2025-09-02 Hamlet Net - Hazards

Announcements:

- Test Session Info
    - Next VE session is Saturday, September 22nd in the Clover Building at the Boulder County Fairgrounds, and starts at 9 am. It is a PVET session, so there is no fee to test. For more info, and to pre-register, see the Licensing/Testing page on the club web site, https://w0eno.org/, under the Education menu.
- Club Activities
    - Breakfast Saturday at 7:30 - 8:00 am at the Hidden Cafe.
    - LARC Members can now check out Club equipment via the Club web page at: https://w0eno.org/ - click on the 'LARC Equipment Check Out Form" link on the "LARC Equipment" menu item at the top of the web page once you log in.
- Upcoming General Meeting Topics
    - Video from Violetta Latham's presentation on youth in ham radio and her upcoming DXpedition to the Manihiki Atoll in the North Cook Islands is up on Youtube. To access links to it and other general meeting information, click on the Presentations link under the LARC History menu heading on the club's web site at w0eno.org
    - Next month's General Meeting will be held on September 17th at the Clover Building at the Boulder County Fairgrounds. LARC equipment that is available to be checked out will be exhibited. We will be having food (hotdogs and hamburgers). Please bring a dish to share if you like. Please contact elmer@w0eno.org if you need a ride and would like to come socialize with other club members.
    - Elections for the Board will also be held. Your current Board has offered to stay on if the club wishes. If you would like to run for a Board position, please let one of the current board members know.
    - Proxy voting forms will be out in the next few weeks. If you are not able to vote in person at the September meeting, please vote via proxy as this will help us meet our quorum requirements. Proxy voting will be available starting the second week in September.
- Upcoming Club Volunteer Opportunities:
    - September 20th is Miner's Day in Fredrick. Looking for volunteers to help run a table at the event and also support the Burro race. For help at the table, contact

Chuck (k0itp@w0eno.org). For the Burro race, contact Bob Henderson at wb0nrv@yahoo.com.

- BARCFest is October 5th. LARC will have a table there, so if you can help staff it, please get in touch with him.
- Foxhunt in October - Chuck is looking for someone to help find a location, place the fox, etc.
- LARC will once again run the Santa on the Air special event. To be successful, we need volunteers to act as Santa or Mrs. Claus during the event, as well as "elves" to act as net control. This is a fun event that children of all ages really love, so if you can get into the repeater (via RF or Echolink) and have a few hours free, please give us a hand. Look for sign up information on the Club web site and nets.
- This Sunday is the Buffalo Race. About 1000 bicyclists are riding up in the mountains. If you are interested in monitoring our repeater from 7am until aroud 1-2pm to help out with any issues. Contact Chuck.
- HAMCON Colorado 2025 for Rocky Mountain Division is October 23-26, 2025 in Grand Junction. For more information and to register, see their web site at: hamconcolorado.com They are also looking for presenters.

- Upcoming Radio Activities
  - This weekend is the All Asian DX SSB contest. If you'd like to try to get some contacts from around the world in your log book, this is likely a good chance to do so! The contest exchange is simple - a signal report and your age. No cross-band contacts are allowed, but the use of spotting information is fine (although you cannot self-spot or request to be spotted).
  - The Route 66 on the Air special event will take place from September 6th through the 14th.
    - Hosted by the Citrus Belt Amateur Radio Club, and celebrating its 26th year, there will be a total of 24 stations with 1x1 callsigns from W6A up to W6Y which will be operating near the original Route 66.
    - This year will be a special year for the event as they will have a total of 5 rover stations - one of which will be an Aeronautical Rover station operating from the air.
    - If you contact at least one station, you can request a certificate or decal from the Club.

        - Details can be found on their web site at: https://w6jbt.org/
    - Ohio and Tennessee state QSO parties are this weekend
    - Finally, if you believe there is a group of hairy ape-like creatures that have been hiding out in the forests of the United States, then you won't want to miss out on the National Sasquatch Awareness Special Event which will take place from October 15th through the 21st.
        - The reason I'm bringing this up is that they are soliciting volunteers to help run stations with their 1x1 contest callsigns during the event.
        - Look out for special event stations W7B, W7I, W7G, W7F, W7O, (stations must work W7O at least twice on 2 different modes, bands, or Zulu days) and W7T to claim the coveted BIG STOMP on the BIGFOOT Certificate! ANYONE can apply for the certificate - even if you only worked one of the stations. (note - the suffixes of the callsigns spell "Bigfoot")
        - Stations will be using CW, phone, FT8/FT-4, RTTY and PSK modes, and will be operating on 80, 40, 20, 15, and 10 meters at various times throughout each day, so there's no excuse not to get involved in the fun!
        - Here is a link to sign up to help run a station for the event: https://docs.google.com/forms/d/e/1FAIpQLSeslRHfzowZOKITDL83lGJLSBz-yRE31_jyVdm-L1npg5bagQ/viewform

- If you are interested in find out more about the Amateur Radio Emergency Services (or ARES) in the local area, check out the Boulder County ARES web site at https://bouldercountyares.org/

  They have a VHF net on Monday nights at 8:00pm, as well as a DMR net on the 2nd, 3rd, and 4th Mondays at 8:30pm.

- If you are an ARRL member, remember that you have digital access to four magazines - QST, On the Air, QEX, and National Contest Journal.

- We have a new net on the LARC repeaters. It's run by Timothy Moss, KFØLAR, on the 22nd of every month at 6pm. The 22nd was chosen to highlight the average of 22 vets who commit suicide each day. While the purpose of the net is to connect veterans, non-vets are welcome to participate as most all of us have friends or family who are or have served.

- The ARRL Colorado Section Net occurs on the second Monday of the month from 7 to 8pm. The net is run by Amanda Alden, K1DDN, our Colorado ARRL section manager, and is open to hams and non-hams alike. This net is a place where Colorado hams can ask questions of ARRL leadership and request help, guidance, club support, and

technical support. This net meets on the second Monday of each month at 7:00 pm Mountain time. The net is on the Colorado Connection, Rocky Mountain Ham Radio DMR Talk Group 700, The Fun Machine, WE0FUN, and the NCARC Buckhorn Repeater 447.700 – with 100 Hz tone.

- We have some volunteer opportunities available where you can help out LARC:
    - Photographer / videographer - record team activities and upload to web site / YouTube
    - Newsletter Editor - put together the monthly Splatter newsletter
    - Event Coordinator
- Time's up for this year, but you can earn your 2026 membership or future renewal by acting as NCS for at least 5 nets next year. You can run either this Tuesday night net or the Thursday night net (or both). We have scripts available for both, so all you need is a good connection into the repeater, and somewhere to keep track of names and call signs as people check in. If you're going to be on the net anyway, why not save some dough at the same time!
- Chuck has set a goal for the Club of running at least one activity a month. This can be a hands-on construction activity, an operating activity like Field Day, a fox hunt, or a special event station. The goal is to get people together to have fun with amateur radio! We have multiple locations at our disposal, as well as lots of Club equipment, so if you have an idea for something you think others hams would like to do, please let us know, and if you're willing to run it, even better!
- The Club is also looking for presentation topics for 2025. If you have any ideas, or better yet, would like to present, please let Chuck know and we'll get you on the schedule! We would like to get some presentations from club members on stuff they've been doing, projects they're working on, or just things that interest them.
- All club activities are open to anyone - members and non-members. If you have questions, ask them on a net or **send email to elmer@w0eno.org**

Presenter: Bryan, AFØW

Topic: Hazards

- While amateur radio is certainly not in the same class as extreme sports like skydiving or BMX bike jumping, there are still some electrical and RF safety issues you need to keep in mind.

Electrical Hazards

- The first category is general electrical issues
- One of the most potentially dangerous electrical hazards is electric shock, which is caused by current flowing through your body
- The obvious solution is to avoid touching live circuits
    a. This applies heavily when working on tube-based equipment, such as older radios and amplifiers, due to the high voltages used in these circuits.
- You may say "Well, I've only got an HT, so I don't need to worry about this."
- While in general that is true - HTs are low-powered devices, there is still a very real potential issue and that is the battery being short-circuited.
    a. Most HTs come with batteries that can be charged simply by dropping them into a charging base. The battery is charged via metal contacts that touch those on the charging base.
    b. Since these contacts are not covered in any way, an issue can arise if the battery makes contact with a conductor such as metal keys or an antenna in a backpack which shorts the positive and negative charging contacts together, which can release a lot of energy!
    c. This issue can also arise with any spare batteries you take along, so consider protecting these by putting them into something non-conductive like a plastic sandwich bag.
    d. You may also find (or design for yourself) 3D printed covers for these terminals
- One protection device you will likely come across, especially if you build a battery box or GoBox are fuses.
- If you've purchased a mobile or desktop radio that runs off 12 volts, it likely came with a power cable with a fuse in either the positive or both leads. You may think the fuse is there to protect the radio, but it's really there to protect the power cabling.
    a. For example, the ICOM IC-7000 has a 5 amp fuse mounted inside the radio, but has 30 amps fuses in both power leads. If you were to short out the 12v power pin in the antenna tuner connector, it is very likely that a circuit trace or other internal component would fail before the 5 amp fuse opens, and that the 30 amp fuse would likely never open.
- Also, if you neglected to put a grommet or other protection on the power cables between the battery and radio, and the metal of the vehicle wore through the positive cable causing a short, the 30 amp fuse on the positive cable would hopefully prevent a fire.

- One thing to be aware of with fuses is that there is a time delay between a current overload and the time the fuse opens, and this delay changes depending on the magnitude of the overcurrent.
    a. For example, a 20 amp fuse will likely handle a 30 amp current for up to 90 seconds before opening, and a 100 amp current for about a second.
- If you've ever touched the two ends of a jumper cable connected to an automotive battery together and seen the sparks, you know you wouldn't want this occurring under your dash for any amount of time!
- One thing you must never do with fuses is to replace them with a fuse rated for a higher amperage. In a pinch, you can try a lower-rated fuse, but never go with a large one!
- The delay between a current overload and the fuse breaking the circuit is also why amateur setups typically use fuses instead of circuit breakers. Circuit breakers have even longer times before acting, which allow a higher potential for damage in an overload situation.
- At some point, a shack-based system is very likely powered from household AC. This should always be done using a three-conductor cord and plug connected to a grounded, three-prong outlet.
    a. The third prong provides a safety connection to ground and is connected to the metal equipment chassis so an internal short between the current-carrying conductors and the equipment case will not result in the case becoming an electrified hazard.
- Also, did you know that even if it is not connected to the AC power line, a linear power supply or tube-based amplifier can still be deadly? They each likely contain large capacitors which will retain their energy even when disconnected from a power source.
    a. You must always be careful to safely discharge this energy before working on these devices.

Contact RF Hazards

- Another category of hazards can be referred to as RF contact hazards
- This is where direct contact occurs with an RF signal - an example would be someone touching an antenna during transmission, possibly resulting in a painful RF burn
- Encountering high-powered RF can be very painful
    a. This is because the RF energy heats and damages tissue beneath the outer layer of skin, resulting in second and third-degree burns which heal very slowly.

- People have reported small fingertip burns from 5 watt HTs when accidently transmitting and touching the antenna connector.
- If you do receive an RF burn, the treatment is like with any other type of burn. Run cold water over it, and seek medical attention if necessary.
- As with the previously-described electrical hazards, avoidance is the best defense.

Indirect RF Hazards

- The last category of hazards are indirect RF exposure
- This occurs when encountering RF energy from an antenna, feedline, or other RF component, such as an attic-mounted antenna
- RF energy is non-ionizing, but it can still cause localized heating
- The FCC has instituted RF exposure limits, called the Maximum Permissible Exposure limits, or MPE (mike-papa-echo).
- The frequency range with the lowest MPE is 30 to 300 MHz, so the VHF band is of greatest concern for radiation, including the 6 and 2 meter bands.
- The MPE limits differentiate between controlled and uncontrolled exposure.
- Controlled refers to situations where people are aware of an antenna and RF energy and can do something about it. In this case, higher power levels are allowed, and limits are based on a 6 minute average exposure.
- Uncontrolled refers to situations where you have no control of people near your antenna, such as neighbors or pets, and allows a lower exposure level and a 30 minute average exposure.
- In either case, proximity to the radio antenna is the single most influential factor when it comes to exposure levels
- As an example, I calculated the results for both our repeater frequencies from a 25 watt radio feeding a quarter-wave antenna using FM modulation and transmitting for 5 minutes, then listening for 10 minutes.
    a. For 147.270 MHz, the minimum safe controlled distance was two-and-a-half feet, while the uncontrolled distance was three-and-a-half feet.
    b. For 448.800 MHz, the minimum safe controlled distance was 2 feet, and the minimum uncontrolled distance was 3 feet.

- To show the impact of power levels, increasing the 2 meter power from 25 to 50 watts raised the controlled distance from 2.5 to 3 feet, and the uncontrolled distance from 3.5 to 4.2 feet.
- My attic-mounted quarter-wave vertical is safe as there is no habitable space within that range.
- On the other hand, if I had an attic-mounted dipole on 20 meters connected to a 100 watt radio running FT8, the minimum controlled distance would be about 2 feet, while the minimum uncontrolled distance would be 4.5 feet. While the power and antenna gain are higher, the frequency is much lower than 2 meters.
- You can try out values for your own station by searching for "rf exposure calculator" on the Internet.
- If you find that your station exceeds these maximum permissible limits for exposure, you can mitigate the problems by relocating or reorienting your antenna, raising your antenna, reducing antenna gain, reducing RF power output, or changing to a lower duty cycle mode.

General Safety

- There are other safety issues you might need to consider based on your operating circumstances
- A big one, especially when operating something like a POTA station, is trip hazards. Feedlines, antennas, ground radials, and guy lines can all be hazards - especially for any curious visitors.
- Lightning or other adverse weather conditions can of course be hazardous, as can something as simple as lack of sun protection and adequate hydration, which can turn a fun outing into an unpleasant or possibly even dangerous activity!
- If you are building kits, antennas, or repairing electronics, make sure to wear eye protection. An errant blob of solder or a fast-moving end cut from a piece of wire can lead to a really bad day.
- Power lines and ladders are two things that have actually taken amateur lives over the years.
    a. Make sure there is no way your antenna or feedline can contact a power line - this also includes throw lines you may use to get your antennas up into a tree. Make sure there are not any power lines on the other side of the tree you are throwing your line into!

    b. Falls from heights, whether from ladders or towers, are another potential hazard. Make sure you are using the proper equipment for the job, and that you are using it properly (resist the urge to step on that top stepladder step!) One moment's inattention can have life-changing results.

- Don't try to tilt up a long mast by yourself. Masts can be a lot more wobbly and hard to control than you would think. This is another reason to make sure you are nowhere near power lines, as you could lose control of the mast and have an accident.

- As you can see, amateur radio is not completely without hazards, but there are means of handling them all, as long as you are aware of their existence and design your system and operating habits to be safe.

- If you're a super-safety-oriented person (or just like walking around with a safety vest and clipboard), then the club can use you! We have dedicated safety officers at Field Day (and could at other events as well) whose primary duties are to watch out for any hazards to keep both the public and radio personnel safe, and to make sure all safety rules are followed by the participants.

Questions:

- **The question for the week is:** Have you ever encountered any radio-related safety issues, and have you performed RF exposure calculations for your station, and if so, were you within the permissible limits?

- **In my case,** I've run into the "trying to raise a long, heavy mast by myself" issue a couple of times. Even when it seems like your mast is rigid and sturdy, you'd be surprised how it can dance around, especially if you have a heavy antenna on the top (like a hamstick dopile!)

  As far as RF exposure goes, I've performed the exposure calculations for my station, including my VHF/UHF dual and single-band radios, as well as my 100 watt HF radio and 500 watt amplifier. My primary UHF/VHF antennas are all in the attic and safe. I have some magnetic mount dual band antennas in my shack, and while I use those primarily for receiving, they would be OK for 50 watt FM transmissions as well.

  My HF antennas are all outdoors and are mounted high enough to be safe for humans and pets, but might cause issues for some tree squirrels!

More Info:

- ARRL RF Exposure Calculator: https://www.arrl.org/rf-exposure-calculator

- Safety (ARRL): https://www.arrl.org/safety

- Safety: https://newhams.info/category/safety/

Email to elmer@w0eno.org

- If you have ideas for net topics or general meeting topics / presenters, please let us know! Tell us on a net, or send email to k0itp@w0eno.org

Email to elmer@w0eno.org

1. KØITP - Chuck - Firestone
2. AFØXS - John
3. KFØUSF - David - Longmont
4. WAØJJC - Bob - Boulder
5. AFØW - Bryan - Longmont
6. KFØUWK - Lawrence - N Boulder
7. KFØNFP - Thomas - Broomfield

End: 8:00pm