Using the MK4 foxhunt receiver to hunt short pulsed transmissions

The VK3YNG MK4 foxhunt sniffer (V2.2 or later) has a special mode for hunting very short duration “pulsed” or “pip”-like sounding transmitters.

These beacons have transmission times of typically around 40 milliseconds and are often used for tracking animals, rockets and model aircraft.

These short transmissions can be very hard to deal with when listened to in the standard tone modes on the VK3YNG sniffer. The transmission is usually so short that the user cannot distinguish the audio tone pitch to determine a direction. The sniffer has a new “peak extend” mode which stretches out the received pulse so that its signal level and resultant tone can easily be determined.

Setting up Peak Extend mode

To successfully look for these very short duration transmissions, the sniffer needs to be set up in “peak extend” mode with a range down delay of 5 seconds. To set this mode:

- Make sure the sniffer is turned off
- Press and hold the “6” button on the sniffer
- While holding this button, power up the sniffer with the “M” button
- The sniffer will beep and briefly display “J”
- Press the “7” or “dset” key. The sniffer will display “d”.
- Press the “5” key
- The sniffer is now configured for “peak extend” mode

The peak extend mode only needs to be set once. The sniffer will remain in this mode for each subsequent use until another filter mode is set.

For pulsed transmissions that only occur every few seconds or longer apart, it may also be useful to activate “Peak hold” mode. For more information on this mode, consult the sniffer operation manual.

Note that if the sniffer is to be used for finding longer pulsed intermittent or continuous transmissions, the peak extend mode may be confusing. For hunting these signals, filter modes 1 through 3 are recommended. Filter mode “1” is the factory default. Also a range down delay of 5 seconds may be too long. A setting of around 2 seconds may be more appropriate. For more information please refer to the sniffer operation manual.

Using the Sniffer

Using the sniffer to locate a signal source is straightforward and intuitive. Just remember the motto "***highest range then highest tone***". Once the sniffer is powered up and the frequency or channel selected, operation is effectively hands free.

Power control and receive mode.

The sniffer is capable of receiving in 4 standard modes. These modes are *Tone, AM, Unmuted FM* and *Muted FM*. Pressing the "M" button powers up the receiver and cycles through these receiving modes. In most cases the *"Tone"* mode will be used to determine signal directions. The sniffer indicates this mode by briefly showing "t" on the display after the "M" button is pressed. Pressing and holding the "M" button for more than a few seconds will power down the receiver.

Channel selection

The receiver always powers up on the mode and frequency stored in channel 1. There are a total of 6 programmable channels on the sniffer. Recalling any channel is just a matter of pressing the appropriate channel button. For information on setting channel frequencies please refer to the sniffer operation manual.

The range display

The range display is effectively a measure of how much signal the sniffer is receiving. In effect it tells you how close you are to the signal source.

- 0 = Extremely weak signal or no signal
- 5 = Close to a medium power signal
- 9 = Very close to a very strong signal

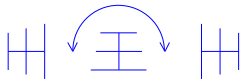
The maximum number displayed when you point directly at a very close signal source will vary depending on how strong the transmitter is. A bit of practice with a typical transmitter will help you determine how the range display indication varies with distance.

Note: When you first set the frequency in peak extend mode, it may take a few pulses before the tone is properly heard, especially if the pulse duration is very short. It can take a few transmissions for the sniffer to determine the proper range to use. Once it has done so, the tone will be heard clearly.

Direction Finding Techniques

Using the sniffer for direction finding takes a little practice, but it doesn't take long at all to become proficient enough at it to find any beacon.

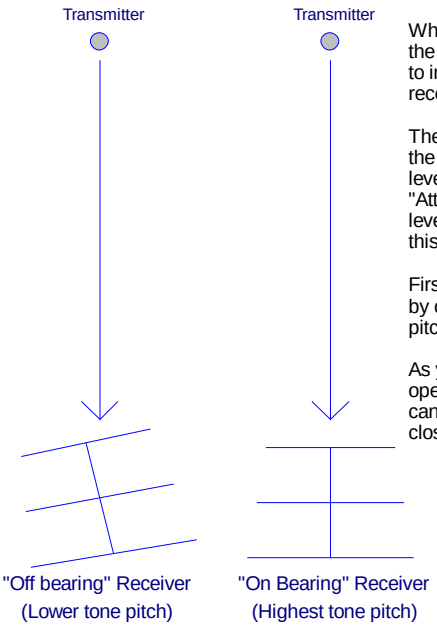
When trying to determine the signal direction, always swing the antenna from left to right over an arc of between 90 and 180 degrees through the "peak" of the tone pitch.



For a continuous signal, swing the antenna back and forth continually while walking towards the transmitter.

For intermittent pulsed signals, the same thing applies except that you will need to try different directions and wait for each transmission. Compare the tone pitch for the different directions and head towards the direction that gives highest pitch.

Every 10 steps or more, do a full 360 degree rotation to make sure that you haven't overshot the transmitter or followed a reflection or false bearing.



When heading towards the transmitter the pitch of the signal tone will continue to increase to a point just before the receiver saturates.

The processor inside the receiver sees the signal has reached the saturation level and automatically adds "Attenuation" which reduces the signal level. You will notice two things when this happens.

Firstly, the "range" display will increase by one range. Secondly, the tone pitch will suddenly drop.

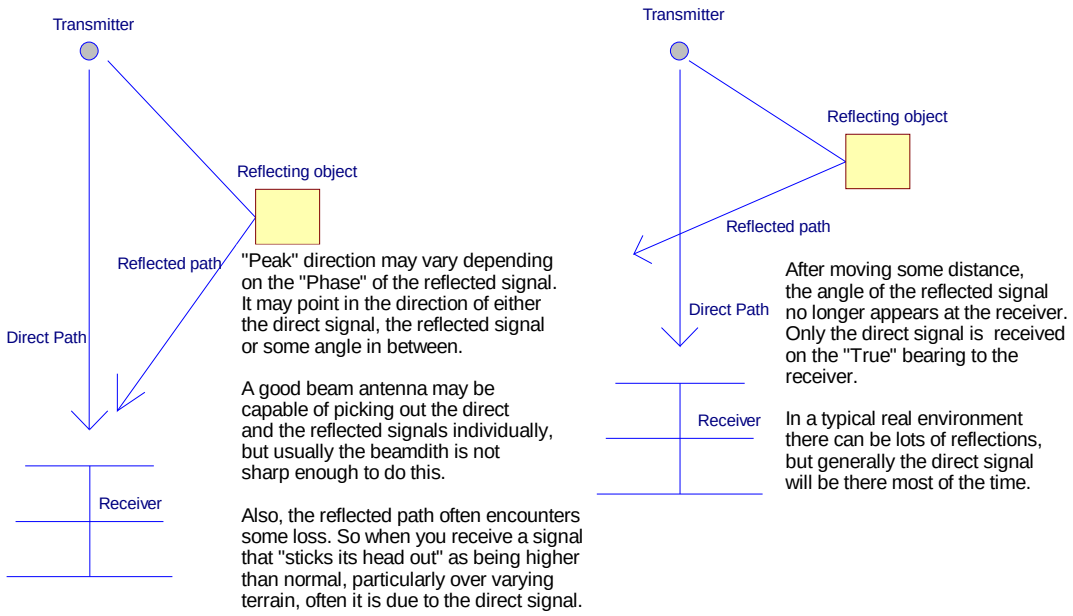
As you get closer to the transmitter, this operation will happen more often and can help give an idea of how much closer the transmitter is.

A few tips to remember:

- Always hold the receiver so the display can be easily seen and the speaker easily heard.
- Always keep sweeping the receiving antenna from left to right over a 90 to 180 degree arc while approaching a transmitter or signal source.
- Every few minutes, do a slow and complete 360 degree spin to ensure that you have not "overshot" the signal source or been fooled by a strong or local reflection.
- Always remember the motto *"Highest range then highest tone"* while using the sniffer.

The Multipath problem

The major problem to contend with at VHF and higher frequencies is a phenomenon called “multipath”. This is where signals reflect off other objects such as metallic structures, hills and even vegetation. Signals in this case either skew or appear to come from multiple directions, hence the term “multipath”. Signals in this case can either skew or appear to come from multiple directions. A good antenna can help sort out some reflections from the wanted signal, but in many cases reflections become something that you just have to deal with.



The useful thing to know about reflections is that they come and go. In most cases if you always make the effort to determine the ***strongest*** signal, you will eventually end up at the signal source. With a bit of practice you can get fairly good at working out which signal is a reflection is which is a direct signal. The major thing to remember is to keep moving. Even if you do start following a reflection, you probably won’t be doing so for long.

Multipath is a bit more difficult to deal with for intermittent signals but the techniques are the same.

Final Comments

With a bit of practice, hunting any signal source should be simple and straightforward with the MK4 sniffer. The peak extend mode makes hunting for short pulse signals almost as easy as continuous ones.

Once the receiver is properly set up, there should be no need to do any adjustments from the time the signal is first received through to when the transmitter is found. Using the MK4 sniffer to quickly and successfully find any signal source should be easy for anybody regardless of age or technical background.