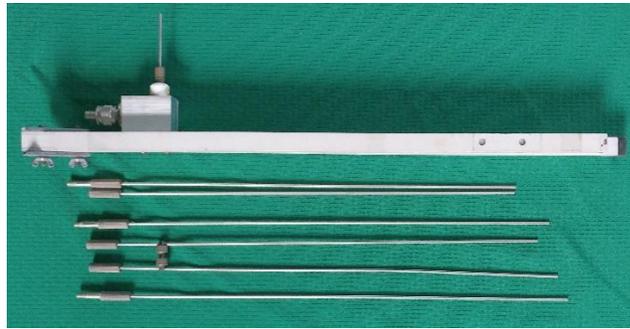
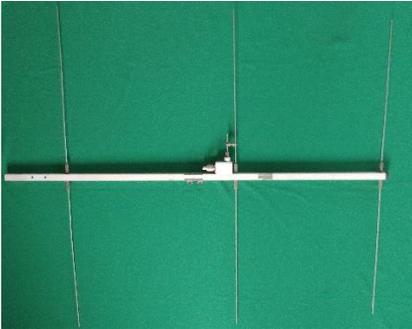


## DIRECTION FINDING ANTENNAS (For Amateur Radio Fox Hunting)

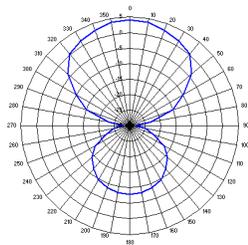
There's hundreds of articles on the web that provide information about equipment that can be purchased or built that can be used to find hidden transmitters.

The antennas and equipment I've used in the past is illustrated below:

**3 Element Yagi** The 3 element yagi is a popular antenna used for direction finding.



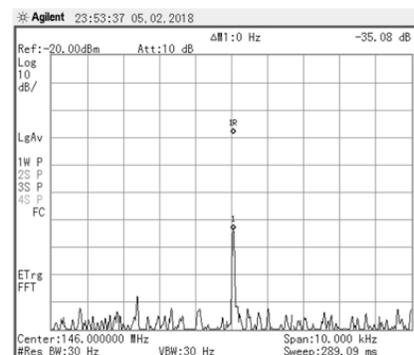
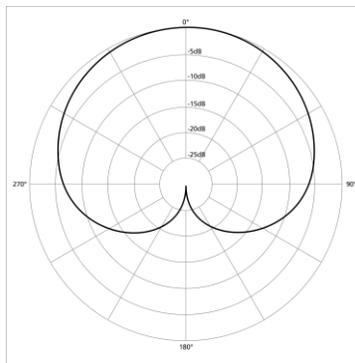
This is a portable 2M Yagi I purchased in Okinawa (1973) for transmitter hunting. It's very light and can be supported by hand at the reflector end. The radiation pattern of this antenna is shown below.



Antenna Specifications	
Gain	7.5 dBd
Front/Back Ratio	19 dB
Bandwidth	99°
Impedance	50Ω

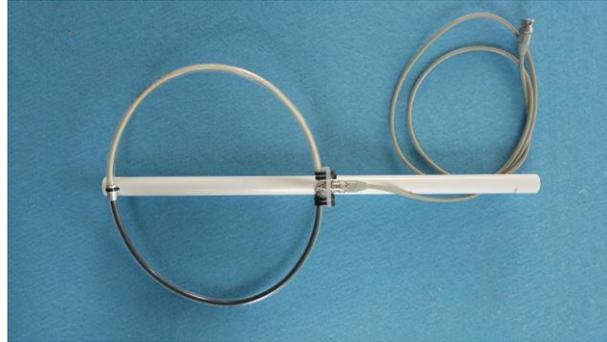
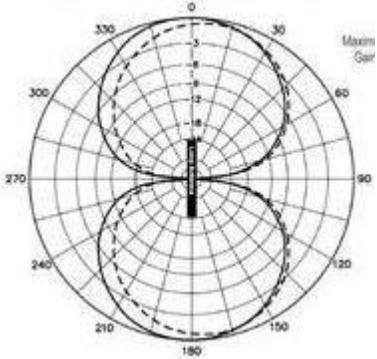
This is a good antenna to determine the "general" direction of the hidden transmitter when the signal is weak. Due to the 99° antenna bandwidth, the closer you get to the transmitter, determining direction gets more difficult and close-in its totally useless.

**Two  $\lambda/4$  Vertical Antennas** The antenna shown below is two  $\lambda/4$  ground plane antennas separated by  $\lambda/4$  wavelengths and fed 180° out of phase. This design results in a "Cardioid" radiation pattern.



Unlike the yagi antennas radiation pattern, the cardioid pattern has a very narrow notch. Adjusting this antenna for minimum signal (notch) provides a more accurate direction of the hidden transmitters location. The notch depth measured 35 dB on this antenna.

**Loop Antenna** Small loop antennas are usually the antenna choice when you get close the hidden transmitter. The main problem with most loop antennas is their radiation pattern which has 2 maximums and 2 minimums.

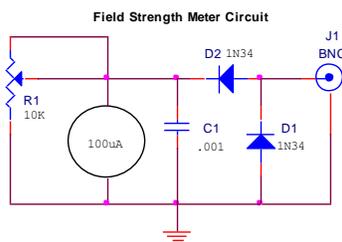


The loop antenna I use (picture) is different, it actually has a “cardioid” pattern. This antenna was originally designed to track tagged animals in Canada.

**Antenna Experiment** When you get very close to the hidden transmitter, everything goes bananas, your RF cables start picking up signals, attenuators are over powered, the RF is being reflected by every object, etc.. During Davids (KL7BX) fox hunt presentation, he showed some samples of antennas using cans soldered together. I tried a couple of these samples and discovered that the cans did not isolate the antenna probe from unwanted RF signals. Being familiar with the design of waveguide transitions where the probe is  $\lambda/4$  and the waveguide dimensions match the frequency, I’ve had some good results with the following design:



This is a single 1 gallon tomato can and the probe is a short  $\lambda/4$  ducky. The meter is an old SWR meter that has a BNC Field Strength Antenna input.



**Equipment** The TH-215A HT meter is not very accurate, but that not necessary for transmitter hunting. You need well shielded RF cables and attenuators. When you are very close to the hidden transmitter, the HT signal level meter will pick up RF even without an antenna, that's where the Field Strength meter is needed.



### Summary

Know the limitations of your equipment!! Take your hunting equipment to an open area like a football practice field. Have your buddy use a low power talkie about 100 yards away and see how your antennas and attenuators perform. If your antenna phasing harness was not designed correctly, the notch may be offset for where it would normally be. You may find that your yagi is useless at this range.

Jerry Ritchie WA5OKO