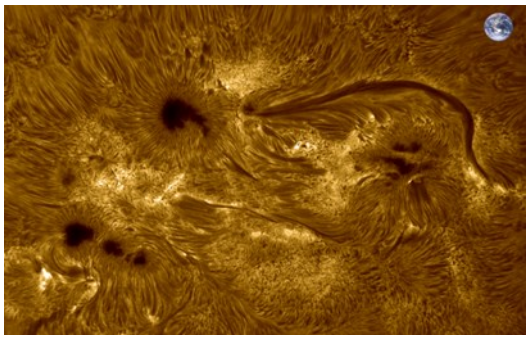
Sunspot complex AR2993-94 posed a threat for strong M-class solar flares.

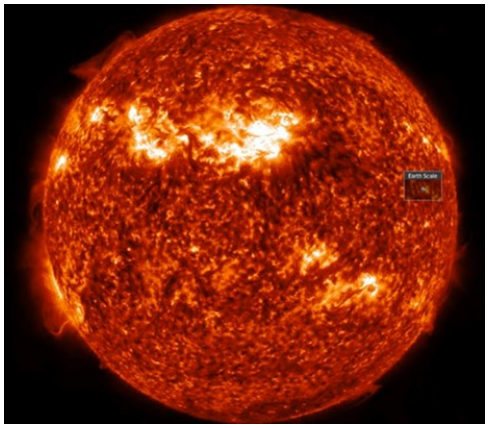
The Radio Sun 10.7 cm flux: 164 sfu. Updated 22 April 2022.

The sun produced dozens of solar flares. No debris was heading our way. Remarkably, all of the explosions were off target. Active sunspot complex AR2993-94 was still turning toward Earth, so the odds of a future hits were increasing.

April 23rd - An angry sunspot faced earth. Sunspot complex AR2993-94 was crackling with M-class solar flares and, it was directly facing Earth.

Two dark cores as large as Earth, and several more as wide as Earth's Moon. A magnetic filament attached to one of the cores was more than 100,000 km long. Inserted is an image of Earth for scale.





Forecast: Issued: 2022 April 24 0030 UTC. Prepared by the U.S. Dept. of Commerce, NOAA, Space Weather Prediction Center. No G1 (Minor) or greater geomagnetic storms are expected. No significant transient or recurrent solar wind features are forecast.

No S1 (Minor) or greater solar radiation storms are expected. No significant active region activity favorable for radiation storm production is forecast.

Radio Blackout Forecast for April 24-April 26, 2022. There is a chance for R1-R2 (Minor-Moderate) radio blackouts, and a slight chance for R3 (Strong) or greater radio blackouts on 24-26 April.

73,
Fred
AA0JK

Past Round Table Pages

Provided By Woody Linwood, W0UI

A couple pages from the November 1960 edition.

November, 1960

The Round Table

The Denver Radio Club, Inc.

'60 ARRL SWEEPSTAKES NOV. 12 - 14 and 19 - 21

HAM Directory Deadline Nears

As the deadline for the 1961 edition of the Colorado Ham Directory draws near hundreds of new and corrected listings are being processed by the editorial staff. The 1961 edition is already a sure success, with orders for copies already being received. Many national and local advertisers have reserved space.

Roy Haney, KØOVQ, chairman of the directory committee, has requested more volunteers to help in production of the expanded book. Anyone able to donate even a small amount of time is asked to call Roy at FL 5-3278.

Howard Eldridge, KØDCW, is in charge of listings. Anyone not listed in the current edition of the directory, or listed incorrectly may send his listing to Howard at 3156 W 25th Ave. Don't forget to include your telephone number. It will also be helpful to indicate whether you are a paid-up member of the Denver Radio Club. You need not be a member to be listed, of course.

Phil Bright, KNØZNV, is advertising manager of the 1961 edition, and is tackling the mountainous task of contacting dozens of prospective advertisers. His job is complicated by the fact that, with the hundreds of new listings being packed into the directory, advertising space will be severely limited and may not meet the demand. Carl

(Continued on Page 11)

CRAIG TO HEAD NOVEMBER MEET

James Craig, design specialist of the Martin Denver Co., will be speaker at the regular club meeting on November 16 at Sabin Hall, Colorado General Hospital.

Before joining the Martin Co., Jim was with the Convair Atlas program in San Diego. The chosen topic is telemetering having to do with communications from the object in orbit. This is sure to be of the utmost to some and of great interest to all. Don't miss it.

Ø Ø Ø

WHAT IS MARS?

By LYS KØPGM

EDITOR'S NOTE: This is not to be construed as a solicitation for members, nor a suggestion of refrainment from MARS activities.

On occasions I have mentioned "the MARS Net" to local Radio Amateurs, and have promptly been queried, "What is Mars?" Some seem to think it's a signal bounce from that planet. Others look down their nose and say there is no one on Mars or Venus or the other planets, so how can you work a Mars Net?

When war was declared in 1917, there were over 6,000 Radio Amateurs in these United States. Over 4,000 of these utilized their radio abilities during World War One. This was never disregarded by the U.S. Armed Forces.

MARS had its inception, in the pre-

(Continued on Page 6)

Past Round Table Pages, Continued

Provided By Woody Linwood, W0UI

DRC's Emergency Responses

In the event of a disaster in the metro area, please monitor our repeaters on 145.490/448.625 (primary) and 449.350 (secondary).

The emergency Net Control Operator will provide information and/or requests to members for assistance.

W0TX Repeater Directory

amazonsmile
You shop. Amazon gives.
Search for Denver Radio Club @ smile.amazon.com

Note to DRC Members:

Our club depends on the involvement and participation of YOU, our members. Do you have a skill or interest that could help the club. Maybe you want to volunteer to be on a committee? Like to write? Have ideas for improving what we do? Speak up and let someone know, all ideas are welcomed and participation is always helpful. ~Editor

Random Site Of The Month
Smashing Security

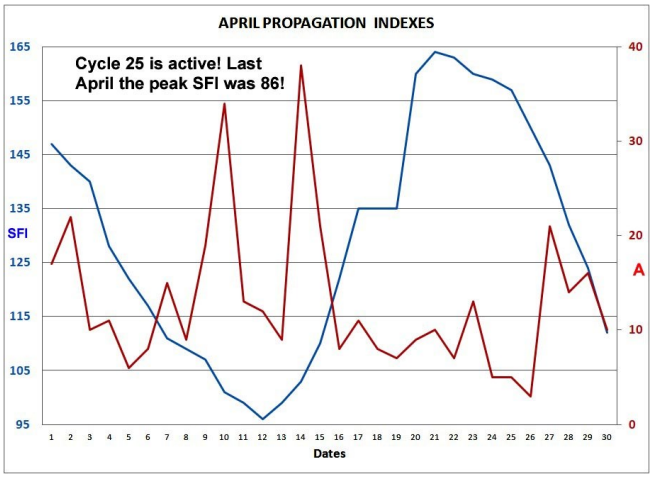
The Round Table Archive
Go to: http://www.wotx.org/roundtables.htm

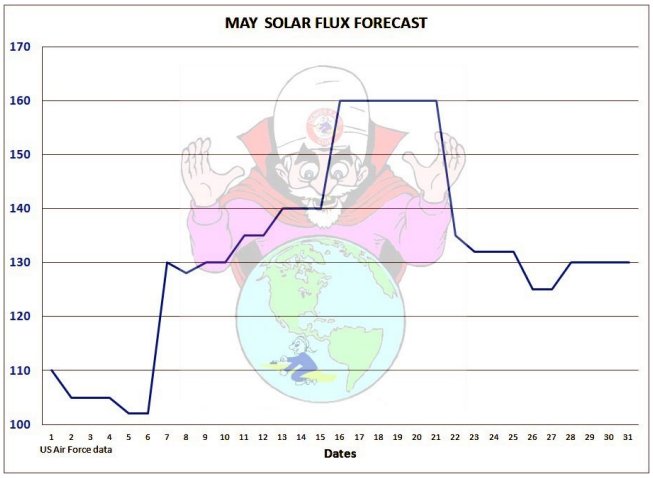
The Round Table Article Index
Go to: http://www.w0tx.org/RoundtableArchive/-RoundTables-Index.pdf

Past & Future Propagation Conditions
By Bill Rinker, W6OAV

The charts below show the Solar Flux and "A" indexes for last month and the forecast for this month's Solar Flux index.

Refer to the September 2010 *Round Table* for more complete information on interpreting these charts, which is available at: http://www.w0tx.org/RoundtableArchive/2010-RoundTables/RT201009(SEP).pdf





Upcoming Events
Hamfests & Conventions

Event	Date	Location	Sponsor Website
Montrose ARC Tailgate Party	06/04/22	Lion's Club Pavilion	montrosehamradio.org

Upcoming QSO Parties
The following are the Contests not sponsored by the ARRL. Please submit additions for future issues.

State/Province	Start Date	End Date	Sponsor Website	Notes
Arizona	05/07/2022	05/08/2022	Central Oregon DX Club	7th Call Area QSO Party
Connecticut	05/07/2022	05/08/2022	New England QSO Party	
Delaware	05/07/2022	05/08/2022	First State Amateur Radio Club	
Idaho	05/07/2022	05/08/2022	Central Oregon DX Club	7th Call Area QSO Party
Indiana	05/07/2022	05/08/2022	Hoosier DX and Contest Club	
Maine	05/07/2022	05/08/2022	New England QSO Party	
Massachusetts	05/07/2022	05/08/2022	New England QSO Party	
Montana	05/07/2022	05/08/2022	Central Oregon DX Club	7th Call Area QSO Party
Nevada	05/07/2022	05/08/2022	Central Oregon DX Club	7th Call Area QSO Party
New Hampshire	05/07/2022	05/08/2022	New England QSO Party	
Oregon	05/07/2022	05/08/2022	Central Oregon DX Club	7th Call Area QSO Party
Rhode Island	05/07/2022	05/08/2022	New England QSO Party	
Utah	05/07/2022	05/08/2022	Central Oregon DX Club	7th Call Area QSO Party
Vermont	05/07/2022	05/08/2022	New England QSO Party	
Washington	05/07/2022	05/08/2022	Central Oregon DX Club	7th Call Area QSO Party
Wyoming	05/07/2022	05/08/2022	Central Oregon DX Club	7th Call Area QSO Party
Arkansas	05/21/2022	05/22/2022	The Noise Blankers Radio Group	

ATTENTION

SUPPORT THE DRC FROM YOUR AMAZON PURCHASES

You can now support your Denver Radio Club when you make purchases from Amazon.com. Amazon Smile donates 0.5% of your purchase to the non-profit (501.c.3) organization of your choice. This is at no additional cost to you. To support the DRC just visit smileamazon.com. Select Denver Radio Club, Inc. as the organization you want to support and proceed with your order as usual. Amazon Smile will credit the DRC automatically. Thank you for your support.

DRC Repeaters

BAND	Freq / Shift / PL Tone	Additional Information
6m	53.090MHz (-1MHz) 107.2Hz PL	
Packet	145.05MHz	**Metro Denver Area Coverage**
2m	145.490MHz (-) 100Hz PL	**Linked to 70cm / 448.625MHz. Primary frequency during emergency net.**
2m	147.330MHz (+) 100Hz PL	**Local area. Has voting receivers. Does not TX a PL.**
2m	147.330MHz (+) 131.8Hz PL	**Test mode operation. Send signal reports to Tech Committee.**
1.25m	224.380MHz (-) 100Hz PL	
70cm	447.825MHz (-) DCS~073; NB 12.5; +/- 2.5	**Saint Anthony's. Note: This is a narrow band repeater requiring DCS.**
70cm	448.625MHz (-) 100Hz PL	**Linked to 2m / 145.490MHz. 1° disaster net freq.**
70cm	449.350MHz (-) 100Hz PL	**Wide area coverage with Echolink, node # 4140. Secondary frequency during emergency net.**
70cm	449.775 MHz (-)	**Yaesu digital, C4FM, Wires-X, DN, VW & Data. No analog FM. W0TX Room 40931.**
70cm	446.7875MHz (-)	**BrandMeister Repeater: Slot 1 – Wide Area Traffic, Slot 2 – Local Talk Group 310804**

MAY 2022

DRC Net Sundays at 8:30 p.m. on 145.490 / 448.625 (no PL)

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	**2**	**3**	**4** **Learning Net** 7:30 p.m. 145.490 / 448.625 (No PL)	**5**	**6** New Moon	**7**
8  First Quarter	**9**	**10**	**11** **Learning Net** 7:30 p.m. 145.490 / 448.625 (No PL)	**12**	**13**	**14**
15 Full Moon	**16**	**17**	**18** **DRC Online Meeting** Elmer 6 p.m. Meeting 7 p.m.	**19**	**20**	**21** 
22 Last Quarter	**23**	**24**	**25** **Learning Net** 7:30 p.m. 145.490 / 448.625 (No PL)	**26**	**27**	**28**
29	**30**  New Moon	**31**				

See arrl.org/contest-calendar for additional details about contests.

DRC Board of Directors

President	W0GV	Gerry Villhauer	303-467-0223	w0gv@hotmail.com
Vice-President	K0KPS	Kevin Schmidt	303-475-9234	k0kps@arrl.net
Secretary	WW0LF	Orlen Wolf	303-279-6264	owolf@mines.edu
Treasurer	N0CRZ	Cathy Villhauer	303-467-0223	crazycathy56@gmail.com
Board Member	N0XRX	Mark Thomas	720-438-0848	n0xrxradio@gmail.com
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Board Member	WG0N	Dave Baysinger	303-987-0246	wg0n@arrl.net
Board Member	KB0CHT	Jeff Irvin	*Check Roster*	*Check Roster*

DRC Staff and Volunteers

Benevolent		Carolyn Wolf	303-279-1328	Contact owolf@mines.edu
Club Librarian	WG0N	Dave Baysinger	303-987-0246	wg0n@arrl.net
Education Coordinator	AA0JK	Fred Hart	303-420-3536	elmer@w0tx.org
EmComm Coordinator	KE0HFH	Michael Vespoli	303-215-8862	emcomm@w0tx.org
EmComm Coordinator	AD0UZ	Brennan Pate	*Check Roster*	emcomm@w0tx.org
Field Day Chairman	K1DBC	Doron Ben Chaim	720-254-1561	k1dbc@arrl.net
Membership	N0XRX	Mark Thomas	720-438-0848	membership@w0tx.org
Net Control	K0TOR	Jim Beall	303-798-2351	k0tor@arrl.net
Public Relations	K0AXP	Dave Verlinde	248-515-2371	w0tx@w0tx.org
RT Managing Editor	AD0UZ	Brennan Pate	*Check Roster*	roundtable@w0tx.org
RT Associate Editor	W6OAV	Bill Rinker	*Check Roster*	*Check Roster*
Hamfest Manager	N0CRZ	Cathy Villhauer	303-467-0223	drcfest@w0tx.org
Tech. Committee Chair	W6OAV	Bill Rinker	*Check Roster*	*Check Roster*
Trustee	WW0LF	Orlen Wolf	303-279-6264	owolf@mines.edu
VE Team	KC2CAG	Tom Kocialski	720-284-1911	kc2cag@arrl.net
Website & YouTube	N0LAJ	Bill Hester	*Check Roster*	w0tx@w0tx.org

Please Let Us Know

Over the years we occasionally hear from hams who have read the Round Table in other states and countries around the world. We appreciate the comments and we would like to know where you are located. So if you live outside the Front Range or Denver Metro Area and read the newsletter either online, email or hard copy please send a short note via email with your *City, State* or *City, Country*.
We will publish it at a later date in our new regular feature called Round Table Round World.
To respond to this request send your information to roundtable@w0tx.org.

Subject: I'm located in…

Editor's Note

DRC members - this is your newsletter. Please email your club or amateur radio related suggestions to the editor. Members are the heart of The Denver Radio Club, so if you have an expertise or an interest in a particular segment of ham radio that you'd like to write about, you may email your submissions to roundtable@w0tx.org. The submission deadline is the 25th of the Month. ~ Editor

Sunday August 28, 2022- Adams County Fairgrounds

DENVER RADIO CLUB HAMFEST

NOTE: NEW PLACE AND DATE!!!

Adams County Fairgrounds

9755 Henderson Road in Brighton

Sunday August 28, 2022

9:00 am – 1:00 pm

$6.00 Admission
(Children under 13 free w/adult)

Exact Change appreciated

Doors open to the Public at 9am
Six-foot tables Advance Purchase..... $13.00 each
Tables at the Door..... $20.00
No guarantee of availability of "at the door" tables!

Vendor Setup begins at 7:30 on August 28th
Table assignment will be available at check-in
License Testing/VE Exams at 10 am
Talk-In: 145.490 or 448.625 PL 100.0Hz
GPS: Lat 39d 43' 19" N Lon 105d 10' 15" W
Handicapped Parking & Access Available

Visit our website for table reservations or email our hamfest manager Cathy Villhauer at drcfest@wØtx.org