

## 2024-03-19 Hamlet Net - Foxhunting

### Announcements:

- Test Session Info
  - Next VE session is this Saturday, March 23rd 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.
- 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
- There are several Board positions that will be available in October. Currently, the Treasurer and Secretary are planning to make this their last year of service. If you are interested in serving on the board of a 501(c)3 non-profit, please consider running for one of these positions. The current members would be more than happy to "show you the ropes" during the year, so you wouldn't start with zero experience.
- Also looking for volunteers to help with LARCFest on April 6. If interested, please check out web site and contact Bob Smith (N0OM) for more information. Tables are also being sold if you have stuff to get rid of.
- Our sister club up in Nederland is looking for some help with events they are running. They have a weekly Monday night net with no predetermined agenda, so you can lead it however you want. They are also planning a Field Day site at Golden Gate State Park and are welcoming anyone who wants to participate. Finally, they are looking for operators for the Ned Gravel run on July 8th. They have signup links for all these events, so head over to their web site <https://w0ned.org/> for more information!
- You can start earning your 2024 membership or future renewal by acting as NCS for at least 5 nets this 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! There are four free memberships available for 2023, so don't wait to get started!
- 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 2024. If you have any ideas, or better yet, would like to present, please let Chuck know and we'll get you on the schedule!
- 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](mailto:elmer@w0eno.org)**

**Presenter: Bryan, AF0W**

**Topic: Foxhunting**

- Last week, the LARC Solder Sniffers group was mentioned, as was their recent project to build offset attenuator kits. I figured this would be a good time to cover the basics of fox hunting for anyone new to the activity, as well as solicit advice from those on the net who have participated in them before
- At the most basic level, amateur radio fox hunting is a search for a hidden transmitter, many times involving a competition
- This isn't just a game - you can actually learn and refine skills which can be helpful in situations such as finding a stuck transmitter, a source of interference, or search and rescue
  - a. LARC was contacted a while back to see if we could help finding a stuck transmitter that was interfering with communications at the Longmont Airport, and the same skills used in a fox hunt allowed the transmitter to be found and the issue resolved.
- This activity can be undertaken by anyone. Since it does not involve transmitting, even unlicensed individuals can join in the fun.
- Participants are usually given the frequency of the fox, and either a location from which the fox can be heard, or boundaries of an area in which the fox is contained.
  - a. Some foxhunts may feature HF transmitters, multiple transmitters at different locations, and may span areas as large as several states.
- There's actually a competitive sport called ARDF (which stands for Amateur Radio Direction Finding) or radio orienteering.
  - a. This radio sports activity deals with the taking of radio bearings to navigate through wooded areas in search of transmitters.
- All you need to participate in LARC's foxhunts is a 2m radio receiver - even a simple Baofeng will work

- While some foxhunts start all participants from a single spot at the same time, many LARC events run over a period of time, allowing you to participate at your leisure

### Starting Out

- It can be very helpful to print out a map of the potential fox area so you can make notes as you proceed
- The first thing you will need to do is to find a location from which you can receive the signal
  - a. If you cannot hear the signal from a location, make a note on the map to keep track of where the fox isn't
- Once you can hear the fox, the next step is to determine the direction of the fox's signal
- Depending on your equipment, you can accomplish this multiple ways
  - a. If you're using an HT (or scanner) with a rubber duck antenna, you can use the "body fade" method. When the fox's transmission begins, hold the radio close in front of your body, then rotate around 360 degrees and listen to the signal
    - Instead of listening for the direction of the loudest signal, try to find the signal null or low point. This will indicate that the signal is coming from behind you. The null will very likely be smaller and easier to find than trying to listen for the strongest signal.
    - You can also try rotating your radio so that the antenna is horizontal instead of vertical - you don't know what polarization the fox is using.
  - b. If you have a directional antenna, such as a tape measure Yagi, you would point it in different directions and again listen for signal peaks or nulls
  - c. Regardless of the method or equipment used, you can then plot your location and the estimated signal bearing on the map
  - d. Keep in mind that these methods aren't exact - there will likely be at least 20 degrees of uncertainty, depending on the method
- At this point, you have a choice - you can either try to head directly toward the signal, or you can move and get a bearing on the signal from other locations
  - a. Multiple bearings is usually the better choice
  - b. Once you get bearings from, say, three locations, you can extend the bearing lines on your map and get a good idea as to the general location of the signal

- Keep repeating this process to narrow down the fox's location
- If it turns out that the signal is pretty strong in all directions, this means that you are likely close to the fox

### Close In Hunting

- At this point, you'll likely run into the problem of having too much signal - you need to reduce, or attenuate, the signal reaching your radio
- Depending on the equipment you are using, you can accomplish this in a number of ways
  - a. If you are using an HT with a rubber duck antenna, you can remove the antenna - just be sure not to transmit with the antenna disconnected! This can also be used in conjunction with the body fade technique
  - b. As mentioned previously, changing the polarization of your antenna can help. This change can impact the signal strength by around 20 dB (or 100-fold)
  - c. You can also tune your radio slightly off the fox's frequency, say 5 or 10 kHz off - this will place the fox's transmission into the skirt, or edge, of your radio's passband and reduce the strength
  - d. You can also tune your radio to a harmonic of the fox's frequency.
    - A harmonic is an integer multiple of a frequency
    - For example, if the fox is on 146.565 MHz, you would multiply that frequency by two to get the second harmonic of 291.3 MHz, but it's unlikely your radio can receive this frequency
    - Luckily, the third harmonic at 439.695 MHz is within the US amateur ham bands, is probably stronger than the 2nd harmonic, and can be received on radios which include the 70cm band. This signal will be weaker here than on the primary frequency. This can drop the signal by 40 to 60 dB
  - e. If you are using a directional antenna such as a Yagi, you can swap it for a rubber duck (or no) antenna to reduce the signal strength
  - f. Finally, you can also employ a device called an attenuator between your antenna and radio to drop the signal level
    - Note that most attenuators are rated for low power levels experienced during reception, so be sure not to transmit when you are using one!
    - This is what the group worked on at the last Solder Sniffers

## Strategy

- There are many points at which strategy and experience come into play
  - a. One is right at the beginning of the hunt - when the hunt does not require participants to all start at the same location, your choice of where to take your first bearing can help (or hurt) you
    - For example, choosing a location in a valley will likely obstruct fox signals
    - Selecting one at a higher, unobstructed location would be a much better choice!
  - b. Keep in mind that signals can reflect off of objects, such as hills or metal buildings - the person hiding the fox can make a hunt much more difficult by taking advantage of things like this
- Be willing to discard any bearing that makes no sense - reflections, multipath, or things like knife-edge diffraction can result in stray signals
- The hardest part of the hunt is frequently the last few hundred feet, due to the overwhelming signal strength
  - a. One tactic here is to use your eyes to locate the fox - although the person hiding the fox can make them very difficult to find - even when you are standing right next to them!
  - b. You can also put your radio and antenna into a metal can to help locate a nearby transmitter

## Variations

- Some variations I've read about are:
  - a. Mobile, city-wide hunts where pairs of individuals listen while driving around in their vehicles
  - b. Everyone starting at the same place and time - in this case, the organizer may choose a location where the fox can be heard, or where it cannot
  - c. Instead of a standalone fox, the winner of the previous hunt acts as the fox using a mobile radio and driving to an undisclosed location
  - d. Competitive fox hunts may place participants by time taken to find the fox, by least distance driven (for vehicle-based hunts), or by number of foxes found (for multiple fox events)

- e. Fixed-location hunts where teams of individuals in fixed locations work together to locate the hidden transmitter without traveling to find it. The team that submits the closest location to the actual fox wins.
- f. Chuck came up with an interesting idea for one of the LARC foxhunts he ran, and that was to use SSTV transmissions from the fox instead of voice or CW. The images were obtained from a camera located at the fox's location, and served to provide clues to its placement

## Summary

- While there is specialized equipment you can use for fox hunts, including loop antennas, doppler and time-difference-of-arrival receivers, you can do very well with just an HT and rubber duck antenna
- If you've never tried fox hunting, give it a try at the next LARC foxhunt!
  - a. If you don't want to work alone, you can join up with one or more other participants and work as a team - or better yet, get your family involved!
- One final tip is to program the fox frequency (as well as any other frequencies you might use, such as nearby or harmonic frequencies) into your radio's memories, and if your radio supports it, to set them so the radio will not transmit on those channels to prevent damaging your attenuator or interfering with others on the hunt.

## Questions:

- **The question for the week is:** Have you ever participated in a fox hunt, and if so, what techniques did you use, and do you have any tips for new participants?
- **In my case,** I've been on one fox hunt that Chuck arranged at Field Day a couple of years ago. I used a Yaesu FT-60 since it had a good S-Meter. I used the factory antenna and the body fade technique while hunting. I was able to eventually find the fox, but I did have to remove the antenna once I got really close.

I also helped Chuck at the fox location for the SSTV hunt.

## More Info:

- ARRL ARDF/Radio Orienteering Info: <http://www.arrl.org/amateur-radio-direction-finding>
- <http://www.homingin.com/equipment.html>
- <http://www.arrl.org/direction-finding>
- Byonics: <https://www.byonics.com/products>

- <https://kk4gq.org/pdf/FoxHunting101-for-KSUARC-KI4ASK-October-2020-PDF-version.pdf>
- [https://wiarc.ca/media/2020/02/Tips N Tricks 4 III-Equipped Fox Hunters.pdf](https://wiarc.ca/media/2020/02/Tips_N_Tricks_4_III-Equipped_Fox_Hunters.pdf)
- Attenuator kits:
  - <https://kc9on.com/product/fox-hunt-offset-attenuator/>
  - <https://qrpguys.com/qrpguys-10-20-30db-switched-attenuator>
- 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](mailto:k0itp@w0eno.org)

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**End: 7:45pm**