EARS Newsletter

Welcome to the EARS, (Emerald Amateur Radio Society), newsletter. This newsletter is a collaborative on-line effort. Each area is updated by by the listed individual in realtime. All updates should be completed no later than a day or so prior to our meetings, which occur on the third Tuesday of each month. <u>See our calendar</u> for more information on meetings and club events.

Given this is an on-line newsletter, updates can come at any time! Just check back in and look for the last updated date in each section. We hope you enjoy this newsletter. If you have suggestions please send them to newsletter@emerald-ars.us.

President's Notes

by Jeff, NT7B.

Welcome to the Newsletter

I'm sure the club has produced a newsletter at some time in the past, but it's been long enough that it seems like an all-new venture for me. I hope to contribute something interesting to read in another issue, but for now I'm content with putting out a huge "**Thank You!**" to NK7Z for assembling the web page and the members contributing content for all to enjoy. We're fortunate to have club members with so much knowledge and experience with so many of the different niches within the Amateur Radio Service.

Meeting Agenda for June 21, 2002

EARS Meeting Agenda, June 21, 2022

Call to Order and President's Opening Comments.

Roll Call / Introductions.

Program: To be announced. Bob's Tower Project presentation has been postponed.

Announcements.

Minutes of May meeting.

Reports: Treasurer, Volunteer Examiners, EARS Net.

Membership Readings.

Old Business:

- Getting the shack EmComm ready: Where are we with computers and setting up HF packet? We have a VHF packet / WinLink setup with the old laptop and Kenwood, but does anyone remember how to run it?
- Repeater Update
- Memorandum of Understanding with the city
- Cascadia Rising 2022

New Business:

- Programs for future meetings
- Website
- Sea-Pac reports

Good of the Order, Brags, Etc.

Last Updated on June 23, 2022 by Web Manager

502 total views, 8 views today

Vice President's Notes

By Doc, W7DOK.

Summer Heat

HEAT Wave! Here we are in Mid Summer with unseasonal heat in our area. Good time to be inside addressing some of those radio projects you've been meaning to get to and just couldn't find the time. All of us have those little projects that we just can't seem to get to. How about operating projects and explorations? Many of us have not branched out to Digital operations or some of the newer modes. Might be a good time to study up, solicit the help of an elmer, and step outside your comfort zone. As a club, we have a service project you'll be hearing more about in time and there will be opportunities to offer some time to those who have served our country. It seems odd to think about or even mention, but we all know it to be true, before we can blink it will be fall, then winter and our time and attention will be drawn to the Holidays. So, fellow HAMS, lets make the most of this summer and get involved in our Hobby to the fullest extent we can. Stay safe and well and remember you are the magic ingredient that makes our club unique. Plan on inviting a friend to our meetings and watching your club GROW.

See you on the air. 73, Doc

Last Updated on July 27, 2022 by Doc, W7DOK

Meeting Notes

By Ken, KG7QPL.

Looking for an Opportunity to Connect?

EARS has several regular meetings and other chances for you to join in and get connected!

- Monthly Club Meetings: 3rd Tuesday of each month, 7 PM, Springfield Justice Center
 - NOTE: August 2022 Club Meeting will be held on 8/23/22, 7 PM, Springfield Justice Center
 - For a summary of our past meetings and links to some of the presentations, see our <u>Past Meetings</u> page.
- Weekly Nets: Weekly on Thursdays at 7 PM at 146.74 MHz (EARS repeater)
- Monthly VE sessions: see the VE section of the newsletter for details
- Monthly no-host Breakfast: 1st Saturday of each month, 10 am, Brail's Restaurant in Eugene

Check out the <u>Calendar</u> page for any changes to the meeting times or locations.

EARS Net Reports (146.74 MHz):

 7/7/2022, 1900: Net control: KG7QPL; Check-ins (6): KJ7CNJ, W7DOK, KC7RJK, AD7Z, NK7Z, KJ7MQA; Traffic: KJ7MQA would like to borrow a vacuum tube tester 7/14/2022 1900: Net control: KG7QPL; Check-ins (7): KJ7CNJ, W7DOK, K7KRA, NT7B, AD7Z, W7CN, NK7Z; Traffic: Reminder next Club Meeting on 7/19, with AD7Z presenting on installing 70 ft. tower; Encouraging others to come to VE sessions; First Annual High Desert Ham Fest on 10/1/22 in Redmond, OR – for details: https://www.hidarg.org/.

July 2022 EARS Breakfast:

We had another great turnout for breakfast this month with 1 former and 7 current members in attendance! Between the food and the conversation, a great time was had by all! We hope to see you at the next breakfast on August 6!

Want to Join the EARS Club?

<u>Click here</u> to learn how to subscribe to our email list or to obtain a membership application.

Last Updated on July 27, 2022 by Club Secretary

452 total views, 9 views today

Volunteer Examiners Reports

By Bob, AD7Z, and Peter, N7IY.

Latest Exam Results:

Our July test session is now in the books. This month we tested three candidates and a total of five tests were given. Our candidates were from Eugene, Corvallis, and Albany.

Two candidates came to take their Technician class exams and the third the Extra class exam. All candidates passed the exam they came for. Both the Technician class attempts being successful, they opted to take the General exam as well. Unfortunately, they need to study a little more for that next upgrade. The good news... when they return to upgrade they won't be paying the FCC fee again!

We were well supported by our Volunteer Examiners and a great THANK YOU to all of them. Those of you who may be interested, here is a short list of some of our more active examiners and the number of exam sessions they have contributed to over the past few years:

Peter, N7IY – 216 Sessions; Bob, AD7Z – 144 sessions; Dave, NK7Z – 95 sessions; Howard, WX7HS – 78 sessions; Michael, W7CN – 69 sessions.

There are others but these are our most active members and examiners. If you are a General class, Advanced, or Extra class license holder you can receive accreditation from the ARRL by passing an open book exam. The service of providing examinations for aspiring Hams is very rewarding and well worth the effort. Nothing feels as good as seeing someone grinning as they are told they PASSED the test.

If you want to get your VE accreditation you can find out all about it here: http://www.arrl.org/become-an-arrl-ve , it is well worth it.

That's it for this month. I hope you will join us at a meeting or exam. Be well.

73, Bob AD7Z

Last Updated on July 30, 2022 by Bob, AD7Z

Digital

By Howard, WX7HS.

WSJT-X and FT8: Timing is Everything

There is an old saying that many things in life are all about timing. When using WSJT-X and its digital modes such as FT8 and FT4, timing is critical. What is meant by timing is that the computer you are using for WSJT-X must be synchronized with Coordinated Universal Time (UTC).

Computers typically use "Network Time Protocol" (NTP), a networking protocol, for clock synchronization between computer systems over packet-switched, variable latency data networks. In operation since before 1985, NTP is one of the oldest Internet protocols in current use. NTP is intended to synchronize all participating computers to within a few milliseconds of UTC.

When using digital modes such as FT8, your signal is sending packets of information to a receiving station and the station you are having a QSO with is in turn sending information packets to your personal computer (PC). In order for each station to communicate with each other, each PC must be time-synchronized 2 seconds (plus or minus) of UTC.

So why is this issue being brought up since PCs are supposed to keep track of time? This issue is highlighted because PCs are notoriously bad at keeping the correct UTC and will not meet WSJT-X time synchronization requirements. Fortunately, there are several software solutions that will automatically update a PC's UTC. Most of these solutions

require an active connection to the internet which allows the program to obtain the current UTC from a NTP server.

The most popular UTC time synchronization software programs for Windows operating systems include Meinberg and TimeSync and are "freeware." Meinberg is available at <u>meinbergglobal.com</u> and TimeSync can be downloaded at <u>http://timesynctool.com</u>. Both of these programs run in the background and will automatically update the PC's UTC. For PCs running MacOS, TimeTools offer a freeware program downloadable at <u>timetoolsltd.com/NTP/NTP-Client/</u>. Installation instructions are available on each website.

As previously mentioned, these programs require an active internet connection. However, the software program JTSync allows the ability to synchronize a PC's UTC without an internet connection by using decoded WSJT-X QSO time stamps. This software is especially useful when operating remotely without an internet connection during Summits on the Air (SOTA) and Parks on the Air (POTA) activities. JTSync is available at <u>http://dxshell.com/JTSync.html</u>. This application only runs on Windows OS.

Next month's edition will discuss various QSO logging programs that are known to seamlessly integrate with WSJT-X and with on-line logging systems including ClubLog, Logbook of the World-LOTW, and QRZ.

Good DX de Howard WX7HS

Last Updated on July 11, 2022 by Howard, WX7HS

437 total views, 8 views today

DX & Contesting

Propagation, part II

"The Sun, and the Ionosphere"

Overview



The Sun, image credit: NASA, GSFC, SOHO, ESA

The sun is a gigantic, continuously running nuclear fusion reactor, 93 million miles away. It is so far away it takes the light from the sun eight plus minutes

to reach Earth. Yet, that light from the sun can still cook the skin right off your shoulders if you are not wearing sunscreen. That energy also can create complex chemical reactions in the ionosphere, that allow radio waves to be refracted, absorbed, or passed, thus allowing us to work DX, or closing the bands. Clearly the sun is delivering quite a large energy punch to the earth's upper atmosphere, and just as clearly that energy punch is changing how the ionosphere refracts radio waves.

Just how much energy? There is a number scientists call "total solar irradiance", that number is a measure of how much energy the sun delivers to the top of the earth's

atmosphere, in watts per square meter, with the sun directly overhead. A square meter is about three feet by three feet. In a single square meter, the latest NASA satellite missions have measured total solar irradiance at around 1360 watts. For comparison purposes, your microwave oven delivers around 1000 watts into the cooking chamber. Now imagine how many square meters there are across the top of the atmosphere– that is a lot of energy being pumped into the ionosphere. How much energy? <u>Around 52,000</u> terawatts...



Daytime



Ionospheric refraction, image, courtesy NASA

ionosphere to form up each morning. During the day, the upper atmosphere is absorbing vast amounts of energy from the sun,via IR, UV, X–Ray, Gamma Ray, and the solar wind. That amount of energy is enough to start knocking electrons from the outer shell of any number of different compounds all up and down the upper atmosphere. Those knocked off electrons are called free electrons, and hold a net negative charge, while the atoms

That 52,000 terawatts, (yes terawatts), of energy, being sprayed across the entire sunlit side of earth's upper atmosphere, is what causes the that have had electrons knocked off, are called Ions, and hold a net positive charged. If you remember from Part I, free electrons are responsible for the bending, or refraction, of RF signals. Usually a downward refraction causes Skip, or DX, and an upward refraction launches our signals into space.



Nighttime

At night, the sun is no longer dumping those terawatts of energy into the upper atmosphere, and the chemical reactions that begun during the day, start to undo themselves due to reduced energy in the upper atmosphere. Remember the atoms that lost electrons, and became ions during the day? Those atoms have a net positive charge, and are still floating around the upper atmosphere, looking for ways to become neutral. How does an ion become neutral? One way is to absorb or eject an electron, or two, to get to net zero charge.

Back to what happens at night – as the sun sets, the energy feeding the upper atmosphere starts to decline, when the energy level is low enough, the negatively charged electrons are able to reattach themselves to the positively charged ions, and they recombine, forming a net neutral atom again. This process is called recombination. The process described above, is why the ionosphere forms up during the day, when large amounts of energy are stripping electrons off atoms, and dissipates at night, when the free electrons can recombine.



Layer up



Looking at the image to the left, you will see a red line running vertically. That red line indicates electron density, (increasing electron density is to the right, decreasing to the left), verses altitude.

You can see that the electron density changes with altitude. When the density increases rapidly, and then decreases, that is called a layer. The ionosphere consists of four layers, the D, E, F1, and F2 layers. Why different layers and densities? Different chemistry at different altitudes, combined with varying amounts of energy at different altitudes, all changing as the day progresses conspire to create the ionosphere.



Layer behavior



Each layer behaves differently. Each layer can, refract, absorbe, or pass a radio wave at some specific frequency and approach angle. As an example let's look at the D layer, and 80

Ionospheric layers, Credit-NASA's Goddard-Space-Flight-Center/Mary-Pat-Hrybyk-Keith

meters. The D layer absorbs radio waves at 3.5 Mhz., or 80 meters, so when the D layer forms up during the day, you lose refractive sky wave propagation on 80 because the D layer absorbs the radio waves at 80 meters. At 20 meters however, the D layer is transparent, so radio waves at 20 meters pass right through the D layer, and are able to hit the more ionized F1 and F2 layers where they are refracted back to the earth's surface, and appear as DX.

Conversely at night, (when the D layer recombines and dissipates), that absorption on 80 meters ends, and the 80 meter radio wave is now able to travel higher into the atmosphere, and see the F layer, where they are refracted back to the earth from a higher point, which allows the signal to travel further, thus DX on 80 "goes long" in the evenings. This is why you will hear short range signals, (30 to 200 miles), during the day on 80, and longer range signals, (200 miles and longer), at night.

The D layer is the lowest layer, and forms up only during the day. It is 35 to 70 miles above the earth's surface, and has several sublayers, each being affected by different energy events. The D layer forms up at sunrise, and dissipates at sunset.

D layer from 40 to 50 miles up

Starting at 40 miles above the earth's surface, is a 10 mile wide band, between 40 to 50 miles. This band is primarily ionized by galactic cosmic rays.

D layer from 50 to 55 miles up

Between 50 to 55 miles high represents a 5 mile thick band of ionization. This band is formed primarily by Lyman Alpha line radiation.

D layer from 55 miles and higher

Yet another band about 5 miles thick exists starting at 55 miles above the surface of the earth, ionization in this band is caused primarily by <u>hard X-Rays</u>.

E layer

60 to 75 miles up the E layer exists. The E layer is roughly 3 to 6 miles thick, and it is primarily ionized by <u>soft X-Rays</u>, and Extreme Ultraviolet, also known as <u>EUV</u>. During the day, the D and E layers are practically the same. The E layer is more highly ionized at local noon than any other time. The E layer ionizes quickly at sunrise, and dissipates just as quickly at night. There were experiments in the 80s, indicating that the E layer does not totally dissipate at the peak of a sunspot cycle.

F layer

Starting at around 95 miles up, you encounter the F layers. The E layer is ionoized by EUV, or Extreme Ultraviolet light. During teh daytime, the F layer splits into two layers, the lower, (95 miles high), F1 layer, and the higher, (125 mile high), F2 layer.

The F1 layer is quite weak, and, like the E layer, plays little role in propagation of RF. The F1 layer hits peak ionization at around local noon, when the sun is at it's highest point in the sky. During winder the F1 layer and the F2 layer merge. This merging is due to lower energy input into the upper atmosphere. The F2 height can vary between 100 and 300 miles, depending on season, and solar conditions. The recombination of electrons and ions in the F2 layer happens slower than in any other ionospheric layer, hence, the F2 layer can, and does last all night a lot of the time. The F2 layer is the most highly ionized layer of all, and as such, plays the largest role in refracting RF signals back to earth.

Layer commonalities

Each layer can either absorb, refract, or pass radio waves, depending on frequency, and angle of incidence to the specific layer. Each layer is affected by the energy impinging upon it, and each layer is affected by the type of atoms in the upper atmosphere. Each layer is profoundly affected by solar events.

Conclusion

We have learned from Part I what the ionosphere is, how it is created, and destroyed, and how it can affect radio propagation. Part II, has covered how the ionosphere is affected by the sun's energy, and what changes take place between day and night. Part II has also covered how layers are formed, and what happens between daytime and nighttime to each layer.

Next Month

Parts I, and II, have been written with the intent of getting you familiar with how the ionosphere operates day to day, Next month, I will cover day to day changes in propagation, based on the changes we learned about in parts I, and II.

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Last Updated on July 3, 2022 by Dave, NK7Z

526 total views, 10 views today

Thank you!

...for taking the time to read our newsletter. For more information on EARS, <u>click this</u> <u>link</u>. We hope you have enjoyed your stay with us, and please check this page often, it is updated in real-time, and articles, can come and go at a moments notice...

Last Updated on July 11, 2022 by Dave, NK7Z

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