

**3rd Planet Solar /
KC9ON**



Amateur Radio and Electronic Hobby Kits, Parts, and Accessories

FOX HUNT OFFSET ATTENUATOR



When you're closing in on the fox you may find the signals to be so strong that you can no longer find a peak or null with your antenna. Sometimes the signal is so strong that the RF will leak straight into the radio, connections and other equipment making the antenna useless. The solution is to use an offset attenuator. The circuit consists of a small RF generator, in this case 4MHz, which will mix with the incoming fox signal (such as 146.52MHz) and produce new signals at plus and minus the fox signal (142.52Mhz and 150.52Mhz). A potentiometer on the board changes the injection level of the RF generator which in turn attenuates the incoming mixed signal to your radio to a level where tracking can continue.

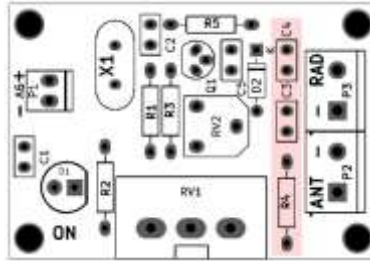
TIP: This project also makes a nice generic crystal oscillator for the basis of a QRP radio or other multiple uses. Before inserting the crystal, solder in a machine pin header (not included) in order to put in various crystal frequencies.

Parts List:

QTY	Ref	Description	Markings
1	C1	Capacitor Disc 0.1uF .1ls	104
1	C5	Capacitor Disc 15pF .1ls	15
	C2 C3		
3	C4	Capacitor Disc 220pF .1ls	221
1	D1	LED 5mm Red	
1	Q1	Transistor JFET J113	J113
1	RV2	Trimmer Horiz 6mm 20K	203
1	X1	Crystal HC49/S 4.000MHz	4.000
2	P2 P3	Terminal Block 5mm 2 pin	
1	P1	Header Wafer 2.54mm 2 pin	
1		PCB Foxhunt V5	
1	D2	Diode Switching 1N4148	
1	R1	Resistor 1/4W 5% 1K Ohms	Brown-Black-Red-Gold
2	R2 R5	Resistor 1/4W 5% 2.2K Ohms	Red-Red-Red-Gold
1	R4	Resistor 1/4W 5% 4.7K Ohms	Yellow-Violet-Red-Gold
1	R3	Resistor 1/4W 5% 1M Ohms	Brown-Black-Green-Gold
1		Knob Red-Black	
1	RV1	Resistor Potentiometer .2ls 10K Ohms LOG	A10K
1		Hardware Bezel LED 5mm	
1		Switch Toggle Chassis SPDT	
1		Connector 9V Battery Clip Assy	

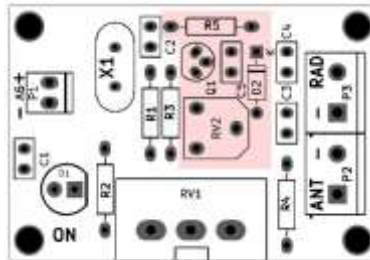
1. Install, solder and clip the excess leads on the following components:

<input type="checkbox"/>	R4	Resistor 4.7K Ohm	Yellow-Violet-Red-Gold
<input type="checkbox"/>	C3	Capacitor 220pF	221
<input type="checkbox"/>	C4	Capacitor 220pF	221



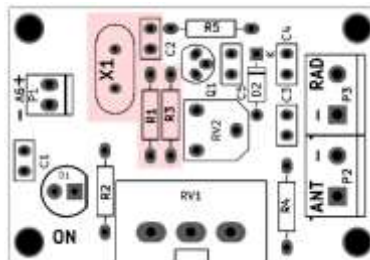
2. Install, solder and clip the excess leads on the following components:

<input type="checkbox"/>	D2	Diode 1N4148	Observe the band position
<input type="checkbox"/>	C5	Capacitor 15pF	15
<input type="checkbox"/>	Q1	Transistor J113	Align the flat side of the transistor to the flat side on the PCB. Substitutes: J112 or MPF102
<input type="checkbox"/>	R5	Resistor 2.2K Ohm	Red-Red-Red-Gold
<input type="checkbox"/>	VR2	Trimmer 20K	Set trimmer to the center position.



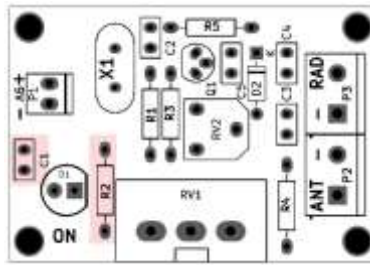
3. Install, solder and clip the excess leads on the following components:

<input type="checkbox"/>	C2	Capacitor 220pF	221
<input type="checkbox"/>	R3	Resistor 1Meg Ohm	Brown-Black-Green-Gold
<input type="checkbox"/>	R1	Resistor 1K Ohm	Brown-Black-Red-Gold
<input type="checkbox"/>	X1	Crystal 4.000MHz	



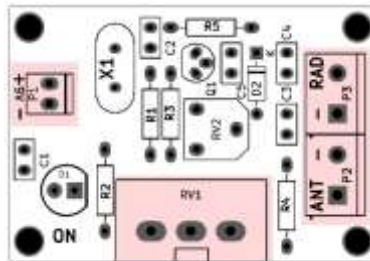
4. Install, solder and clip the excess leads on the following components:

<input type="checkbox"/>	R2	Resistor 2.2K Ohm	Red-Red-Red-Gold
<input type="checkbox"/>	C1	Capacitor .1uF	104



5. Install, solder, and clip the excess leads on the following components:

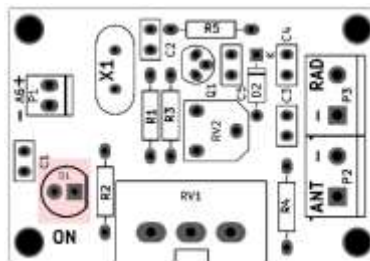
- | | | | |
|--------------------------|-------|----------------------|---|
| <input type="checkbox"/> | P2 P3 | Terminal Block 2 pin | Slide 2 terminal blocks together using the pins and grooves on the sides of the block. Solder the combined block at P2 and P3. Make sure the wire insertion area is positioned AWAY from the board. Once soldered, unscrew the screws until they are flush to the top of the block. |
| <input type="checkbox"/> | P1 | Wafer Header 2 pin | Orient the locking tab toward the inside of the PCB |
| <input type="checkbox"/> | RV1 | Potentiometer 10K | Keep as perpendicular to the PCB as possible. Install the knob on the potentiometer. |



6. Install the LED as follows:

- ☐ Position the LED with the flat spot is on the right. Insert the LED bezel over the LED. Bend the LED leads downward 90 degrees where it exits from the bezel.
- ☐ Place the leads into position D1 on the PCB. Adjust the height to 1/2" between the PCB and the center of the LED. The LED should be aligned with the center of the potentiometer shaft. Apply a small amount of solder to 1 lead. Check spacing and adjust as needed. When spacing is correct solder both leads and trim the excess.

Note: You may wish to perform the final adjustment of the LED when placing the PCB inside a chassis. The bezel may also be removed until chassis build.



This completes the PCB Assembly.

Power Wiring & Initial Testing

[]	Trim to length as needed and strip 1/8" on each of the 9V battery assembly positive (red) wires.
[]	Solder one of the wires to the center of the switch.
[]	Solder the remaining wire to one of the switch side terminals.
[]	Connect cable assembly housing to P1 on the PCB.
[]	Connect a 9V battery (not included) to the battery clip. The LED should be lit when the switch is placed in the on position. *Note: Any DC power source can be used between 6 and 12V.
[]	Optional testing and troubleshooting: Using an Oscilloscope, with the ground connected to the negative battery terminal, a 4MHz signal of 200-300mV can be seen at the Antenna and Radio terminal as RV1 and RV2 are turned. Alternatively, a signal should be heard when placing the unit near an HF radio tuned to 4.00MHz using a short piece of wire attached to either the radio or antenna terminals.



Chassis Assembly (Parts NOT included in kit)

For best performance it is recommended to use a metal enclosure to keep stray RF to a minimum. A plastic box, cookie tin, coffee tin, or even mounted straight on the antenna can also be used. Below is a list of possible material and example of final assembly.

Materials Needed (may vary with build and not included with kit):

QTY	Description
1	Enclosure a minimum of 2" x 2" x 1" (50.8mm X 50.8mm X 25.4mm) or larger
1	9V Battery or 6-12VDC power source
2	RF connectors such as a chassis mount BNC or UHF
4-8	4-40x1/2" screws with locking washers (for SO-239 & PCB mounting)
2	#4 solder lugs (for SO-239 ground)
6"	Coax RG-174
4	Spacers (Pony Board) to space PCB off from metal areas.

- [] If using an enclosure Lay out, drill and deburr Holes for potentiometer, LED, Switch and RF Connectors or coax pass-thru's.
- [] Cut coax to length and strip for antenna connection side. Place coax into the terminal block locations marked ANTENNA observing ground (shield). The other end of the coax can be run straight to the antenna or a coax connector of your choice.

- [] Cut coax to length and strip for radio connection side. Place coax into the terminal block locations marked RADIO observing ground (shield). The other end of the coax is typically run to a mating coax connector for your radio (BNC/SO-239, etc.).
- [] Insert coax connectors, PCB, and battery into enclosure.

Using the Offset Attenuator

WARNING!! DO NOT TRANSMIT with the offset attenuator in place! Damage to your radio and attenuator may occur!

*****TIP:** Practice, adjust, and set up your equipment using a fixed frequency, like the National Weather Service. It's a great way to find your beam antenna peaks and nulls.

- [] Connect a directional antenna, such as a tape measure beam, to the Antenna jack on the offset attenuator.
- [] Connect a directional antenna, such as a tape measure beam, to the Antenna jack on the offset attenuator.
- [] Tune the radio 4MHz ABOVE OR BELOW the fox frequency. For example, if the fox is on 146.52MHz then tune the radio to either 150.52MHz or 142.52MHz.
- [] Adjust the pot until the fox is barely audible. Sweep the antenna to look for a peak or null to find the fox.
- [] You may find the RV1 pot to not be sensitive enough to attenuate depending on your equipment, fox, etc. In these cases set the RV1 pot to mid position. Then adjust trimmer RV2 clockwise where desired attenuation occurs.
- [] Right on top of the fox and need even more attenuation? Try higher multiples of 4MHz. For the example above use 154.520MHz 158.520MHz, 162.520Mhz, etc.

