



THE ROUND TABLE

Monthly Newsletter Of The Denver Radio Club

Since 1917

March 2024

PRESIDENT'S MESSAGE

BY GERRY VILLHAUER, W0GV

Hello DRC Members.

I hope all is well with you and your family. Strange weather lately for sure; Snow one day and 60 degrees and sunny the next day.

No Swap Fest this month as far as I know. The LARCFEST will be Apr 6, 2024 at the Boulder County Fairgrounds in Longmont. Check their website for details. Please make sure our DRC Hamfest is on your calendar, it will be here before you know it. Sunday August 25, 2024 at the Adams County Fairgrounds in Henderson. We are looking as always for help making this a successful event. Please contact Bill Worthington, KE0YKV to give a hand. Bill's contact information for email is drcfest@w0tx.org. Our success depends on members to fill important positions. This is a one day event not a long commitment.

The program for our March meeting will be an interesting presentation. Thomas Schuessler, N5HYP from the Dallas, Texas area will be telling us about AMSAT; Amateur Radio through orbiting satellites. Thomas will give a basic overview of what it takes to start doing contacts through Amateur satellites. That will be at our regular meeting, March 20, 2024 at 7 p.m. Remember also, the Learning Net starts around 6 p.m. prior to the regular meeting and program. Join in to the Learning Net for discussion on various interesting subjects. The link to join, if you don't already have it, is on the DRC website.

Our program at the February meeting had technical issues with John Protures program on simple design Yagi antennas. We will reschedule John for another date. Thanks to Doron, K1DBC for providing some interesting fill in video to save the day.

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:

Doug Bates - KEØZUO	Terry Dalby - N8BIF
Patrick Vaglica - K7DKP	Michael Johnson - KFØODR
Mark Winslow	Gemma Huang - KFØDGZ

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

Why is your ham room moving violently in many directions at the same time?

The answer can be found on page 5 of the November 2016 issue of the Roundtable [w0tx.org/RoundtableArchive/2016-RoundTables/RT201611\(NOV\).pdf](http://w0tx.org/RoundtableArchive/2016-RoundTables/RT201611(NOV).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 to host a class at this time.

DIPOLES: EFFECTS, AND BEST HEIGHTS

BY BILL RINKER, W6OAV

This article discusses $1/2 \lambda$ dipole SWR and dipole radiation patterns, why they change with height and what is the recommended dipole height.

SWR

How often have you heard someone say "No matter what I do, I cannot get the SWR of my dipole down to 1:1?". Well, the response would be that if the antenna SWR is 1:1 then there is extra loss somewhere in that antenna system. And the impedance is not what it should be. (Assuming no transmatch is in the system).

An antenna in space has no external influences. The impedance of a $1/2 \lambda$ dipole in space is 73 ohms + j42.5. The SWR of this $1/2 \lambda$ dipole in space, if fed with 50 ohm coax, would be about 1.44.

However, an antenna on earth is subject to all types of external influences. The proximity of an antenna to ground is the largest influence. Chart 1 shows the changes in a dipole's SWR as

the dipole is raised above average ground and re-tuned to resonance as it is raised. As shown the SWR varies considerably and never gets to 1:1. When tuning a dipole, it is important to know about what SWR to expect to determine whether there is an issue with the system. [1]. (Tip: Measure the SWR across the band. If it is basically flat, then there is excessive loss in the system).

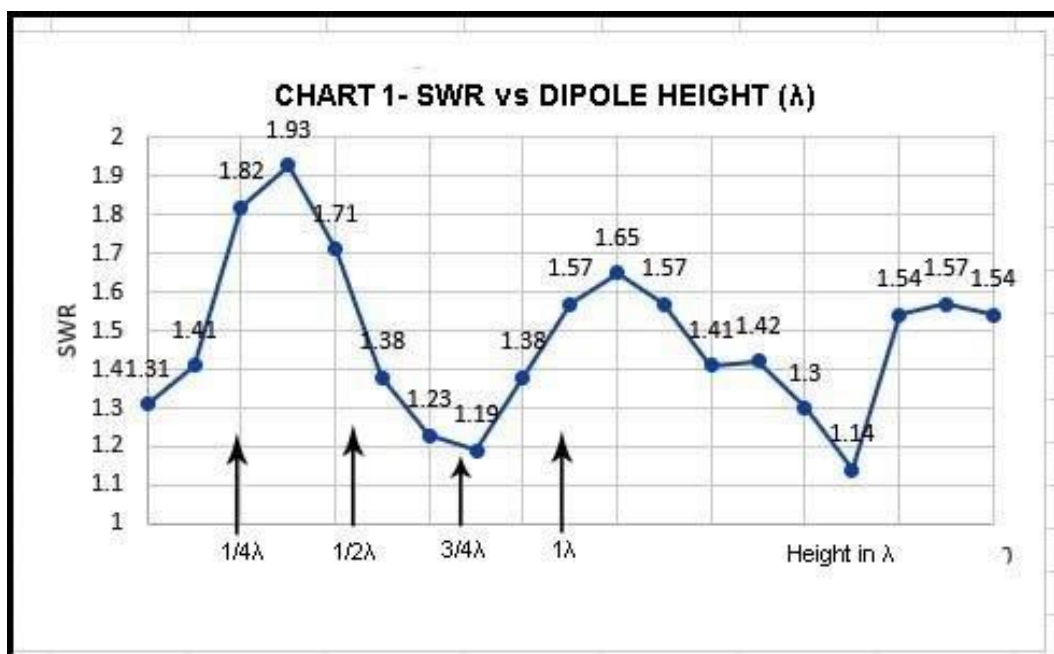
So, why does the SWR vary with height?

The signal that is radiated from a dipole directly down towards the ground is reflected back and induces a voltage in that dipole. The magnitude and phase of the current resulting from this Induced voltage depends on the height of the antenna above the earth. At certain antenna heights the induced signal will be in phase with the original signal producing a larger total current. At other antenna heights the induced signal will be out of phase with the original signal producing a smaller total current. These phase changes explain the SWR variation shown in Chart 1.

The larger total current created by the in phase induced current emulates an antenna with a lower resistance than the original dipole. A lesser total current in antenna emulates a dipole with a higher resistance.

The electrical characteristics of the ground (conductivity and permittivity) affect both the amplitude and the phase of reflected signals. For this reason, the electrical characteristics of the ground under the antenna will have some effect on the impedance of the antenna, the reflected wave having been influenced by the ground. Different impedance values may be encountered when an antenna is erected at identical heights but over different types of earth. [2]. [3].

Referring to Chart 1, notice that at $1/2 \lambda$ height above ground the antenna's SWR is close to 1.44. The reactance is 69.02 ohms $+j2.264$ which is very close to the free space impedance.



RADIATION PATTERNS

As mentioned above, an antenna in space has no external influences. The radiation pattern of a dipole in space is essentially a donut shape around the axis of that dipole.

However, an antenna on earth is subject to all types of external influences. The proximity of an antenna to ground is the largest influence.

So, why does the radiation pattern vary with height?

The radiation pattern of a dipole antenna changes with height primarily due to two factors:

Ground reflection and interference: When a dipole is close to the ground, the signal reflects from the Earth's surface. This reflected signal combines with the direct signal, resulting in interference patterns. The relative phase and amplitude of these reflections depend on the height of the antenna above the ground. This modifies the overall radiation pattern.

Current distribution along the antenna: The current distribution along the length of the dipole is affected by its height above the ground. At low heights, the ground acts as a mirror image of the antenna, causing a change in the current distribution. This effect alters the phase and amplitude of the pattern radiated by different segments of the antenna, further modifying the radiation pattern.

The radiation pattern can vary significantly depending on the height of the dipole antenna above the ground. Below are general observations relative to dipole height above ground:

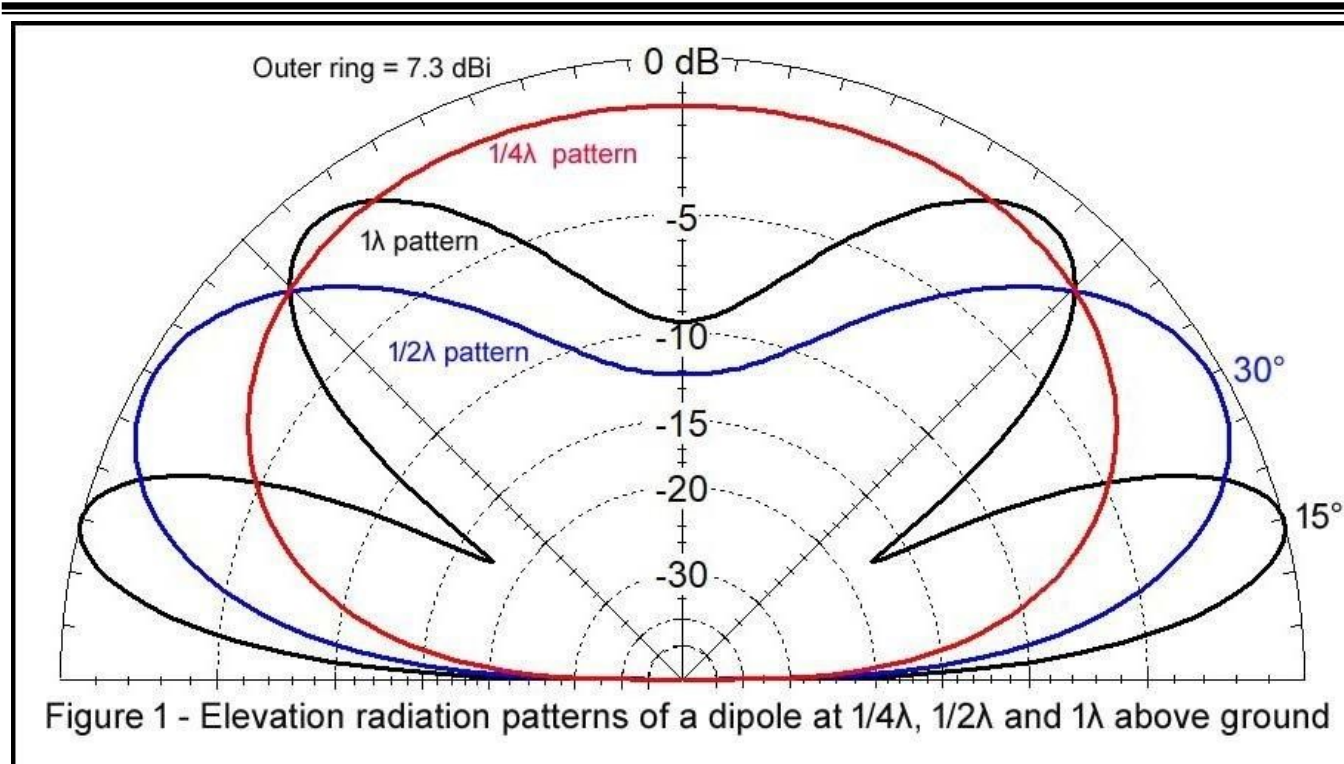
Low height: At a height of $1/4 \lambda$ or less, the ground reflections and interference effects caused by the dipole's nearby strong inductive field are significant. This often results in a very high angle of radiation, making the antenna suitable for NVIS (depending on frequency). Reference Figure 1 (red outline). The peak pattern off the ends of the dipole is 8.5 db at 30° down from the broad side pattern. This pattern almost makes an antenna that is almost omnidirectional.

Moderate height: When the antenna is placed at a height between $1/4 \lambda$ and $1/2 \lambda$, the ground effects are less pronounced, and the radiation pattern may resemble a classic dipole pattern with its main lobe directed perpendicular to the antenna's axis. This height is good for communications from 1000 miles to DX distances. Reference Figure 1 (blue outline). The peak pattern off the ends of the dipole is 12 db at 25° down from the broad side pattern.

High height: When the antenna is moved higher than $1/2 \lambda$, the ground reflection and interference effects diminish. The radiation pattern splits into two lobes, one lobe is very low to the horizon and the other lobe is high above the horizon. This height favors mainly DX distances. Reference Figure 1 (black outline). The peak pattern off the ends of the dipole is 20 db at 15° down from the broad side pattern. [4].

SUMMARY

According to Figure 1, the recommended height for a dipole antenna is $1/2 \lambda$. This is because the SWR (is a good match for 50 ohm coaxial cable, and the radiation pattern (30°) favors propagation from approximately 1,000 miles to DX distances. (Some literature recommends a dipole at a height of 60% of the λ . There isn't much of a performance difference between these



two heights).

A dipole antenna at a height of 1.0λ has good low-angle signal for DX (15°), but this comes at the expense of coverage from 1,000 to 3,000 miles away. However, a dipole at $1/2\lambda$ has a radiation pattern at 15° that is only 3 dB ($1/2$ S Unit) below that of the higher dipole. Additionally, a dipole at $1/2\lambda$ has better radiation off the ends of the dipole elements, and it is easier to put up.

In summary, the recommended height for a dipole antenna is $1/2\lambda$ because it provides a good compromise between SWR, radiation pattern, and ease of installation. [5].

NOTES

1. All the information in this article was developed using Antenna Modeling software EZNEC 7+.
2. Every ham interested in antennas should download the documents listed in reference [6].

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]. A Dipole Feed Point Distance From Ground and Impedance:
<https://w8jxn.org/?p=1165>
- [3]. SWR vs height:
<https://www.qsl.net/kk4obi/Standard%20dipole.html>
- [4]. Dipole Antenna Radiation Patterns:
<https://hamuniverse.com/wb4ytdipolepatterns.html>
- [5]. How High Should My Dipole Be:
<https://www.onallbands.com/dipole-antennas-how-high-should-my-dipole-be/>

- [6]. [Reflections II, by Maxwell, W2DU:](https://archive.org/details/reflectionstrans0000maxw/mode/2u)
<https://archive.org/details/reflectionstrans0000maxw/mode/2u>
Reflections III, by Maxwell, W2DU:
<https://w1yca.org/tech/ant/reflectIII.pdf>

WHY IS FORMULA “468/MHZ=L” NOT ACCURATE?

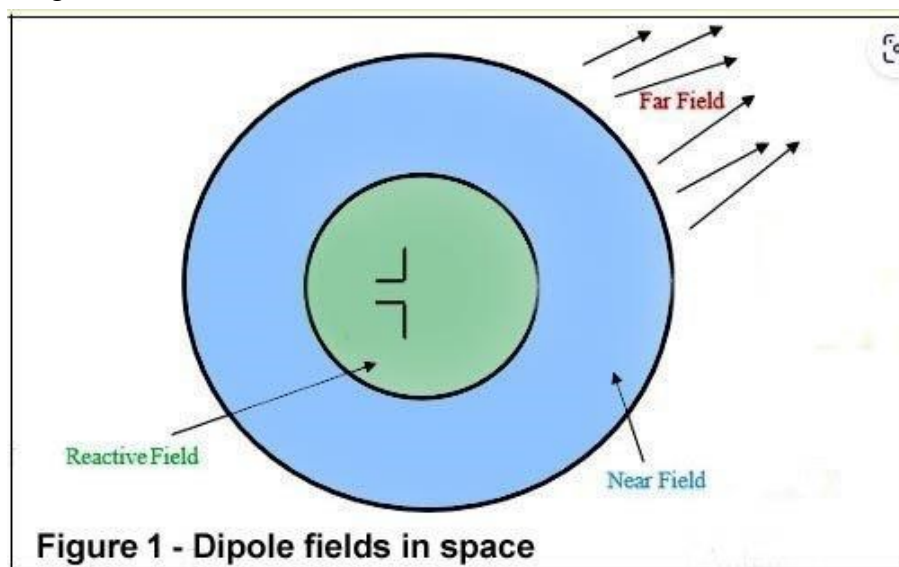
BY BILL RINKER, W6OAV

How often have you heard the comment “I calculated my HF dipole resonant length using the standard equation $L = 468/\text{MHz}$ but when I installed the dipole it was nowhere near the calculated resonant frequency. Why?” Well, there are many reasons for this issue which are discussed below.

Dipoles in Space

The formula ($468/\text{MHz}=L$) calculates the approximate length of a half-wavelength dipole in feet. This formula assumes the dipole is operating in free space without any nearby objects affecting its performance. The dipole’s resonance is determined by only the element’s physical length. Its impedance is mainly resistive with minimal reactance.

Figure 1 illustrates the fields around a radiating dipole in space. The Reactive Field (oscillating between capacitive and inductive) is dominant very close to the dipole. The Near Field is dominant for a short distance beyond the Reactive Field. The Far Field is dominant beyond the Near Field. [1]. The first two fields cause all the issues described below when they come into contact with earth ground as described below.



Dipoles on Earth

When a dipole is moved from free space to the earth, many changes in the dipole’s characteristics occur. These changes occur as the dipole’s Reactive and Near Fields approach and interact with the lossy ground. The Reactive field interacts with the ground losses and the Near field reacts with the image antenna in the ground.

The following changes occur when a dipole is moved from free space to earth:

Resonance Shift:

As a dipole approaches the earth's lossy ground, the dipole's natural resonant frequency decreases almost exponentially. See Figure 2. Note that the SWR slightly improves as a dipole approaches the ground. This improvement results because the lossy ground is absorbing some of the dipole's Reactive Field. Figure 3 shows that the type of ground also affects the dipole's resonance.

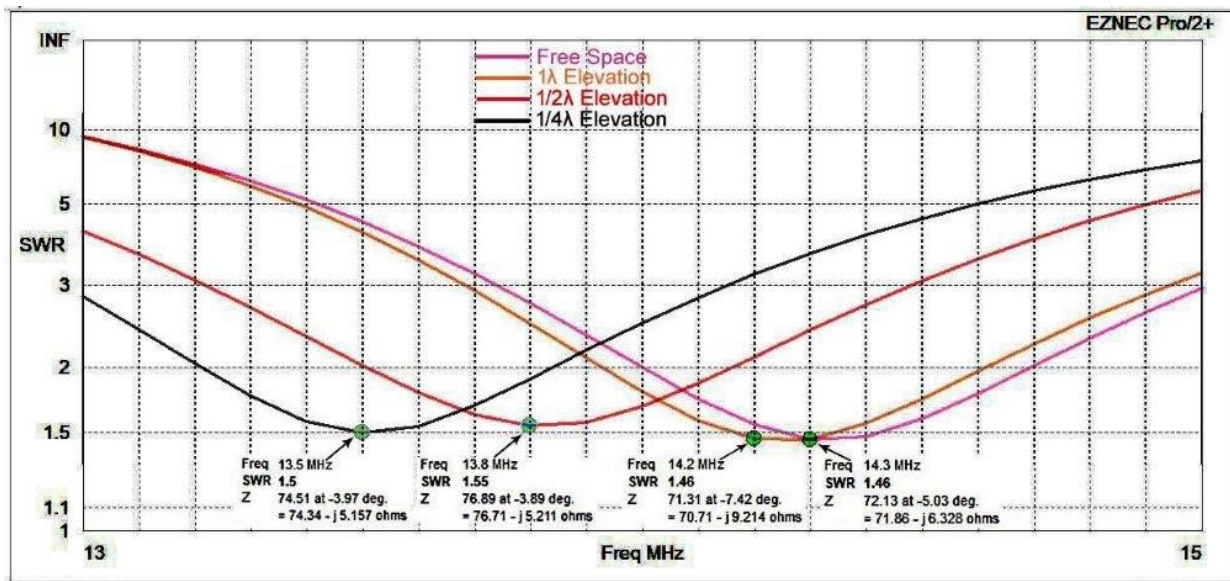


Figure 2 - Dipole characteristics in free space and at various heights above average ground

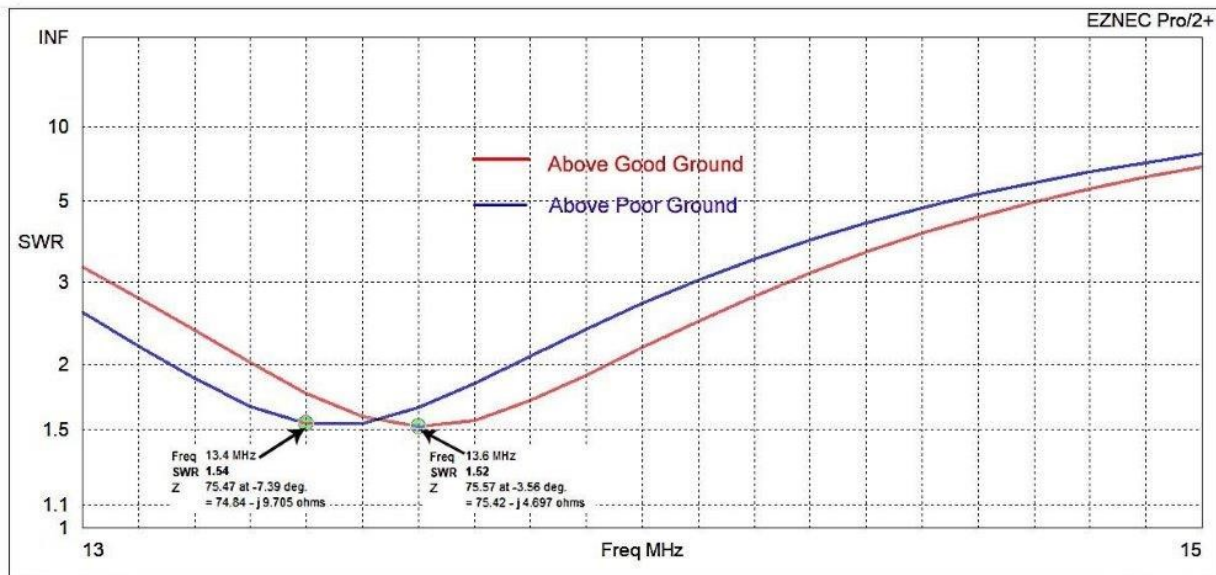


Figure 3 - Dipole characteristics above poor and good ground

Reactance:

When a dipole is near the earth's ground, it operates in the Reactive and Near Field regions, where these fields dominate. This introduces additional complexities in the impedance and resonance of the dipole because of the interaction with the nearby lossy surface and the dipole's image in the earth. Note the reactance values (Z) in Figures 2 and 3.

Signal Loss:

When a dipole is near the earth's lossy ground a significant portion of the radiated signal can be absorbed by the ground, producing a reduced radiated signal. The proximity to the earth increases the coupling between the dipole and the ground, resulting in increased losses and decreased efficiency of the dipole. (See Figure 4.)

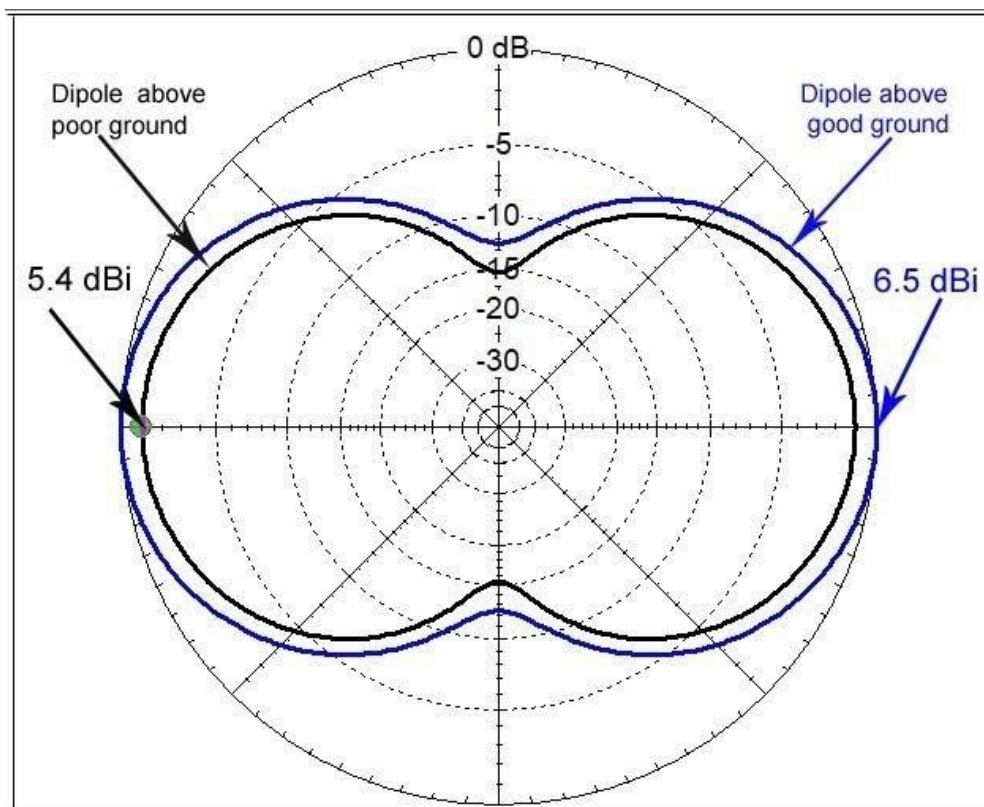


Figure 4 - Affects of different grounds on dipoles

Insulation affects:

The free space formula does not consider the effects of a dipole's wire insulation. The composition and thickness of the insulation acts as a dielectric between the wire and the surrounding air. Figure 5 shows the effects of thick PVC insulation on the dipole elements. Note that the insulation causes the resonance to decrease. Thick insulation was used in this example to illustrate its effect. The effect of "normal" insulation would have much less effect on parameters.

Wire Gauge:

The free space formula does not consider the effects of a dipole's wire gauge. Figure 6 shows that the gauge of the antenna wire does have a very minimum effect on resonance and impedance. The dipole's efficiency isn't affected by the normally used wire gauges.

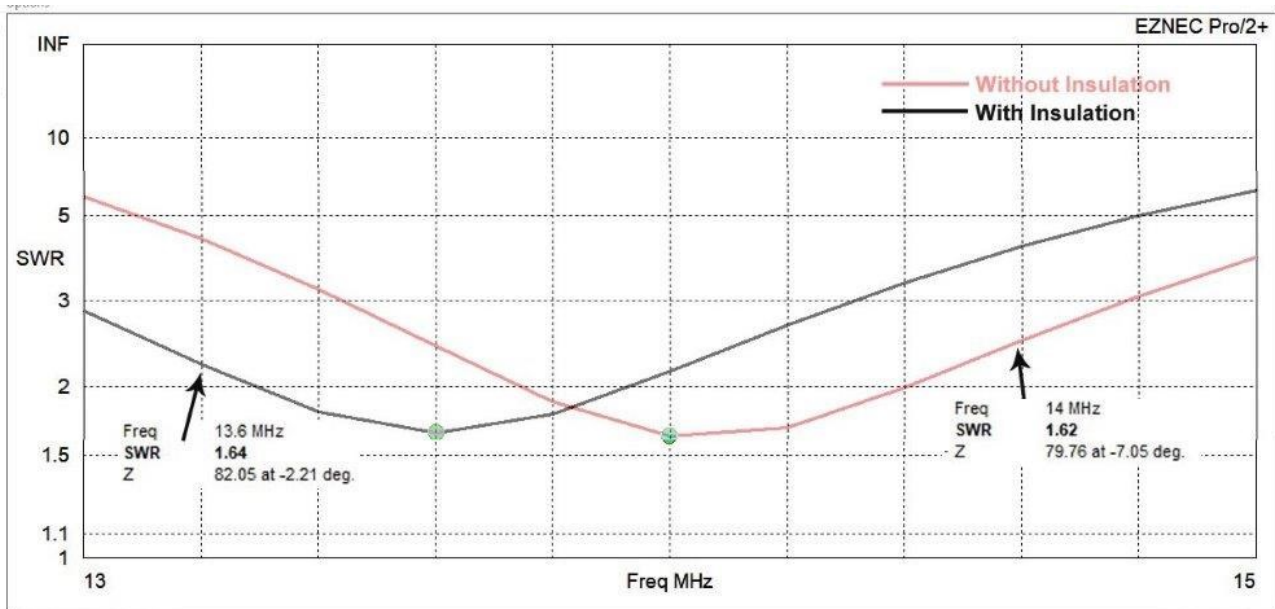


Figure 5 - Effects of insulation on antenna elements

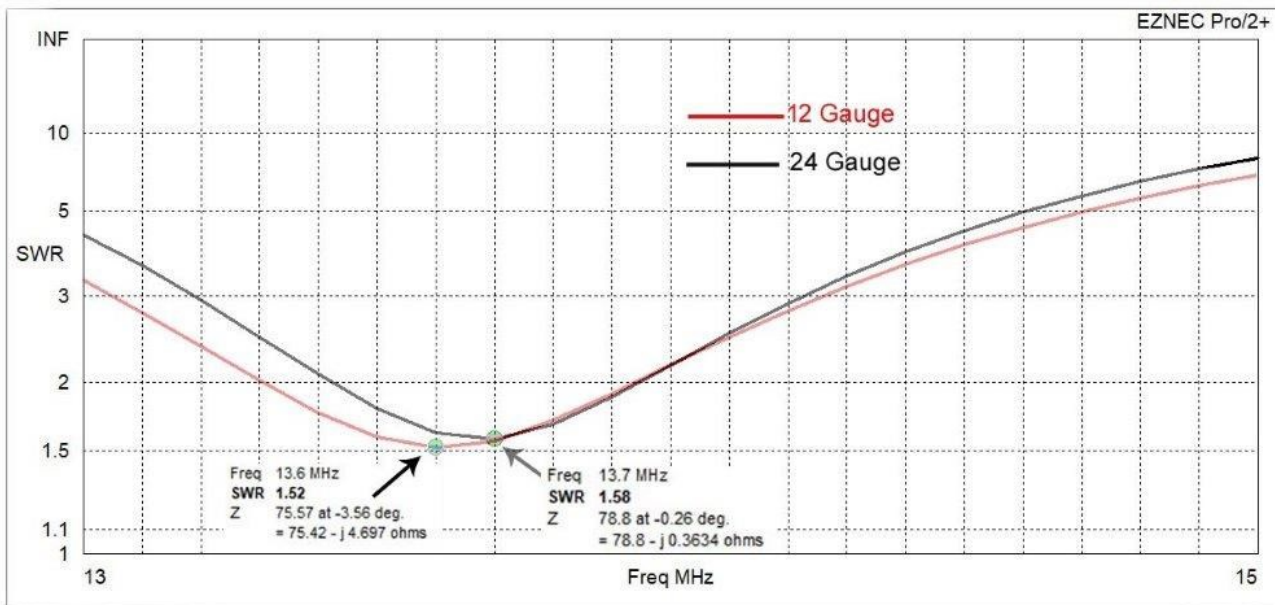


Figure 6 - Effects of antenna wire gauge

Efficiency:

On the earth, the dipole's efficiency and radiation patterns are influenced by factors such as ground losses, reflections, and the presence of nearby objects (earth, houses, trees, etc.)

Summary

As the figures with this article show, most of the earth's influences will cause a dipole's length to be electrically longer than calculated by the free space formula. This is handy since re-resonating will involve removing a little wire (better than having to add wire!)

Ground plane verticals were not discussed in this article. Verticals are not influenced as much as horizontal are by the earth. The ground plane's radials tend to mitigate the earth's effects depending on their length, their number, and their placement. [2].

This article discussed dipoles. However, the effects discussed above also apply to all the various types of antennas.

References

[1]. ARRL Antenna Book, 21st Edition, Chapter 2.

[2]. A Closer Look at Vertical Antennas with Elevated Ground Systems:

<https://rudys.typepad.com/files/elevated-ground-systems-article-final-version.pdf>

[3]. Antenna Near Field & Far Field Distance Calculator:

<https://www.everythingrf.com/rf-calculators/antenna-near-field-distance-calculator>

[4]. Antenna Fields:

<https://www.ad5gg.com/2016/09/21/antenna-field-regions/>

Note: The figures in this article were developed with EZNEC.

~ 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

DRC's Trading Post

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

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.

PAST ROUND TABLE PAGES

PROVIDED BY WOODY LINWOOD, W0UI

From the October 1960 edition.

BUY-SELL-SWAP

FOR SALE—Globe Chief 90A with companion plate modulator, \$70. Westinghouse 1/2hp-H.D. 110 v.a.c. motor, \$20. Winchester Model 12 shotgun, pump action, 30-inch full-rib barrel, with full grain cowhide case, excellent condition. Mark 218 20-power spotting scope with adjustable tripod, \$40 or trade for ham gear. Howard Eldridge, 3156 West 25th Ave. GE. 3-3892.

WANTED—Pair of 813a. Swap for 4-125a, 803a, or cash. G. W. Bordner, 7176 Jennie Dr., HA. 9-9137.

FOR SALE—Excellent condition, Genset Mobile Twins: G-66B, G-77. W0RQL, 7998 Chestnut Ave., Littleton.

FOR SALE—Morrow 5BR converter and fixed tuned receiver for mobile, \$65. PE-103, \$15. Limiting amplifier, \$10. Cabinet for 5" scope with tube, \$7.50. Disk recorder with many blank records, \$15. W0ICR, WE. 4-1458.

WANTED—RME HF-10-20 converter in good condition. Will pay reasonable price Charles Deisher, K0SJM, GL. 5-5462.

For Sale—Over 300 QST's Late 1939's through 50's. \$30 or 15 cents each. Also CQ's, Popular Electronics and Radio and TV news. Larry, W0DGG, PY 8-1561, 6007 S. St. Paul, Littleton.

FOR SALE—Viking II with VFO, \$20. NC 183 D Receiver like new, \$225. D104 Push to talk mike and stand, \$25. Don, K0CEQ, BK 6-2373

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Letters to the Editor

In behalf of the Fairplay Chamber of Commerce and myself, I would like to once again thank you for your amateur radio coverage of the Burro Race this year.

I am sorry I did not have time to meet and talk with you as I would have liked, but I was kept busy the entire day elsewhere.

Would you please pass the word along to the other "hams" of the wonderful job they did and the sincere thanks we send to them.

Sincerely,
 Harlan Bohl, Pres.
 Fairplay C of C
 ☉—☉—☉

Surplus Gear

Can you identify it mister?
 We hope so; ignorance is bluster!
 —☉—

Growing Pains

Know what happens to little hams who whine all the time?
 They become groan hams.
 —☉—

Highways or kc's

On women drivers—this simple clue
 Will make their signal plain to you
 When they wave their ladylike voice about,
 You know, beyond a shadow of doubt,
 They're planning on doing something?
 —☉—

Did U Know . . .

That experience is something that enables you to recognize a mistake when you make it again.
 —☉—

That while money's not everything, often it's reckoned as miles in advance of what-sorver is second.
 —☉—

That some YL's like the ham with a past, some like him with a future, but they all go for the man with a present.

SAMPLE MACHINE
and
AUTO BODY SHOP
 General Machine Work - - Complete
 Auto Body Repair Service
 NORV (K0IYC) and NORM
 3355 South Umatilla SU 1-1050

Page Ten

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
[Edmonton, AB Amateur Radio Club](#)



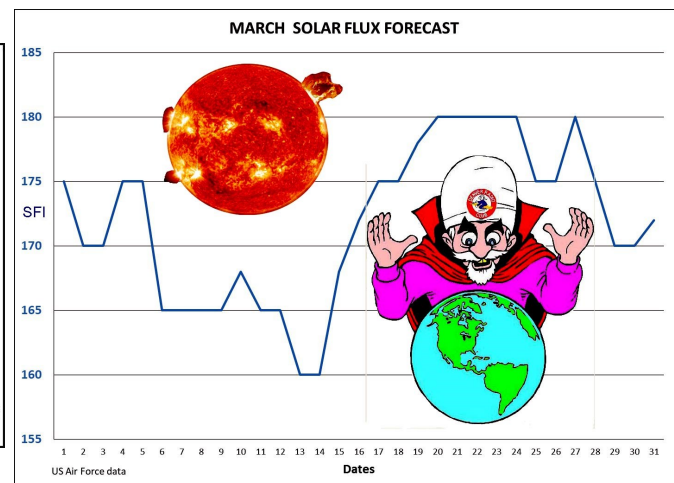
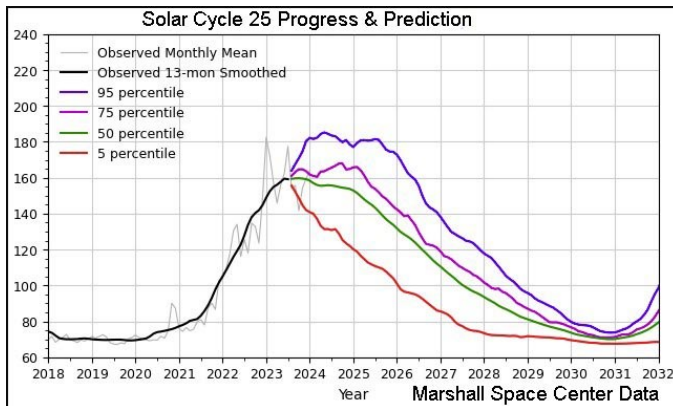
THE ROUND TABLE ARCHIVE AND ARTICLE INDEX
w0tx.org/roundtable

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



UPCOMING EVENTS
HAMFESTS & CONVENTIONS

Event	Date	Location	Sponsor Website
LARCFest	4/6/24	Boulder County Fairgrounds	w0eno.org/larcfest
Montrose ARC Tail Gate Party	6/1/24	Lions 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
Idaho	03/09/2024	03/10/2024	Idaho QSO Party	
Oklahoma	03/09/2024	03/10/2024	Oklahoma QSO Party	
Wisconsin	03/10/2024	03/11/2024	West Allis Radio Amateur Club	
Virginia	03/16/2024	03/17/2024	Virginia QSO Party	
Louisiana	04/06/2024	04/07/2024	Louisiana Contest Club	
Mississippi	04/06/2024	04/07/2024	ARRL Mississippi Section	
Missouri	04/06/2024	04/07/2024	Boeing Employees' ARS – St. Louis	

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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MARCH 2024							<i>DRC Net Sundays at 8:30 p.m. on 145.490 / 448.625 (no PL)</i>
Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
					1	2 ARRL DX - CW Begins 0000 UTC	
3 ARRL DX - CW Ends 2359 UTC  Last Quarter	4	5	6 Learning Net 7:30 p.m. 145.490 / 448.625 (No PL)	7	8	9	
10  DAYLIGHT SAVINGS TIME  New Moon	11	12	13 Learning Net 7:30 p.m. 145.490 / 448.625 (No PL)	14	15	16  First Quarter	
17 	18	19	20 DRC Monthly Meeting Elmer 6 PM Meeting 7 PM  <i>The First Day Of Spring</i>	21	22	23	
24	25  Full Moon	26	27 Learning Net 7:30 p.m. 145.490 / 448.625 (No PL)	28	29	30	

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

DRC BOARD OF DIRECTORS

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Board Member	WG0N	Dave Baysinger	303-987-0246	wq0n@arrl.net
Board Member	KB0CHT	Jeff Irvin	Check Roster	Check Roster

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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