The Hellgate Static

August 2020

Hellgate Amateur Radio Club
P.O. Box 3811, Missoula, MT 59806-3811

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Upcoming Events

October 3	Riverbank Run (rescheduled)
October 16-18	Boy Scout Jamboree on the Air
October TBA	Western Montana Dirt Derby
December 5	Skywarn Recognition Day
December 14	Christmas Dinner

Officers:

President: Mike Leary, K7MSO
Vice-President: Eric Sedgwick, NZ7S
Treasurer: Dick Walton W7XT
Secretary: Donna Pecastaing, KC5WRA

Standing Committees:

Emergency Coordinator: Jerry Ehli, N7GE
QSLs, Awards: Bob Henderson, N7MSU
Webmaster: Mike Leary, K7MSO
Radio License Exams Contact VE:
Paul Shuey, N7PAS
Static Editor: Terry Cook, KF7BQ
Bluetooth_one@hotmail.com

Repeater Advisory Committee:

Eric Sedgwick NZ7S (Chair)
Tom Mc Ginley, K7QA
Tom Hellem, K0SN (Re-elected)
Paul Shuey, N7PAS (Re-elected)

August Zoom Meeting

At the August 10th Zoom meeting, Lyndel Thiesen, N7LT, will present a program tracing the history of the amateur radio service, from the beginning of radio to the present. Lyndel lives in Kalispell, and has been a ham since 1984. He maintains several ten meter beacons and repeaters in Montana.

We look forward to an interesting and informative program.

Due to the current Corona virus crisis, the HARC August meeting is scheduled to be conducted remotely via zoom teleconferencing software.

Watch for an invitation to the meeting in your Email, it will contain the meeting ID, a password and a link to the meeting. Be sure your microphone is enabled.

If you have not received an invitation by Monday morning, August 10th, contact Mike Leary at mleary2001@yahoo.com and request an invitation.

Stay healthy and we hope to see you there.

Radio Direction Finding Primer

Common methods used by 2meter transmitter hunt enthusiasts.

Several club members have expressed an interest in having one or more two meter transmitter hunts. At one time years ago, HARC had transmitter hunts once a month during the summer. The transmitter could be located anywhere in the Missoula valley that is publicly accessible and would transmit periodically. Fox hunts always occur on simplex frequencies.

The participants had fun both as the fox or hidden transmitter and as hunters. We are hoping to find members or non-members who are interested in participating in some hunts this summer. We expect that they will be relatively easy ones as we will be pretty much novices at this point, and will learn together. The hunts should not require a lot of equipment, but if you have a directional antenna and a signal strength meter on your two meter radio it will help.

This article is a short introduction to the gear most commonly used by amateur radio fox hunters.

Tape measure yagi antenna

Directional loop antenna

Directional Antennas - Many hams use compact directional antennas, which can be used to home in on the hidden transmitter, either by following the direction of the strongest signal to the transmitter or by taking strongest signal bearings from multiple locations and plotting the bearings on a map (triangulation). In the case of triangulation, the area in which the bearings intersect is the most likely location of the transmitter. Compact yagis or cubical quads are popular with enthusiasts.

Some directional antennas (such as loop antennas) are used to search for a null (minimum signal strength) in the hidden transmitters signal. These may provide a sharper bearing, but typically require a relatively strong signal.

If you don't currently have equipment available, a technique known as “body fade” can be quite effective. See the article “Body Fade – an RDF technique” in this issue.

Passive attenuator

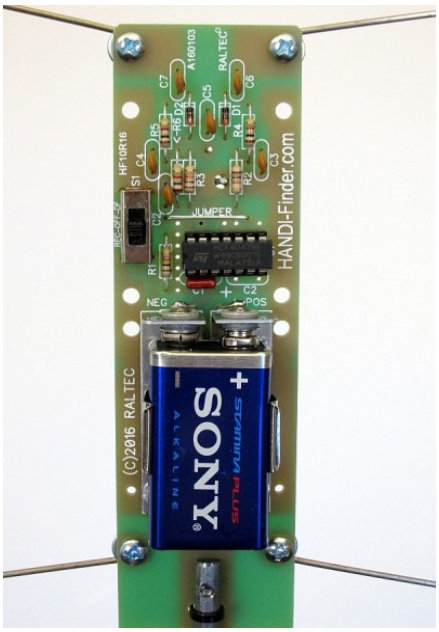
Active attenuator unit

Attenuation – By attenuating the received signal, you can reduce strong signal overload, and more easily determine if you are moving closer to the transmitter, or moving away from the transmitter. The attenuation applied to the received signal, can be either:

Passive (resistive attenuation between the antenna and the radio or reducing the effectiveness of the antenna itself), or

Active attenuation where a simple mixer circuit and local oscillator can provide weaker signals at frequencies above or below the hidden transmitters frequency. Attenuation is particularly useful close in where other methods suffer from strong signal overload.

TDOA antenna array

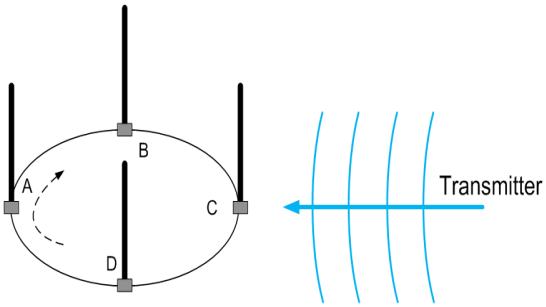


HandiFinder TDOA kit

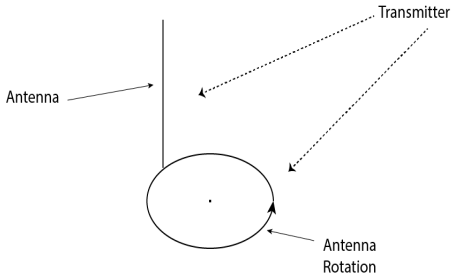
Time Distance of Arrival (TDOA) – Using an FM receiver and a simple timer circuit that switches

Time Distance of Arrival Continued

the receiver between two antennas spaced about a half wavelength apart, at around 500 times per second, will produce 500Hz audio tone in the FM receiver. The audio tone will disappear when the antennas are in phase (equa-distant from the transmitter.) After rotating the two antennas until the tone nulls, the operator can draw a bearing line 90 degrees from the plain of the two antennas. Most TDOAs provide a bearing line that does not indicate whether the transmitter is in front of you or behind you, so two readings must be taken at different locations to resolve the 180 degree ambiguity. For this reason, TDOAs are typically used in a triangulation mode. They are fairly compact and inexpensive to buy or build.



Pseudo Doppler Fig 1



Pseudo Doppler Fig 2

Pseudo Doppler – Using a circuit that switches the receiver between multiple vertical antennas (Fig 1) (usually four or more) in a pattern that resembles a single antenna moving in a circle (Fig 2). The doppler direction finder detects a (Pseudo-doppler) shift up in frequency as the virtual antenna moves toward the transmitter, and a shift down in frequency as the virtual antenna moves away from the transmitter.

The doppler direction finder calculates the heading to the transmitter and indicates the direction to the transmitter on a compass rose. Doppler units can be used in a follow the signal mode or by triangulation.

Triangulation

Many times the quickest way to find a transmitter using directional antennas or TDOA is to take several “fixes” using you antenna and a compass. The fixes or bearing lines can be plotted on a map of the area. Some people actually plot them on Google Earth on a laptop.

Where the bearing lines intersect is the most likely location of the transmitter. The more bearings you plot that intersect in an area, the more confidence you can have that you are can move in closer and continue your hunt. Odd bearings that do not intersect near the other readings may be the result of reflections or “Multipath,” and may be discarded.

In this case google earth is used, to plot bearing lines, but a local area map of suitable size will work as well.

The area where the bearing lines cross is the likely location of the transmitter and deserves further exploration in search of the hidden transmitter.

There are many other direction finding methods but the above described methods or combinations of them comprise most of the popular methods in current amateur radio use.

It takes very little equipment to enjoy hunting for hidden transmitters and in many cases, especially with less experienced hunters, the fox may provide clues to assist the hunters as time goes on.

If you are interested in participating in a hunt, we are currently setting one up. If you are interested, please let us know at the meeting, or call Terry KF7BQ, at 406-396-0475 or at bluetooth_one@hotmail.com.

More information about transmitter hunting can be found here:

ARRL Radio Direction Finding Resources http://www.arrl.org/direction-finding

Tape Measure Yagi Antenna http://theleggios.net/wb2hol/projects/rdf/tape_bm.htm

Build the HANDI-finder (TDOA) https://www.handi-finder.com/

KB9VBR fox hunting video https://www.youtube.com/watch?v=yR2cpd0vQdM

Homing In resources for radio fox hunting http://www.homingin.com/

AREDN Mesh Network Coming To Missoula

Kevin Kerr, W1KGK, is currently working on bringing a **A**mateur **R**adio **E**mergency **D**ata **N**etwork to the Missoula area. He has installed a mesh network node at Pats Knob, near Plains, and is planning to complete a microwave link to Missoula's Point 6 in the near future. Once the Missoula link is completed, an access point at Point 6, will be capable of serving a Missoula mesh network. Eventually a link to Kalispell, through Polson are in Kevin's plan.

AREDN operates on frequencies in the 900MHz, 2.4 GHz and 5 GHz bands, and allows high bandwidth connections for file transfers, video, telephone interconnect and a myriad if other services. It makes use of relatively low cost commercial microwave equipment modified for amateur radio use. AREDN is has become very useful for emergency and disaster support in many areas of the country. It is a resource that the amateur radio community will lose if we do not put it to use.

Body Fade a simple technique to use your hand held radio to find a signal source

This technique is described in a fair number of transmitter hunt resources. It will likely work to locate transmitter when you are close to the transmitter and don't have a directional antenna available

- Hold HT close to your chest or waist and use your body to block (attenuate) the signal
- Slowly turn around, and listen to signal (or observe your S-meter)
- When signal sounds the weakest, the transmitter is behind you (180 degrees from direction you are facing)
- As you get closer to transmitter, you may not detect any changes in signal strength.
- Lower HT into cardboard box or tube shielded in aluminum foil until hear noticeable change in signal strength.
- Try body fade again.–Tune off frequency +/-5-10 kHz to reduce receiver's sensitivity (thereby signal strength).
- Try body fade again.–Tune to 3rd harmonic (if multi-band HT), and listen for lower strength signal there (147.54 x 3 => 442.62 MHz, 146.565 x 3 => 439.695 MHz)
- Remove the antenna and perform body fade technique again (remember RX only –don't TX!)

Tentative July Zoom Meeting Minutes

Attendance: K7MSO, NZ7S, N7PAS, K7QA, KJ7OKW, KF7CBY, KF7BQ

Approval of last meeting's minutes. Passed with correction.

Correction: All remote testing inquiries are referred to W5YI.

Approval of Treasurer's report - tabled

Repeater Committee Report – nothing to report

HF Committee

- Field Day - Eric NZ7S really produced on phone,

New Generator works well, old one started smoking towards the end.

Since did not use Mt Sentinel site DNRC is giving us a credit for next year

Still selling donated equipment.

Upcoming Events: None until October

Other Business:

Transmitter hunt interest and dates email.

Mike K7MSO will send. Email to District ARES Mgr. W1KGK

VHF Net Control operators:

- 15 July Mike K7MSO
- 22 July Terry KF7BQ
- 29 July Paul N7PAS
- 05 Aug.Donna KC5WRA

*** Next Club meeting: 10 August