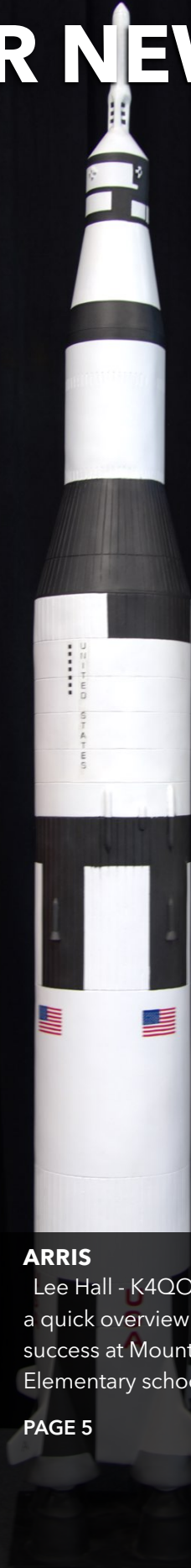




WX4CAR NEWSLETTER

MAY 2024 | ISSUE 9



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MESSAGE FROM THE PRESIDENT



Marty Buehring - KB4MG

This year has been really fantastic for the club! We continue to grow in numbers and we have accomplished a lot in the first part of this year. Be sure to continue the great job you have all done in welcoming new hams and new members.

Our ARISS event at Mountain View Elementary School was a huge success. **Cassie (KQ4JVI)** will give us the highlights at the May meeting. The CARS team did great work both leading up to the event and the day of. The ISS came over right on time and the students got to ask 12 questions of astronaut Jennette Eps. If you watched the live stream I am sure you saw the excitement. The event was featured in the ARRL eNewsletter for April 18th, in the "In Brief" section as well as the front page news in the Marietta Daily Journal. Congratulations to everyone who was part of this team.

We now have to turn our attention to Field Day. The theme for this year is "Be Radio Active", and will be similar to last year, but with some other surprises. Be watching the club website (www.wx4car.org) for

more information, as it become available. **Chad Cone (KY4KP)** will look to fill in gaps in the teams we need to staff this event. Consider how you will help.

If you have never been to an ARRL Field Day I urge you to attend. This is the premiere event for the club and is a chance to interact and learn from doing and from others. This club has a diverse set of skills which you can benefit from. The second biggest benefit is the camaraderie with the members. There is a good chance you will meet another ham with similar interests to yours and that you can share knowledge and experiences.



We have a more complex and useful project for people to build this year at Field Day. Most of you have seen the 4-output Anderson PowerPole distribution board. We have begun to order the parts and will assemble these in kit form. If we have a shortage of parts, we will focus on the single kits to be built on Field Day and deliver additional ones when parts are available, so be patient with us.

What do you want to do on Field Day? Do you have some specific goals in mind? As the plans are unveiled see where you can connect to fulfill your needs. Maybe it's to learn digital modes? Maybe

try your hand (pun intended) at CW? That is what this event is all about. Maybe you need help with your radio? We want to see as many members attend as we can this year.

SOAPBOX TOPIC

I feel strongly that hams need to be continual learners who sharpen both their operating skills as well as their technical knowledge. Why? To get the most out of this hobby I believe you need both. There are a growing number of what we call "appliance operators" out there that will be limited in their ability to fully enjoy ham radio as it was meant to be. This is a technical hobby and does require a technical test to get a license. If you go that far, it follows that you want to learn more.

At CARS we try to give you some technical training at every meeting. Some of it is geared towards operating, like POTA, and other lectures like the one on Radio Filters to give you the technical know-how to better use your equipment. If you feel at any time that a topic is over your head, then this is opportunity to dig deeper and try to understand the topic. Ask questions. Submit a question on the club email and we will answer you. Happy learning!

73,

Marty - KB4MG





THINGS I WISH I KNEW ABOUT ANTENNAS BUT WAS AFRAID TO ASK (PART 1)

By Tony Drake KC4OBY



As amateurs, we talk a lot. We talk about radios. We talk about propagation and band conditions. In this series of articles, we are going to talk about antennas.

One thing I have learned is that just because someone is talking about a topic, doesn't necessarily mean that they are qualified to talk about it. My goal in writing these articles is to change that.

I have been fascinated with antennas since I was first licensed in 1990. I have spent a lot of time reading, researching, modeling and talking to people who know a lot more than I do. The only thing people agree on is that they don't agree. I am going to attempt to distill that information in such a way that you will be able not only

to read the material, but understand it. If more explanation or clarification is required on a topic, or you have a question that isn't covered in the article, please let me know and I will do my best to address it.

START WITH THE BASICS

So, what is the best antenna? The answer is "it depends." Let's look at antennas through the lens of the classic dilemma of the radio amateur: if you can hear that station loud and clear, why can't you make contact? These articles will focus on one part of the question: antennas.

We need to start with some basic definitions, so we are all on the same page.

The **antenna system** comprises the entire set of components from the output of the radio to the end of the radiating element, that portion that sends and receives signals. We define **gain** as the relative increase in signal transmitted and received in a particular direction. **Polarization** is the orientation of the signal being

transmitted relative to the real ground. An **isotropic radiator** dispatches a signal in the shape of a sphere with equal intensity in all directions and has a net gain of zero. **Directivity** describes the radiation pattern of a given antenna.

POLARIZATION

Polarization is determined by the orientation of the antenna. Typical antennas can be either horizontally or vertically polarized. (For moon bounce or satellite communications we also have the concept of circular polarization, but that generally doesn't apply to terrestrial communications.)

In most cases, you want your transmitting antenna to have the same polarization as the receiving antenna and vice versa. This is why most VHF/UHF antennas for local (simplex/repeater/FM/Digital modes) use vertical antennas.

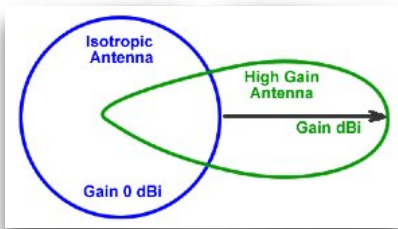
Antennas for high frequency (HF) can be either horizontally or vertically polarized. Polarization matters less in this frequency range because bouncing a signal

off the atmosphere can change polarization.

GAIN

Gain is the key metric that is used to measure antenna performance. Gain has an amplitude and a direction. Amplitude is measured in decibels (dB.) The direction is measured in degrees. Gain has to be expressed relative to something, such as an isotropic radiator (dBi) or a dipole (dBd).

An isotropic radiator is a theoretical antenna and a physical construct used to provide a reference for gain. The isotropic radiator has a theoretical gain of zero and radiates equally in all directions. This provides a convenient reference for directional antennas.



Antenna gain is measured in two dimensions. The azimuth plane is a circular slice in the horizontal plane.

If you picture an orange, when you slice it horizontally relative to the navel or stem (on the equator if you are thinking about a globe), this is the azimuth plane. The elevation plane is a circular slice in the vertical plane. If you have ever looked at the night sky, the azimuth is the direction you are facing, and the elevation is the angle that you move your head up and down to view the particular object you seek.

The difference between these planes becomes important when we look at an antenna's gain. To determine the gain, we have to know the polarization of the

antenna. The gain of a vertical antenna is measured in the elevation plane. The gain of a horizontally polarized dipole is measured in the azimuth plane. For other antenna types, and depending on ground characteristics, there can be radiation in both directions.

GROUND

There are few topics in amateur radio that are less understood than ground. One reason for that is that there are actually four common uses of the word "ground", and it can be hard to separate which one we are talking about. You can actually say "I got down on the ground to see where the ground wire was attached to the ground rod that I used to connect my antenna ground to the house ground", and be completely correct and well understood, but only by certain people.

To reduce the confusion, let's look at uses for the word "ground" in radio:

- Ground 1: the physical surface or terrain on which we walk and build stuff. "Real Ground" or "RG"
- Ground 2: Neutral Ground. This is the third wire (neutral) in alternating current (AC) circuits.
- Ground 2a: Direct current (DC) Ground: This is the negative pole of a DC circuit, typically the black wire. It doesn't mean anything for AC, as the polarity alternates between positive and negative.
- Ground 3: The RF Ground (RFG).

When talking about radio equipment in the shack, we primarily refer to numbers 2 and 2a above. When we discuss propagation, antenna performance and patterns, we refer to ground number 3, the RF

ground (RFG), which relates to number 1, the "Real Ground" (RG).

When discussing RFG, you are concerned about two things: height above RG and conductivity of RG.

RF Ground quality is determined by the conductivity of the real ground. Conductivity in water is due to its dissolved minerals and compounds. Conductivity in soil is a combination of the moisture content and the elements, compounds, and minerals present. For example, salt water is considered the best RFG, because the conductivity is very high. The opposite of this is distilled water, which, due to the purity of the water has very low conductivity.

Ground is important because it helps determine the performance of an antenna system. When we discuss one quarter-wave vertical antennas, the RFG forms a virtual "second half" of the antenna. When we discuss horizontal antennas including dipoles, the height above the RG determines the radiation pattern, and whether you will be communicating with the local area or long distances (DX).

It's a lot to take in with a single article. Next month, we'll take a look at the impact of frequency, takeoff angle and height above ground on antenna performance.

73,

Tony Drake - KC4OBY





STUDENTS ENJOY “OUT OF THIS WORLD” EXPERIENCE AT ARISS

By Lee Hall - K4QO



Students at Mountain View Elementary School in Cobb County had the experience of a lifetime in April when they had a chance to talk live to an astronaut aboard the International Space Station orbiting some 250 miles above the earth.



“We started this journey during COVID and [the students] have worked so hard, more than you can imagine,” said Cassandra **Zielinski (KQ4JVI)**, science teacher at Mountain View and CARS member. “People said they were too young, and they couldn’t handle it. Let me tell you, they can and they did.”

Zielinski and her students worked for more than a year to make this event happen. About 20 students ranging in age from kindergarten through middle school were selected to pose questions to astronaut **Jeanette Epps (KF5QNU)** during the QSO, which lasted about 10 minutes as the ISS flew overhead.

Several CARS members worked on the project as did members of the North Fulton Amateur Radio League (NFARL).



An effort is now underway to designate a school in Cherokee County for a future ARISS contact.



CHEROKEE AMATEUR RADIO SOCIETY

GEORGIA PARKS DAY 2024

By **CHAD CONE - KY4KP**

Our annual Georgia Parks Day POTA picnic, held Saturday April 6, was a huge success. Thirty-one members and family attended at Red Top Mountain State Park. As always, we had great food and fellowship.

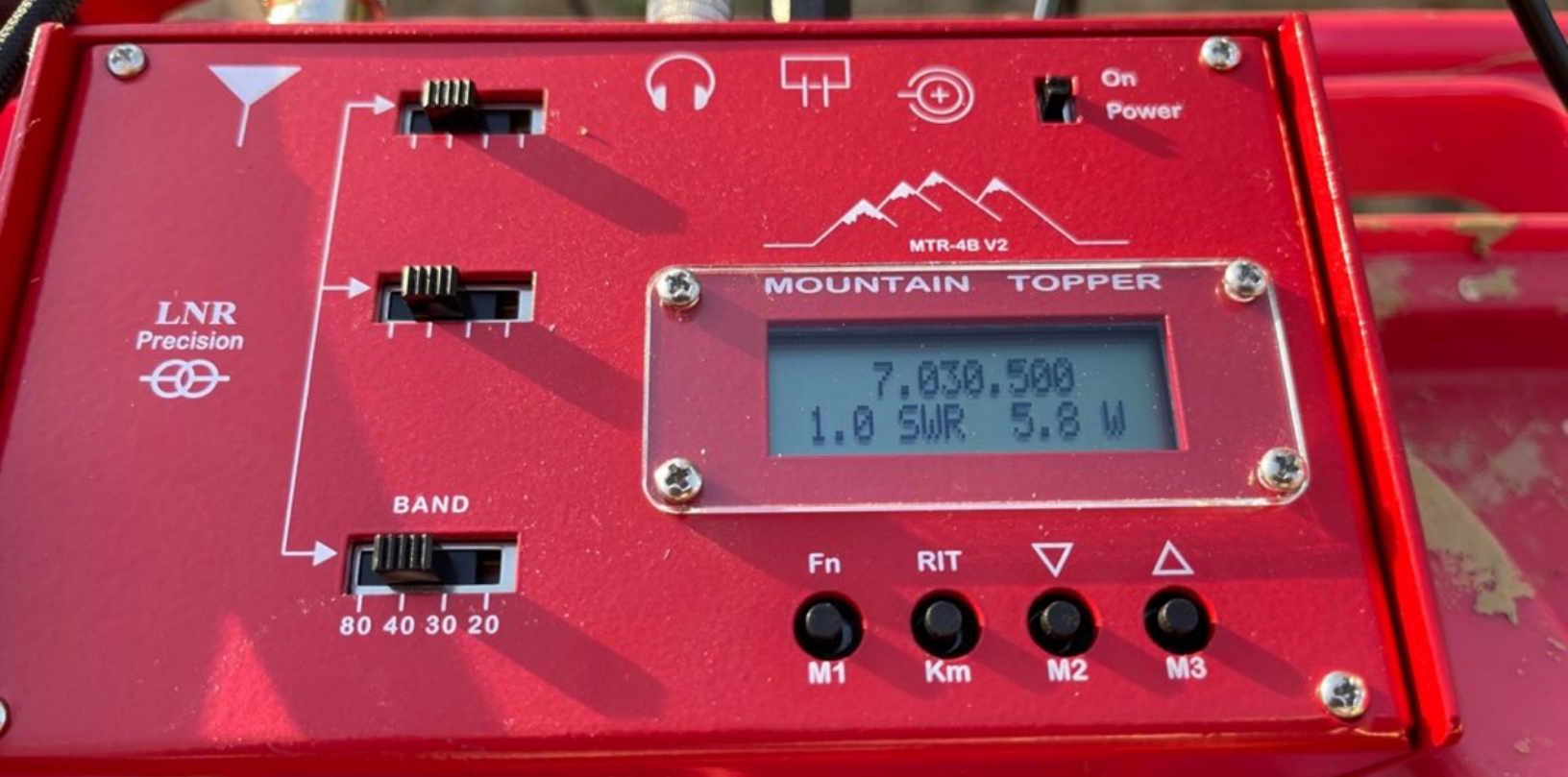
We operated from an end-fed half-wave antenna using several different radios. Thanks to everyone who brought a radio and jumped on the air to make contacts.

Several newly licensed members achieved their first HF contacts with one being DX. Operating on the 10, 15, 20 and 40-meter bands, we were able to get a

whole host of operators on the air. The combined club effort resulted in 713 contacts, 12 parks activated, 11 Georgia parks hunted, one park hiked and a final score of 9,366 points. Outstanding job, everyone!

Events like this are only possible with the planning, setup and execution from devoted members. Thank you for being the best part of CARS. Get involved and Get Active. Remember, Amateur Radio is a Contact Sport!





CHEROKEE AMATEUR RADIO SOCIETY

GEAR



By Dave Jensen - W7DGJ

Dave was first licensed in 1966 as WN7VDY (and later WA7VDY). Dave loved radio so much he went off to study broadcasting and came out with a BS in Communications from Ohio University. After working his way through the microphone business of Audio-Technica, he moved to Arizona and was later re-licensed as W7DGJ (Scottsdale). His column, Tooling Up, ran for more than 20 years in the website of the leading scientific journal, SCIENCE, and his column Trials and Errors: Ham Life with an Amateur continues to be a popular read each month on QRZ.com.

Read Dave's column at <https://www.qrz.com/trials-and-errors>

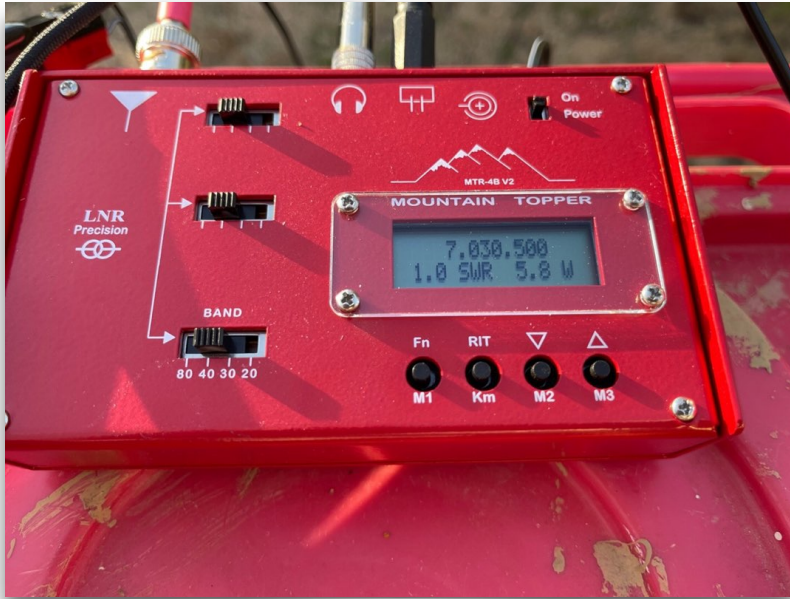
One thing I have always wanted to do is to put an entire station - radio, antenna, and key - into a package small enough that I can have it with me no matter where I go. Someone else may want to put that miniature station into a pack and climb to a summit. But for me, I'm just as often sitting in a hotel room or an AirBnB, wishing I had brought my ham radio gear along with me. I'd love to have my ICOM, but even my little Xiegu G-90 feels too cumbersome to have with me on trips like these.

My choice of radio for these scenarios is the Mountain Topper by LNR Precision. This radio fits in the palm of one hand and weighs less than eight ounces. It operates with five watts out on four bands (20M, 30M, 40M, and 80M) and has a feature set that you'd expect

to see on only a full-size radio. Are there compromises to get this into a package this small? Of course - but I've discovered nothing negative . . . certainly nothing with any impact on enjoyment. The Mountain Topper is simply a joy to operate.

Last field day I packed up a go-bag along with a 20/40M dipole. It fit into the glove box of my car, and leaves plenty of room whenever I toss it in my briefcase. In my column on QRZ I have occasionally spoken about the joy of QRP and how much it reminds me of fishing off the side of a bank with a worm and a bamboo rod. This radio is the perfect rod/worm replacement for "fishing" with a radio no matter where you are headed.





I didn't have much time to review the well-done PDF manual available on the LNR website before I took off for a park in the far south of Scottsdale, about 45 minutes from my home. I decided to explore the radio on my own (sans manual) and didn't think I could screw it up too badly by winging it. It's funny how QRP radios either attract attention or other hams don't have a clue what you would do with such a tiny signal . . . I got a few glances from other amateur operators (it was Field Day) but for the most part all the attention was focused on the legal limit setup going out of a huge Yagi that another ham had brought along on a cherry picker up 40 feet. So, I grabbed my tiny go-bag and set up quite a distance from the other radios.

When I plugged in ear buds to take my first listen, I thought something was wrong. I knew that there is no volume control on the Mountain Topper (one compromise made to keep it small and light) and assumed the worst. I had heard the startup sound (a CW signal telling me what band I was on) but nothing

else. Then, as I tuned up a bit, a signal came blasting in, so clear and loud. . . it completely surprised me as it came from a non-existent noise floor. The problem for me wasn't a lack of volume . . . it was the fact that I am so used to turning up the gain to hear the whoosh of band noise. When CW signals began playing in my ears, I reminisced about times in my life when I haven't had to contend with noise at 4-5 on my S-Meter.

The power supply I brought along with the Mountain Topper was a small Bioenno battery pack with 12-volt output. The radio offers fantastic flexibility for power supply voltages and will work with anything from 5.5v to 13v. It also works great with a standard nine-volt smoke alarm battery. The radio put out 5w into a perfect SWR on the resonant antenna. I enjoyed going up and down the CW segments of both bands and always noted the

"I VERY MUCH LIKE THE HIGH-QUALITY MACHINED ALUMINUM CASE AND THE BACKLIGHTED 2-LINE LCD SCREEN ON THIS DEVICE"

match on the Mountain Topper's SWR readout.

As I began pecking away, I realized how slow I had become on a straight key and wished that I had brought along a working paddle (my SKCC credentials should be revoked.) My first QSO on the rig was with a ham in Bartlesville OK, over 1000 miles on 5w. It is worth noting that in most of my QSO's that day I was heard. There were very few CQs that I responded to where I was not heard, despite my 4-5 watts. They may have been 449 signal reports, but I was heard and understood, despite my rather sketchy straight key fist.

I very much like the high-quality machined aluminum case and the backlighted 2-line LCD screen on this device, as so often QRP radios have cheap plastic cases and simple LEDs to tell you what's going on. In this case, even in the dark I was able to see what kind of power I was putting out, my frequency and my SWR. Changing bands is easy, with all four accessible by heavy duty slide switches on the front and a corresponding CW beep that tells you what band you're on (plus, you can see your frequency on the screen).

Additional features you don't usually see on a radio of this price or size would be RIT operation and three Morse code

memory functions. The Mountain Topper MTR4B was designed by Steve Weber, famous for his QRP radio designs over the years. In my rating system, I rate Build Quality and User Experience. The Mountain Topper is one of those rare products that gets an A+ in both categories.



ASK THE EXPERT

By Marty Buehring - KB4MG

Question: Why do HF (160-10 meters) signals fade in and out when I am communicating?

Answer: To answer this question it helps to understand a little bit about HF propagation. There are three ways in which HF signals propagate; 1) line of sight, 2) ground wave, and 3) sky wave. Depending on which of these you are using, fading will be negligent or dominant.

Line of sight is what it implies. The transmitter and receiver are in clear line of sight of one another. This is very limiting for HF and rarely used. This is however the case with VHF and UHF because of how these frequencies behave versus HF. Typical distances are less than 50 miles and require antennas to be high up. There is no fading of signals, unless there is some ground-level interference.

The ground wave method, also called surface wave, is mostly dependent on the terrain and the makeup of the ground it is traveling across. Interference by the ground causes the wave to tilt and follow the curvature of the earth

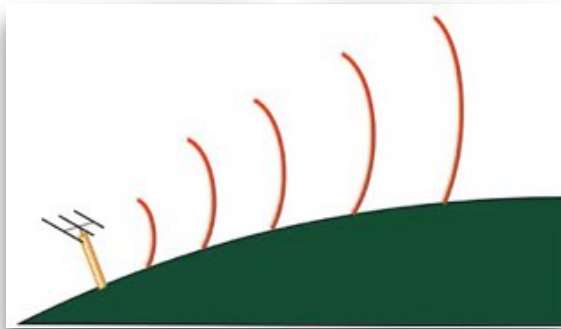


Figure 1 - Ground wave

for some distance. See figure 1. The distance it can travel is highly dependent in the conductivity of the "ground" below it. Hard and rocky ground does not work very well. Salt water on the other hand, works very well. This actually works pretty well for ship-to-shore and ship-to-ship communications. It also depends on frequency and works best with lower frequency. For example, for the 40 meter band a 150 watt transmitter could reach 35 km over land, but 250 km over salt water. If we raise the frequency to the 10 meter band, it would only reach 13 km over land and 107 km over the salt water. There is also very little, if any, fading of ground waves.

The sky wave is a completely different animal. This type of propagation uses the ionosphere to send signals back to earth. See figure 2. Most diagrams depict this by showing what looks like a reflection of the signal. Because of the scale of diagrams, it is not possible to show what is really happening here, which is refraction (a bending). This refraction is dependent on the ionization level in the atmosphere, which is dependent on space weather. The different layers also have varying degrees of refraction. This is also sensitive to the frequency used and the height of the antenna. A higher antenna has a lower incident angle (also called take-off angle) and will have better distance. The downside will be a larger "skip zone" as seen in figure 3.

The sky wave is a completely different animal. This type of propagation uses the ionosphere to send signals back to earth.

Skip zones are where no signals of any of the three types can be received. It is common to have a zone like this of hundreds of miles. In my case, my skip zone is pretty much the entirety of Alabama and Mississippi, going to the west. I talk to Texas just fine.

So now that you have a better understanding of the types of propagation, why do we hear signal fading?

The ionization layers are caused by the sun's flux striking the ionosphere and freeing electrons from atoms of the gases in the upper atmosphere. These "free electrons" provide what is needed for refraction to take place.

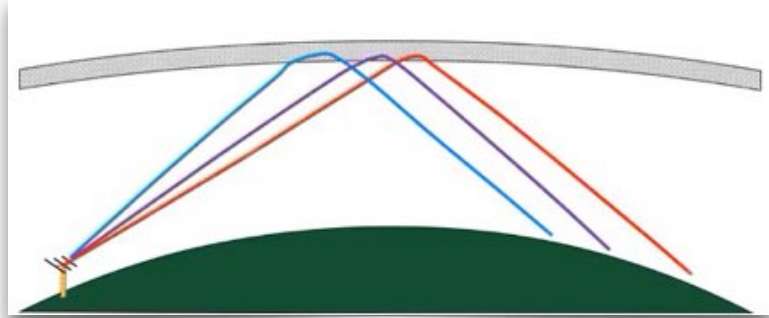


Figure 2 - Refraction of HF waves



When trying to understand propagation it is important to look at the solar data and see what the Maximum Useable Frequency (MUF) is for the day you want to operate. If you try to use a band that exceeds the MUF, it will not be refracted. So, in other words, don't waste your time with it.

The SFI (solar flux index) and Sunspots (SSN) are a good indication of the amount of ionization taking place. The higher these numbers, the more flux that is available for ionization. There are other factors beyond the scope of this answer, but in general, you can look at these numbers to help understand current conditions.

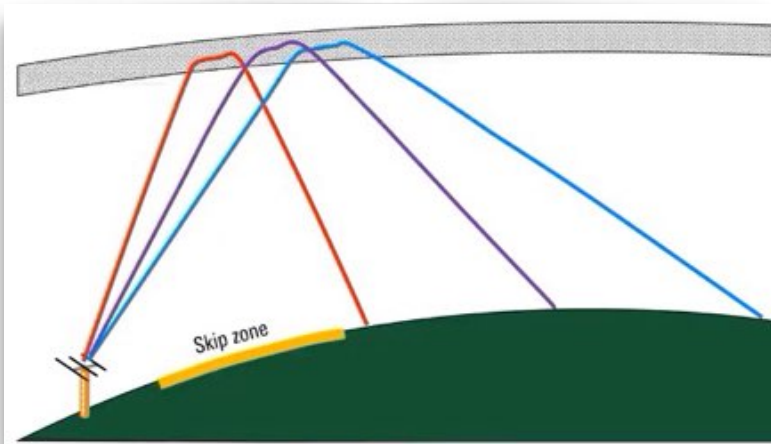


Figure 3 - Skip zones

So, why fading? Well, imagine that the flux coming from the sun is not constant, but comes in waves of increasing and decreasing intensity. This is what you are hearing on your radio when signals suddenly fade or even disappear. Sometimes you can just wait a short time (8-10 minutes or maybe longer) and signals will come back just as strong. This changing intensity affects both receive and transmit signals.

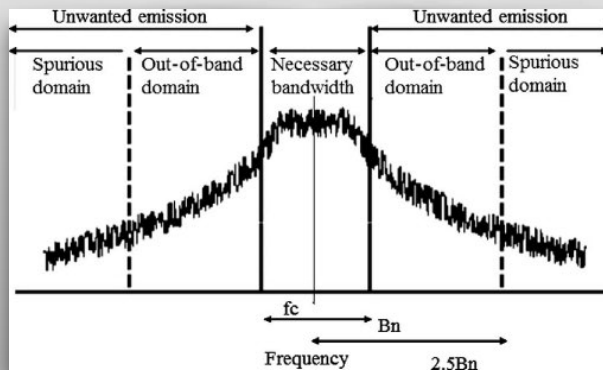
In other cases, there may be a solar storm (CME's and flares) in the process. In the worst cases, it will cause a radio blackout and you may not hear anything for a day or more! Eruptions on the sun hurl high energy particles towards the earth and overwhelm the radio signals by upsetting the ionosphere. These are rare and you can freely find the information about them on the Internet.

A good forecast resource can found at : www.spaceweatherwoman.com from Dr. Tamitha Skov.

Hopefully that helps explain why signals fade and how they propagate.

OUT OF THE POOL

Random questions floated from the Element 4 Extra Class license pool. Please note that the Extra pool is being revised and a new updated pool will be released July 1, 2024.



Which of the following constitutes a spurious emission?

- A. An amateur station transmission made without the proper call sign identification
- B. A signal transmitted to prevent its detection by any station other than the intended recipient
- C. Any transmitted signal that unintentionally interferes with another licensed radio station
- D. An emission outside the signal's necessary bandwidth that can be reduced or eliminated without affecting the information transmitted

Answer: (D)



CONTESTING

CONTEST CORNER

MAY 2024

INDIANA QSO PARTY

1500Z May 4th to 0300Z May 5th

DELAWARE QSO PARTY

1700Z May 4th to 2359Z May 5th

NEW ENGLAND QSO PARTY

2000Z May 4th to 0500Z May 5th

VOLTA WW RTTY CONTEST

1200Z May 11th to 1200Z May 12th

CANADIAN PRAIRIES QSO PARTY

1700Z May 11th to 0300Z May 12th

UN DX CONTEST

0600-2000Z May 18th

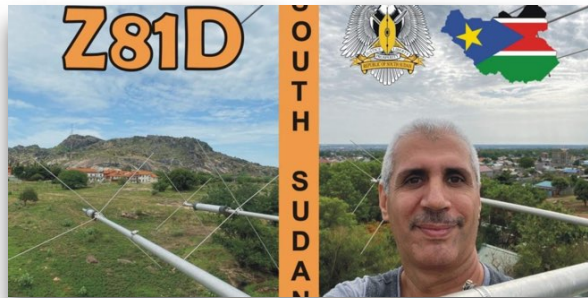
CQ WW WPX CONTEST, CW

0000Z May 25th to 2359Z May 26th

DXPEDITION NEWS



3G0YA Easter Island 160-6m SSB, CW, Digi -Thru May 6th



Z81D South Sudan 40-6m SSB and ft8 - May 2024



9X2AW Rwanda 160-10m SSB, CW and DIG - May 2-17





RESOURCE LINKS

Website - <https://www.wx4car.org>

Contact Us - <https://www.wx4car.org/contact-us.html>

Membership - <https://www.wx4car.org/membership-form.html>

CARS Club Technical Programs - <https://www.wx4car.org/technical-monthly-programs.html>

Club Activities - <https://www.wx4car.org/club-activities.html>

POTA Corner - <https://www.wx4car.org/pota-corner.html>

ARRL FIELD DAY - <https://www.wx4car.org/field-day.html>

Ham Fests - <https://www.wx4car.org/amateur-radio-events.html>

CARS Groups.io - <https://groups.io/groups>

ARRL Testing Info - <https://www.wx4car.org/testing2023.html>

New Ham Kit - https://www.wx4car.org/uploads/8/3/7/7/83773582/wx4cars_intro_to_new_hams-7apr2021.pdf

Ham License Upgrading - <https://www.wx4car.org/obtaining-a-license.html>

Technician Ham Cram Study Guide - https://www.wx4car.org/uploads/8/3/7/7/83773582/2022-2026_technician_pool_study_guide.pdf

Club Apparel - <https://www.hamthreads.com>

CARS Club Badges - <https://www.thesignman.com/clubs/carsga.html>

POTA Supplies - <https://www.clubgearonline.com>

CONTESTING LINKS

ARRL Contest Calendar - <http://www.arrl.org/contest-calendar>

Contesting Calendar - <http://www.contesting.com/>

CQ Contest Calendar - http://cq-amateur-radio.com/cq_contests/cq_annual_contest_calendar/

SolarHam Site - <http://www.solarham.net/index.htm>

Space Weather - <http://www.spaceweatherwoman.com/>

Contest Calendar - <https://www.contestcalendar.com>

OTHER LINKS

ARRL - <http://www.arrl.org>

Sky Warn - <http://skywarn.org>

QSO Today - <http://qsotoday.com>

Cherokee EMA - <http://cherokeega-ema.org>

Georgia ARES - <https://www.gaares.org>

Ham Radio Work Bench - <http://hamradioworkbench.com>

On All Bands - <https://www.onallbands.com>





MISSION STATEMENT

The mission of the Cherokee Amateur Radio Society is to promote the hobby of amateur radio to the Cherokee County residents and surrounding communities. It primarily serves to provide education, FCC testing, public service, and fellowship to people with the common interest of amateur radio.

Cherokee Amateur Radio Society is an organization of FCC licensed amateur radio operators (also called Hams) that meet and share the hobby, educate people about amateur radio, as well as support our local community in times of disaster. We are located in Cherokee County, Georgia and have club call sign WX4CAR. We are an ARRL Affiliated Club.

The club also participates with ARES, and the Cherokee County EOC when severe weather gets close to the area, and we help with local public service projects. The members of the club also dedicate some of their time to promote and help new hams to develop their skills and knowledge on Amateur communications modes and to be better operators. We are a very active club and participate in ARRL Field Day every year. If you are located in Cherokee County or the surrounding area, we would like to invite you to participate.

CARS OFFICERS FOR 2024:

President: Martin Buehring - KB4MG

Vice President: Chad Cone - KY4KP

Secretary: Mark Schulze - KO4IFY

Treasurer: James James - KE4HMS

Cherokee County Emergency Coordinator:

Rob Bruderer - W1JKU

Email: club.wx4car@gmail.com

Time & Location of Meetings:

Meetings are the second Saturday of each month at 10:00 am Eastern Time.

**William G. Long Senior Center
223 Arnold Mill Road
Woodstock, Georgia 30188**

Our meetings are open to all visitors. You do not need to be a member or have a license to attend. Come for the fellowship and technical programs. We also have a combined ARES meeting at the same time. ARRL FCC Testing is at 1:00PM following the meeting.

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