



THE ROUND TABLE

Monthly Newsletter Of The Denver Radio Club

Since 1917

February 2024

PRESIDENT'S MESSAGE

BY GERRY VILLHAUER, W0GV

Hello DRC Members.

The weather is really unpredictable this time of the year. As I write this it is 60 degrees and we just came out of single digit and minus single digit weather. The forecast for the upcoming week is back into the deep freeze! Come on Springtime!

Our next regular meeting will be Wednesday, Feb 21, 2024. Join us for the Elmer session at 6 pm; bring your questions to ask. The regular meeting will start at 7pm. Our program will be presented by John Portune, W6NBC. His subject will be "Simple Yagi Design". John always has very interesting and easy to understand topics. Mark your calendars for Feb 21 and join in. The meeting address is on the [DRC website](#).

The next hamfest for 2024 will be the RMHam Swapfest on Sunday Feb 18, 2024 at the Adams County Fairgrounds. Details can be found on the [RMHam Radio Webpage](#). DRC will be represented with a couple tables to sell our wares. Look for our tall banner; stop by and visit.

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?

FROM CATHY VILLHAUER, N0CRZ, DRC MEMBERSHIP

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:

Chris Wetmore - KDØNIH

Jeff Davis - KFØBPN

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.

QUESTION OF THE MONTH

BY BILL RINKER, W6OAV

What Are the Three Categories of Mobile VHF/UHF Vertical Antennas?

The answer can be found on page 5 of the March 2015 issue of the *Roundtable*:

[https://w0tx.org/RoundtableArchive/2015-RoundTables/RT201503\(MAR\).pdf](https://w0tx.org/RoundtableArchive/2015-RoundTables/RT201503(MAR).pdf)

2024 DRC HAMFEST

BY BILL WORTHINGTON, KE0YKV

The DRC 2024 Hamfest is scheduled for Sunday, August 25th and will be held at the Adams County Fairgrounds, 9:00 am to 1:00pm. As the new Hamfest coordinator, I am going to need some help. The most pressing need is to arrange the food and drinks. I also need help with ticket sales, door prize raffle, VE testing, equipment sales, and vendor registration. If anyone can offer some help, I would greatly appreciate it. I can be reached at drcfest@w0tx.org or 720-626-5485.



SKYWARN WEATHER SPOTTER TRAINING

The National Weather Service (NWS) has released 2024 Skywarn Spotter Training for Colorado. The site has five sites available within the Denver metro area at this time. They are:

JeffCo	March 25, 2024	In Person	7-9 PM	6651 Indiana St, Arvada, CO
JeffCo	April 3, 2024	In Person	530-730 PM	480 S. Allison Pkwy, Lakewood, CO
Adams/Arapahoe	April 11, 2024	In Person	6-8 PM	5416 S Riviera Way, Aurora, CO
Adams	April 20, 2024	In Person	10 AM-12 PM	4430 S. Adams County Parkway, Brighton, CO
Adams/Arapahoe	April 22, 2024	In Person	6-8 PM	1100 E Colfax Ave, Bennett, CO (Community Center)

The training prepares the general public in spotting hazardous weather conditions and reporting them to the NWS. This training is highly useful for amateur radio operators who can report via radio.

For additional class opportunities see [SKYWARN Spotters \(weather.gov\)](https://www.weather.gov/skywarn).

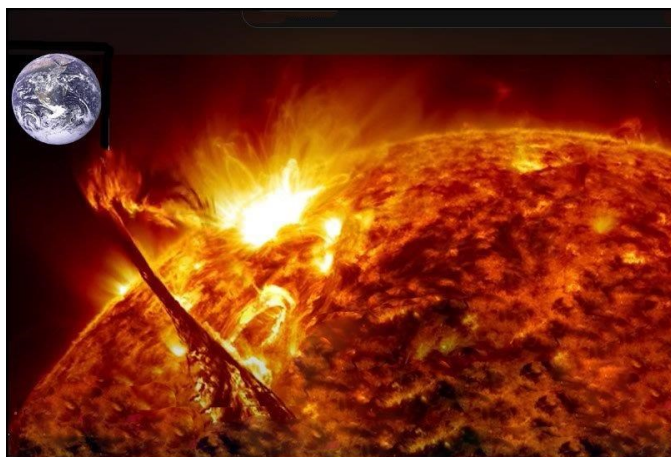
Currently, the Denver Radio Club has no plans in hosting a class at this time.

ARE WE READY?

BY BILL RINKER, W6OAV

Are we hams ready for the next severe solar flare? The history of solar flares shows that they can be quite severe and destructive, especially with today's technology. Scientists estimate that there is a 12% chance of a destructive solar flare occurring within the next decade.

According to the National Oceanic and Atmospheric Administration (NOAA), there have been 117 severe solar flares this century, of which 31 have hit the earth. This includes all flares that were classified as A-class or higher, where A-class flares are the weakest and X-class flares are the strongest. So, let's look at a short history of severe solar flares.



A SHORT HISTORY OF SOLAR FLARES

660 B.C

A solar storm of unprecedented strength slammed into Earth according to scientists who analyzed traces of the event preserved in ice cores and tree rings. The study, published in the journal *Proceedings of the National Academy of Sciences*, found that the storm was about 10 times more powerful than any solar storm recorded in modern times.

774-775 AD

A solar flare occurred that was much more powerful than any solar flare recorded in modern times according to the evidence preserved in ice cores and tree rings. This flare would have caused a dramatic increase in the levels of radiation at the Earth's surface, which could have had a significant impact on human health and the environment.

The Carrington Event of 1859

This was the most intense geomagnetic storm in recorded history. The flare was so powerful that it caused telegraph systems around the world to fail. Auroras were seen as far south as the Caribbean.

The geomagnetic storm induced strong currents in telegraph wires, which caused sparks and even fires in telegraph stations. In some cases, telegraph operators received electric shocks.

If a Carrington Event-sized storm were to occur today, it could have a devastating impact on our modern technology. It could cause widespread internet and power grid blackouts with long term damage to large transformers, to satellites, to undersea data cables and other electronic devices, and even disrupt financial markets and transportation systems.

May 15, 1921

This flare was a powerful eruption on the sun that caused a massive geomagnetic storm on Earth. The telegraph exchange in Karlstad, Sweden, caught fire and burned down due to overheated wires. The switchboard at the Brewster station of the Central New England Railroad in New York also caught fire and destroyed the building.

February 25, 1956

A surge of electric currents in power lines and telegraph wires caused damage and disruption to some systems. The geomagnetic storm induced extremely high voltages in power lines in Canada, causing fuses to blow and transformers to overheat. Telegraph operators also experienced shocks and sparks from their equipment.

August. 4, 1972

A major solar flare that erupted knocked out long-distance phone communication across some states, including Illinois. That event caused AT&T to redesign its power system for transatlantic cables.

March 13, 1989

A severe solar flare led to a geomagnetic storm that disrupted power grids in Quebec, Canada. It left six million people without electricity for nine hours and even melted some power transformers in New Jersey.

October 28, 2003

In late October and early November 2003, a series of powerful solar flares occurred. These solar storms caused aircraft to be re-routed, affected satellite systems and caused power outages in Sweden. The Solar and Heliospheric Observatory (SOHO) temporarily failed during the solar onslaught.

December 5, 2006

This flare disrupted satellite-to-ground communications and Global Positioning System (GPS) navigation signals for about 10 minutes. It actually damaged the solar X-ray imager instrument on the GOES 13 satellite that snapped its picture.

February 15 & June 7, 2011

In 2011, the Sun produced a series of X-class solar flares, the most powerful class. These flares caused concern for satellite operators and power grid managers, although the impacts were relatively minor.

July 23, 2012

A significant solar storm narrowly missed Earth, similar in scale to the Carrington Event. If it had hit, it could have caused widespread disruptions to communication and power systems. Slight disturbances were felt on earth.

September 2017

The sun produced a series of flares. They coincided with several major hurricanes in the Atlantic Ocean, such as Irma, Katia and Jose. The radio blackouts caused by the solar flares complicated the relief efforts for these disasters, as they affected emergency communications, aviation and GPS signals.

Solar Storms of 2020

A series of a solar flares occurred late that year which temporarily disrupted GPS signals in parts of Europe.

Solar Storm of 2022

In February 2022, SpaceX witnessed the destructive power of the sun when a geomagnetic storm destroyed 40 Starlink satellites worth over \$50 million shortly after deployment.

HOW TO PREPARE FOR A MAJOR SOLAR FLARE

Various agencies, including NOAA, the USAF, and NASA, monitor the sun for solar activity. If a Carrington-level event were directed at Earth, it would likely have an X45 classification with a notification lead time of 8 to 20 hours. Power companies could take measures, including intentionally cutting power, to protect against transformer damage.

Should a Carrington level solar storm occur today the electrical power grid would suffer possible long term damage due to large transformer destruction and electronic equipment without surge protectors would be destroyed.

What Should We Do?

Stay informed about solar activity through official sources like NASA and NOAA. They provide

alerts and early warnings about potential solar storms, allowing time for preparations. Very fast coronal mass ejections (CME). CMEs can take as little as 4 hours to hit earth, while slower-moving CMEs can take up to 18 hours to arrive. This allows for preparations and mitigations if a particularly powerful or fast CME is heading toward Earth.

Some items to consider **before** a solar flare are:

- Hams should develop a plan for how they will communicate with each other, with family members and with emergency response organizations during a solar flare. This plan should include a variety of different communication modes and established HF/VHF/UHF net frequencies. Ensure that members are trained to implement these plans effectively.
- Install high-quality surge protectors and UPS systems with surge protection for critical equipment. These devices can help protect against excess voltage spikes.
- Maintain backup power sources, such as generators or battery systems, to keep essential equipment running during power outages caused by the solar event. Ensure these systems are well-maintained and protected from the effects of the storm.
- Be prepared for long power outages. Build an emergency kit which should include food, water, first-aid supplies flashlights, a battery powered AM/FM radio and other essential items for at least three days.
- Be prepared when a solar flare occurs to protect emergency backup electronics such as a radio or laptop, by putting them (unplugged) inside a sealed cardboard box and wrapping the box completely with aluminum foil.

Some items to consider **during** a solar flare are:

- Stay indoors: This will help to protect you from radiation exposure.
- Unplug electronics: This will help to prevent damage from power surges.
- Listen to the radio or follow local news sources for updates: This will help you to stay informed about the situation and receive instructions from emergency officials.
- If you must go outside, wear protective clothing: This includes sunglasses, a hat, and long sleeves and pants.

References:

NASA Chief Gives SERIOUS Warning About Solar Storm!

https://www.youtube.com/watch?v=aCjKGpj_b5U

How Prepared Are We For A Carrington Level Solar Storm?

<https://www.youtube.com/watch?v=sBxjwzKwVI0>

Solar Flare Impacts:

<https://www.swpc.noaa.gov/impacts#:~:text=About%20Space%20Weather%20Impacts&text=Solar%20flares%20can%20produce%20strong,electronics%20and%20cause%20electrical%20failure.>

How to Prepare for a Solar Flare Hitting Earth (Because It's Probably Going to Happen):
<https://lifehacker.com/how-to-prepare-for-a-solar-flare-hitting-earth-because-1848076402>

Earth is no stranger to the sun's wrath.
<https://www.space.com/12584-worst-solar-storms-sun-flares-history.html>

Before an Extreme Solar Event:
<https://www.weather.gov/safety/space-before>

How to Protect Your Home from Solar Flares and Solar Storms:
<https://todayshomeowner.com/solar/guides/how-to-protect-your-home-from-solar-flares-and-solar-storms/#:~:text=with%20the%20metal.,To%20protect%20emergency%20backup%20electronics%20such%20as%20a%20radio%20or,metal%20garbage%20can%20with%20cardboard.>

THE DOUBLET

BY BILL RINKER, W6OAV

Have you spent hours raising and lowering an HF $\lambda/2$ dipole while attempting to resonate it on a particular band? Have you spent hours climbing up and down while attempting to tune an attic HF $\lambda/2$ dipole? Well, there is an easier way to install a dipole that will NOT require tuning, will be multiband, will be efficient on the bands below its physical $\lambda/2$ size and will provide gain on bands above its physical $\lambda/2$ size. This antenna is a non-resonant dipole (also known as a doublet). SO, what is a doublet? Well, let's look at the following definition from the ARRL Antenna Book, Issue 21:

"The simplest and most flexible (and also least expensive) all-band antennas are those using open-wire parallel-conductor feeders to the center of the antenna.

The length of the antenna is not critical, nor is the length of the line. As mentioned earlier, the length of the antenna can be considerably less than $\lambda/2$ and still be very effective. If the overall length is at least $\lambda/4$ at the lowest frequency, a quite usable system will result."

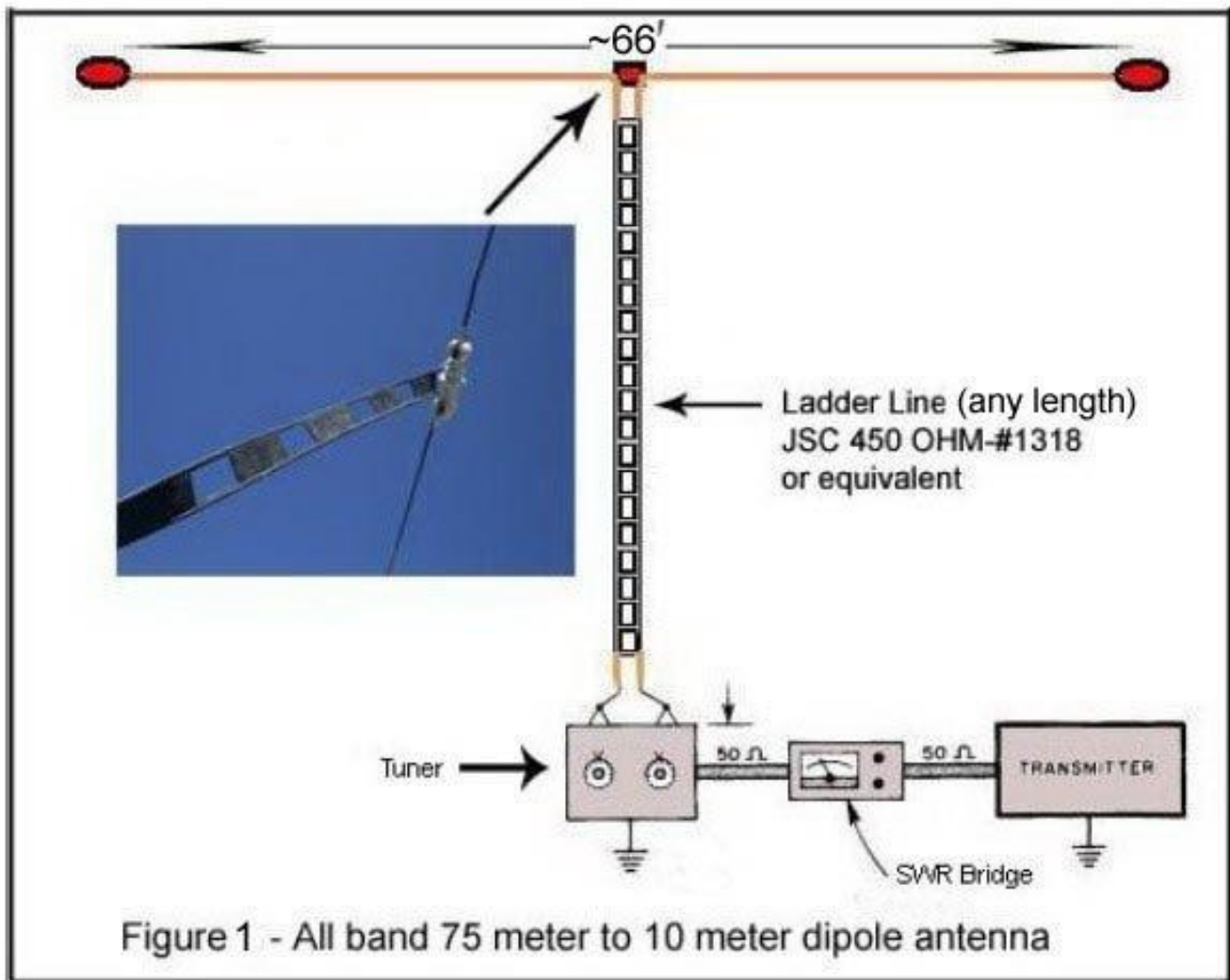
How Do Doublets Work?

So, how do doublets work? The secret is the use of ladder line (often called open wire). The article listed in reference [1] details in depth how doublets work. In summary the tuner, the ladder line and the antenna operate as a resonant system. The tuner will get all the power from the transmitter into the ladder line feeder, the ladder line feeder with virtually no loss will get all the power to the dipole and the dipole will radiate that power. Mismatches in the system will cause some reflections which will reinforce the outgoing power.

As mentioned earlier, doublets will provide gain on all bands above the antenna's [physical \$\lambda/2\$](#) length and will work well on bands below the antenna's physical $\lambda/2$ length [2]. For example, a dipole approximately 66' in length (a $\lambda/2$ on 40 meters) will radiate as well as a $\lambda/2$ dipole on 40 meters and with good efficiency on 60 and 75 meters and provide gain in lobes on all bands above 40 meters.

Radiation Patterns

Figure 1 shows the doublet that I used for years, both for portable operations and for home use. This antenna is a $\lambda/2$ at 40 meters. Let's analyze this doublet's performance using 4NEC2 software (and verified with EZNEC software). Figures 2 through 6 show the theoretical radiation patterns of $\lambda/2$ dipoles as compared to the 66' doublet on each band. The red in the coverage diagrams shows the horizontal coverage whereas the blue shows the vertical coverage. The yellow arrows next to the coverage diagrams point out the maximum gain values. The 3D patterns are made looking down at a 45-degree angle towards the end of the antenna element. My experience using the 66' doublet over the years seems to verify the theoretical patterns.



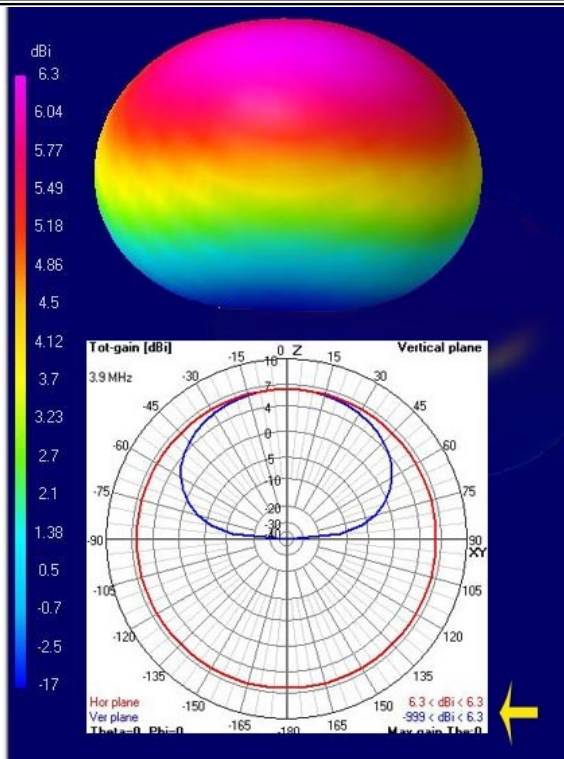


Figure 2a - 75m - 120' dipole @ 40'

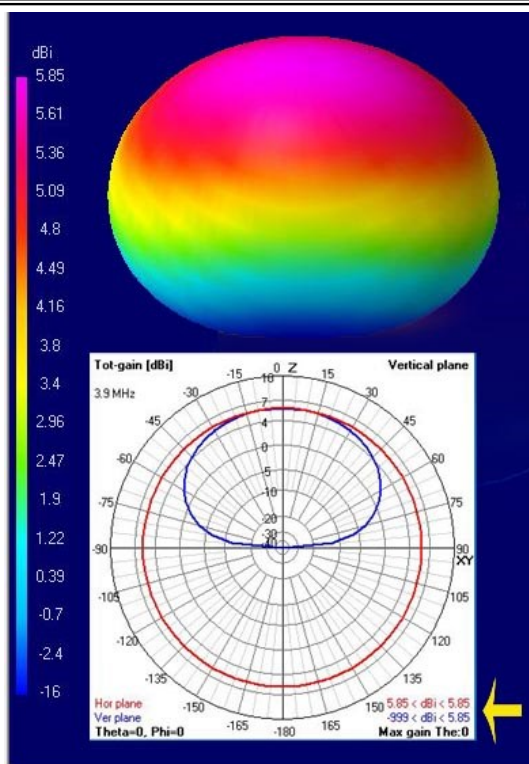


Figure 2b - 75 m - 66' doublet @ 40'

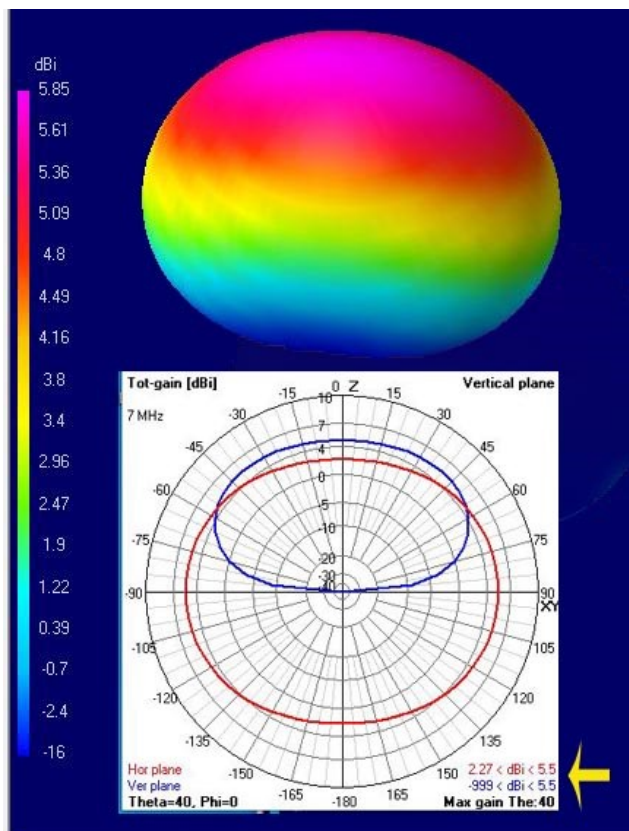


Figure 3 - 40m dipole or 66' doublet @ 40'

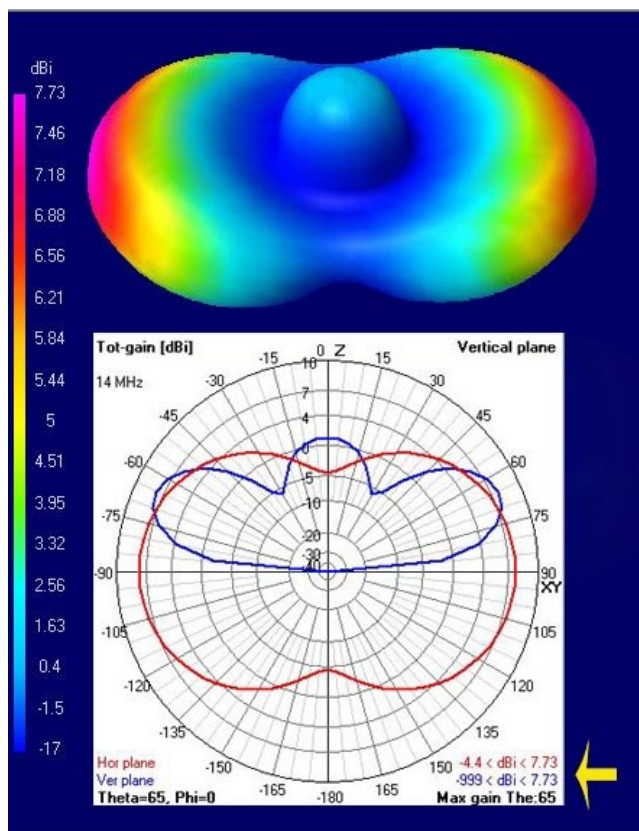


Figure 4a - 20m dipole @ 40'

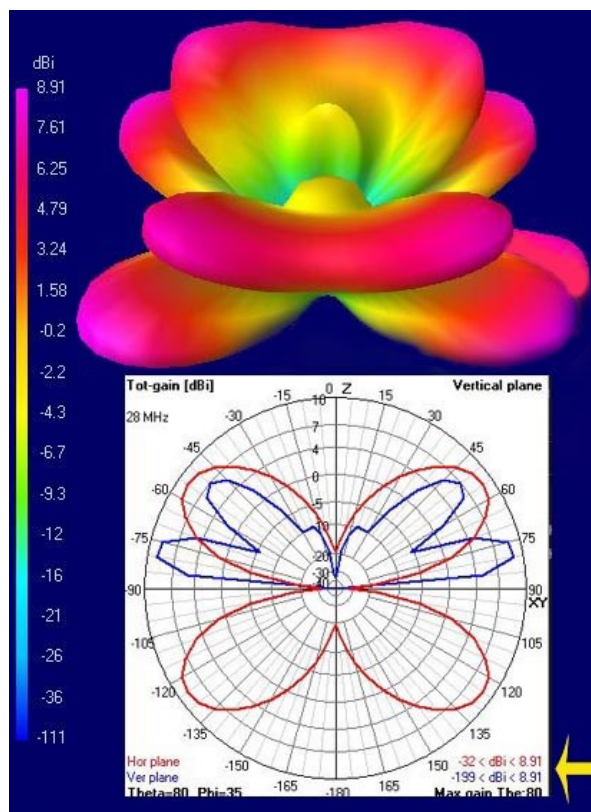


Figure 6b - 10m 66'doublet @ 40'

When looking at the figures above one might wonder why horizontal and vertical lobes occur on the different bands. Well, vertical lobes occur as a fixed frequency antenna is raised above ground. Increasing the frequency on a fixed antenna has the same effect as raising that antenna above the ground [3]. Horizontal lobes occur as the physical length of a fixed frequency antenna is increased. Increasing the frequency on a fixed length antenna creates the same effect as lengthening the antenna while maintaining the same frequency [4].

Building and Using a Doublet

The YouTube tutorials below show how easy it is to build and use doublets [5] [6] [7].

When installing a ladder line feeder there are several rules to follow [8].

Keep the line away from conducting objects by twice the line spacing.

Curves should be no sharper than 45 degrees.

For a 90 degree bend use two 45 degree bends separated by a couple of inches.

Should the tuner not be able to match the system on a particular band add about $\lambda/8$ of ladder line. This changes the impedance presented to the tuner.

Note: The above information also applies to Inverted Vee doublets.

References

- [1]. Don't Worry About High SWR! (Page 8):
[https://w0tx.org/RoundtableArchive/2016-RoundTables/RT201602\(FEB\).pdf](https://w0tx.org/RoundtableArchive/2016-RoundTables/RT201602(FEB).pdf)
- [2]. The Doublet Antenna & Ladder line:
<https://www.youtube.com/watch?v=KSR3waUAh38>
- [3]. Horizontal Radiation Gaps:
<https://ham.stackexchange.com/questions/5470/horizontal-dipole-radiation-gaps>
- [4]. 3D Dipole Radiation Pattern vs Current Distribution, effect of increase the electrical length:
https://www.youtube.com/watch?v=edyFGAT_87o
- [5]. The Doublet Antenna in Practice | Ham Radio:
<https://www.youtube.com/watch?v=iefof6PIYxk>
- [6]. Ham Radio - The Doublet antenna, the principles. Part 1:
<https://www.youtube.com/watch?v=tA4loihJwE>
- [7]. Ham Radio - The Doublet antenna, QSOs and observations. Part 2:
https://www.youtube.com/watch?v=sli_OXoOugM&t=0s
- [8]. KV5R'S Ladder Line Tutorial:
<https://kv5r.com/ham-radio/ladder-line/>
- [A]. Minimum length of a non-resonant multi-band dipole:
<https://owenduffy.net/antenna/misc/mdl.htm>
- [B]. Doublet vs Dipole vs End Fed Antennas - Which is Best for You?
<https://www.youtube.com/watch?v=t0pGq7jTEuo>
- [C]. All-Band Doublet by L. B. Cebik - W4RNL (SK):
<http://www.webclass.org/k5ijb/antennas/All-Band-Doublet.htm>



The DRC needs you!

Please contact W0GV (president@w0tx.org) if you are interested in helping with the open positions.
See the list at the end of the newsletter.



DRC's Trading Post

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

PAST ROUND TABLE PAGES

PROVIDED BY WOODY LINWOOD, W0UI

From the October 1960 edition.

Item . . .

(Continued from page 7)

- surely non-believers and are not long for this world.
5. Take care thou usest the proper method when thou taketh the measure of a high voltage circuit so that thou dost not incinerate both thee and the test meter, for verily, though thou has no account number and can be easily writtern off, the test meter doth have one and as a consequence bringeth much woe unto the supervisor.
 6. Take care thou tampereth not with interlocks and safety devices, for this incurreth the wrath of thy supervisor and bringeth the fury of management about thy head and shoulders.
 7. Work thou not on energized equipment for if thou so doest thy buddies will surely be buying beers for thy widow and consoling her in certain other ways not generally acceptable to thee.
 8. Verily, verily I say unto thee, never service equipment alone, for electrical cooling is sometimes a slothful process and thou might sizzle in thine own fat upon a hot circuit for hours on end before thy maker sees fit to end thy misery and drag thee into his fold.
 9. Trifle thou not with radioactive tubes and substances lest thou commence to glow in the dark like a lightening bug and thy wife be frustrated nightly and have no further use for thee except for thy wages.
 10. Commit thou to memory all the words of the prophets which are written down in various safety precautions, and which giveth out with the straight dope and consoleth thee when thou hast suffered a ream job by thy supervisor.

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TWO METER ACTIVITY

By John KNØCYQ

I would like to introduce at this time the two meter stations I have copied on 144 Mc. Howard (a reissued call) KNØCYG; Dave, KNØCLH; Leo, WØACA; Walt, KØCLJ; Frank, KØMNQ; Tommy, WØIUF, in Boulder; Wild Bill, WØA00; Everett, KØQAR; Dick, WØFBO; Bob, WØEKD; Jerry, KØTFA; Chuck, KØKZR; Jim, KØWRF; Dean, KØWXZ who is portable at Buckley Field; Bill, KØKWS; The golden voice on two meters, Tim, WØFZG and a newcomer to new meters, Dud, WØFKQ who hangs around 147.42. I would at this time like to take the opportunity to say welcome to the 144 Mc gang, Dud. From yours truly and the whole group. We hope to see you around real often. So boys when you call CQ, tune around 147.42 for Dud.

Did you know the reason Bill, WØA00 isn't on more often is that he would rather tear that rig of his apart and tinker with it than modulate it. That Chuck, KØKZR is back in Boulder going to college. That the reason Howard, KNØCLH isn't on more often is because he can't eat and Ham at the same time. The reason Leo, WØACA doesn't call the Colorado State two meter net now is that he got tired of talking to himself. Leo can you still smell smoke? Leo had some hot wires in his shack lately.

Tim, WØFZG is putting up a new beam so watch out boys and keep the gain turned down. Frank, KØMNQ is now working days so tune for him in the evening around 144.17, lets hear from you more often, Frank. There is an Army Mars Net called every evening except Tuesday and Saturday with Leo, WØACA as net control.

Yours truly would at this time like to thank the whole two meter gang for the wonderful cooperation that I received in acquiring points during the V H F QSO party September 17 and 18. I made contact with just about every one. It sure did help out point wise. Winter will be here before long, so boys lets fire up the transmitters and burn out the cobwebs that accumulated during the summer months.

73 for now and see you on 2.

Page Nine

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](#)



Kings Soopers Reward Program—Help the DRC.
kingssoopers.com/i/community/community-rewards
citymarket.com/i/community/community-rewards



RANDOM SITE OF THE MONTH
[Jamestown, ND Amateur Radio Club](#)

THE ROUND TABLE ARCHIVE

Go to: w0tx.org/roundtable

THE ROUND TABLE ARTICLE INDEX

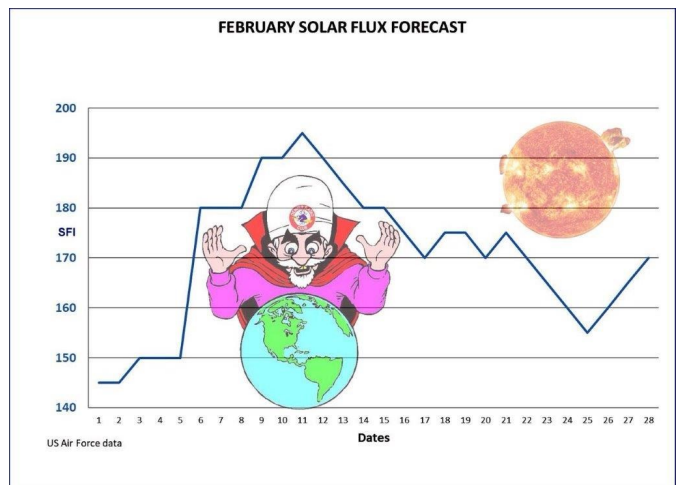
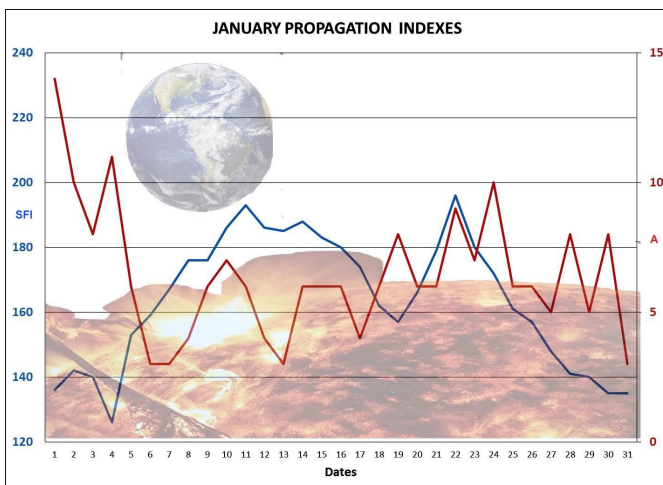
Go to: w0tx.org/RoundtableArchive/-RoundTables-Index.pdf

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: [https://www.w0tx.org/RoundtableArchive/2010-RoundTables/RT201009\(SEP\).pdf](https://www.w0tx.org/RoundtableArchive/2010-RoundTables/RT201009(SEP).pdf)



UPCOMING EVENTS

HAMFESTS & CONVENTIONS

Event	Date	Location	Sponsor Website
The Swapfest	2/18/24	Adams County Fairgrounds	rmham.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
Idaho	03/09/2024	03/10/2024	Idaho QSO Party	

Source: qsoparty.eqth.net/index.html See contestcalendar.com/contestcal.html for a larger QSO parties list.

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.

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

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EmComm Coordinator	KE0HFH	Michael Vespoli	303-215-8862	emcomm@w0tx.org
EmComm Coordinator	AD0UZ	Brennan Pate	Check Roster	emcomm@w0tx.org
Field Day Chairman	N6WHV	Dick Nelson		fieldday@w0tx.org
Membership	N0CRZ	Cathy Villhauer	303-467-0223	membership@w0tx.org
Net Control	K0TOR	Jim Beall	303-798-2351	net@w0tx.org
Public Relations	K0AXP	Dave Verlinde	248-515-2371	publicrelations@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	KE0YKV	Bill Worthington	720-626-5485	drcfest@w0tx.org
Tech. Committee Chair	Open			tech@w0tx.org
Trustee	WW0LF	Orlen Wolf	303-279-6264	trustee@w0tx.org
VE Team	K0RAP	Robert Pickett	720-336-0114	k0rap@w0tx.org
Website & YouTube	K1DBC	Doron Ben Chaim	720-254-1561	websiteadmin@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...

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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