

# Introduction to Fox Hunts

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# What's a Fox Hunt?

- A Ham Radio exercise to find a hidden transmitter using a directional antenna, some map work
- AKA Bunny hunt, T-Hunt, RDF (Radio Direction Finding)
- Fun social event, out of the shack, and into the sunshine
- can involve building antennas, attenuators
- Its a recreational exercise, but the skills can be used for other purposes.

# Why do Fox Hunts / RDF ?

- It's fun playing detective & is usually a bit competitive

## Other uses for Radio Direction Finding:

- Hunting down interfering radio signals, both accidental and malicious interference to repeaters, which could affect ham and commercial communications, and emergency services
- Helping to find downed aircraft by “DFing” their Emergency Location Transmitters (ELT). Example: St. Thomas Search and Rescue exercise.

# How do you win?

- If you're having fun, Everybody Wins!
- Bragging rights can be claimed by:
  - Whoever finds the Fox first
  - Whoever finds the Fox at all during the time period
  - Whoever finds the Fox with the least vehicle mileage
  - Whoever tells the best story at the follow up coffee break

# Learner Fox Hunts

- To encourage more participation in LARC Fox Hunts, we make a few changes so it's easier to find the Fox:
  - The Fox transmits continuously, rather than the usual on for one minute, off for 2 or 3 minutes
  - We encourage participants to share their findings and theories over a designated repeater
  - We prohibit Foxes from doing anything “clever” to make it more challenging for Hounds
- We may try a traditional hunt once we get the hang of it

# What Gear does a Hound Need?

- sunscreen, hat, water, snacks
- compass, or equivalent smart phone app
- directional antenna (to be discussed later) (we have loaners)
- VHF / UHF handheld radio
- medium scale city map (11 x 17) - may be provided (bus maps)
- ruler, and parallel or rolling ruler
- protractor
- pencils, erasers (maybe white board markers or grease pencil)
- attenuator

# What is the sequence of events -1

- everyone meets at the starting point (a central location) around 1:15
- Fox verifies that his transmit on 146.565 can be heard
- Fox leaves, heading to the secret location
- Observers are allocated to Hounds
- When on location, Fox checks in on designated repeater, and again verifies that his signal on 146.565 can be heard
- Vehicle odometer readings are noted, trip odometers zeroed
- At about 2:00, the Hounds are let loose

# What is the sequence of events -2

- Hounds may, or may not take an initial bearing at start point
- compass used to get direction to Fox
- line is drawn on map indicating this bearing
- Hound selects a location for next bearing, and drives to it.  
(Picking good locations is part of the strategy.)
- A safe place to park and take a bearing is chosen
- process repeats, and hounds get closer to Fox (sometimes)
- closeness causes problems taking bearings - techniques change



# What is the sequence of events -3

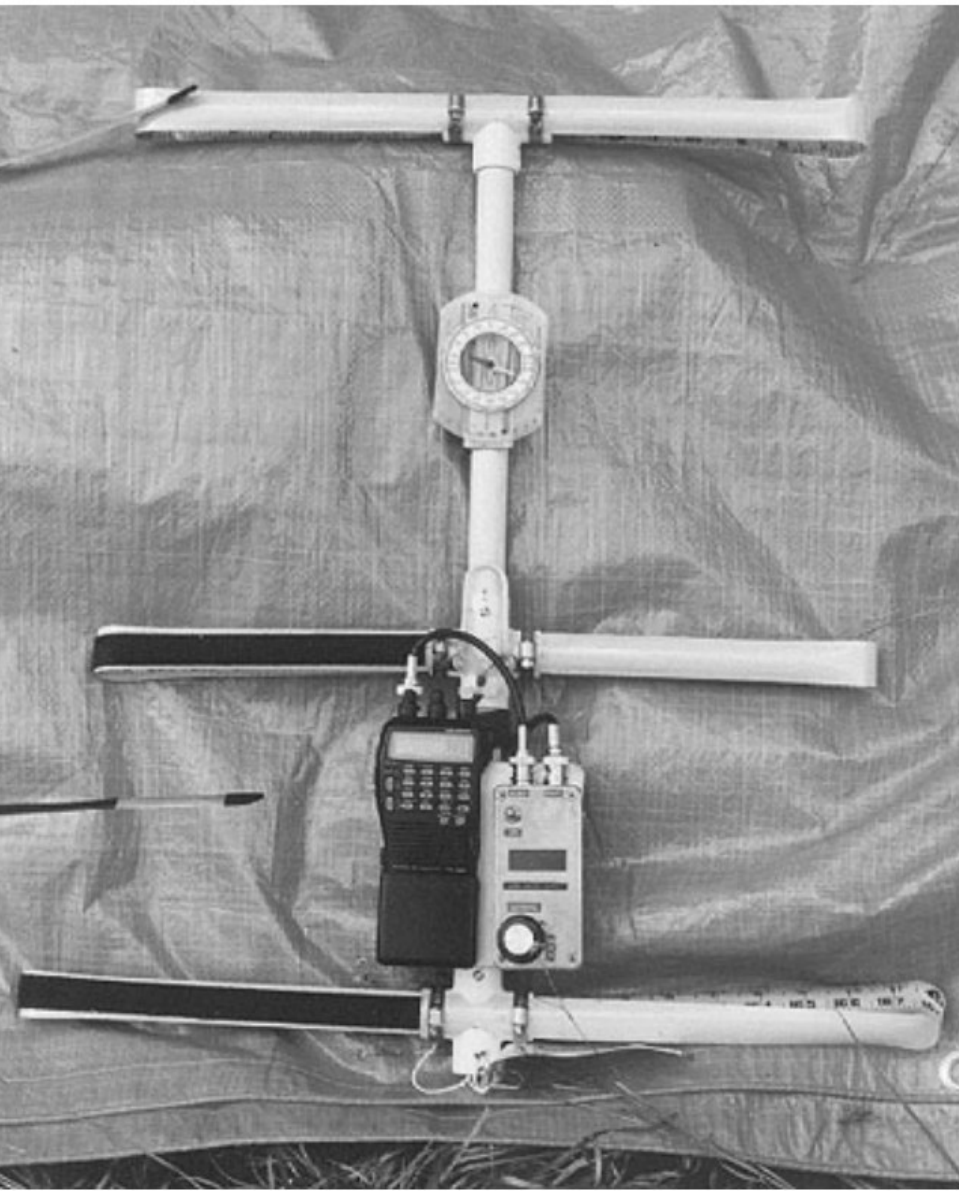
- a Hound may find the Fox. In last hunt, this took a little over an hour. In previous 2 hunts, Fox was never found.
- If so, the time and mileage are noted by the Fox
- Hunt continues for other Hounds, until end of time period (4PM?)
- After end of the hunt, participants retire to pre-selected Timmy's for beverages, bravado, bragging and belly-aching
- Bragging rights are recognized, and possibly published on a website

# What does the Fox Do?

- Uses omidirection high gain antenna
- initially at high power (20 - 50 Watts) decreasing gradually
- selects fairly open location with minimal blockage or reflection
- location is on public property, and stationary
- arrives early enough to allow testing of signal on 146.565
- does an awful lot of talking - continuously for 2 hours
- takes part in mini-net on repeater every 30 minutes
- records time and mileage of hounds who find him

# Yagi Directional Antennas

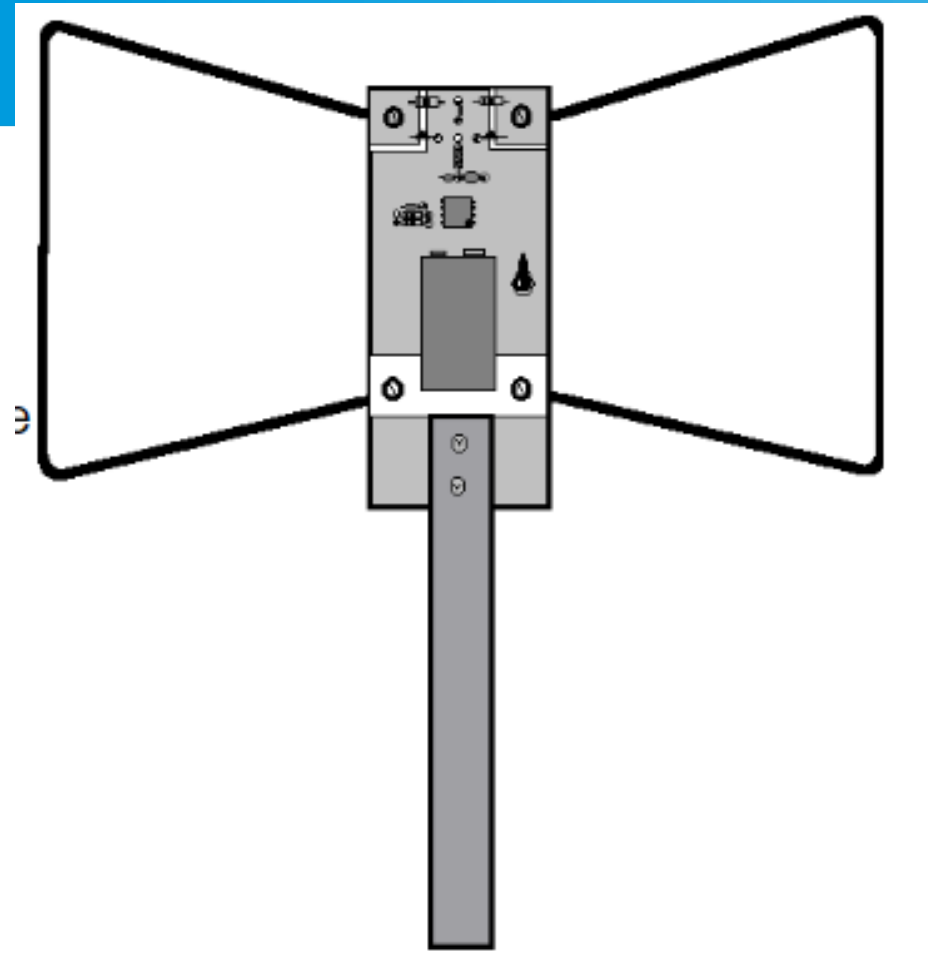
- easy and cheap to make
- often use metal tap measures
- can collapse for transport
- this one has compass attached -wonder if its accurate near metal
- plastic pipe and hose clamps
- shows radio and attenuator
- folded elements
- LARC has loaners



# How do you take a bearing with a yagi?

- hold yagi vertical to match polarization, unless you're attenuating
- rotate your body slowly to look for:
  - strongest signals (bisect the range - it's a cardioid pattern)
  - weakest signal, and use opposite direction
- Once you've decided on the direction, put the antenna on the ground, temporarily recording it. (Landmarks aren't accurate)
- Do this away from vehicle, so metal doesn't impact compass
- Use your compass and this guide to get a direction in degrees

# TDOA Directional Antennas



- TDOA = Time Difference of Arrival
- also fairly easy to build, specially if you buy a cheap kit
- small enough to transport
- a bit easier to use than Yagi's
- need a battery - bring a spare

# How do you take a bearing with a TDOA?

- Hold the antenna with the 2 antennas vertical
- Rotate your body, listening to the buzzing sound on your radio
- when buzz is quietest, Fox is broadside to antenna, ie perpendicular to the line joining the antennas
- when buzz is loudest, Fox is on line that goes thru both antennas
- when you've got direction, mark it by putting antenna on ground
- Do this away from vehicle, so metal doesn't impact compass
- Use your compass and this guide to get a direction in degrees

# Fancy Directional Antennas

- Doppler Systems, Roanoke Doppler, Little L-per DF, Happy Flyers DF, BMG SuperDF
- use electronic or automated antennas, microprocessors
- many can operate while vehicle is in transit
- Often scored as a different category in competitions
- maybe some day, but don't expect to see these in London soon

# How do you get your bearing on the map?

- If you want max accuracy, subtract 9 degrees from your compass reading to account for magnetic north not being true north
- draw a big dot on the map at your current location
- use your parallel or rolling ruler to draw a north/south line thru dot
- position protractor (or compass) with center on dot, and zero degrees straight up, on the line you just drew
- make another dot at edge of protractor at your modified bearing
- If your bearing is over 180 degrees, use (bearing - 180) instead
- connect the dots, going well past each one
- Note: you don't know which end of the line is the right one, yet



# Do we care about compass declination?

- If it's too much bother, just skip it.
- Our bearings won't be super accurate, in any case
- on the other hand, subtracting 9 isn't that hard
- some compasses have declination compensation built in
- if you're using a phone app, figure out in advance if it's based on true north or magnetic north. Mine are all magnetic.

# What happens when you get close to the Fox?

- you'll likely see strong signals in all directions - how to progress?
- need to “attenuate” (reduce) incoming signal in some way:
  - tune off frequency - say 146.560 instead of 146.565
  - use your body to block some of the signal
  - use an attenuator device on your antenna (easy to build, receive only)
  - use wrong yagi polarization to reduce effective signal
  - use the 3<sup>rd</sup> harmonic trick - Mike Watts to explain
- Think like a Fox

# What happens at end of the Hunt?

- when end time for hunt arrives, it's over, & Fox leaves
- usually, a post hunt meeting place has been decided in advance
  - typically a Timmy's close to the starting point
- in any case, repeater is used to coordinate activities
- assuming COVID allows, lots of discussion & stories, and homage paid to those earning bragging rights
- afterwards, ride-along observers are delivered back to their cars at the starting point

# Rules

We're pretty informal, but some hunts have strong rules such as:

- Fox must be on, and accessible via public property
- Fox must be stationary, and not move during the hunt
- No hounds can transmit on the Fox frequency
- You have to leave the area immediately after finding the Fox
- You can't announce that you've found the Fox, or give any hints

# Typical Fox Hunt Setup

## Key Information for a Learner Fox Hunt (may vary)

meeting place location:	<u>CHOCC</u> East Door (map on next page)
date and time for initial meeting:	typically 1:15 on a Saturday
frequency to be used by the fox:	146.565 MHz
repeater used by cooperating teams:	VE3OME, 145.450- <u>MHz</u> , PL=114.8
Start time of actual hunt:	2:00 PM .
End time for hunt:	4:30ish PM , depending on progress
location of get together after the hunt:	Timmy's at Oxford and Adelaide

# References

- <http://ka7oei.blogspot.com/2016/11/tdoa-direction-finder-systems-part-1.html>
- [https://manualzz.com/doc/12948786/tdoa-fox-hunting-antenna?\\_\\_cf\\_chl\\_jschl\\_tk\\_\\_=pmd\\_110bd52611fa787993ace730ab07966f629d0649-1628434643-0-gqNtZGzNAfijcnBszQdO](https://manualzz.com/doc/12948786/tdoa-fox-hunting-antenna?__cf_chl_jschl_tk__=pmd_110bd52611fa787993ace730ab07966f629d0649-1628434643-0-gqNtZGzNAfijcnBszQdO)
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