Step by Step Building PJ-80 80-meter ARDF Receiver Kit

CRKITS.COM
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What is ARDF? ARDF is the abbreviation of Amateur Radio Direction Finding, or so called Fox Hunting. If you are looking for a kit that you can build in an evening, and put into use to actually hunt a few “foxes”. The PJ-80, an 80-meter ARDF receiver kit designed by Chinese Radio Sports Association, might be an ideal choice for you. This document is written as a supplement of the original assembly manual to show you step by step building with photos. Also, you may have found out, this document is arranged to be friendly to Kindle or iPad, as many of you already own and use more frequently than your PC or laptop now.

Read Full Manual First

The original version of full manual is still very useful, so please download and read it before you actually start the kit building. It can be found at http://crkits.com/pj80manual.zip.

Parts Inventory

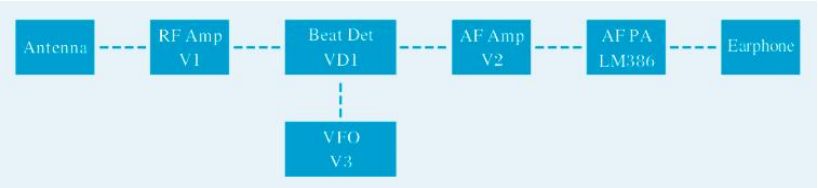
First thing first is to do parts inventory. A complete part list is located at http://crkits.com/pj80partlist.pdf.

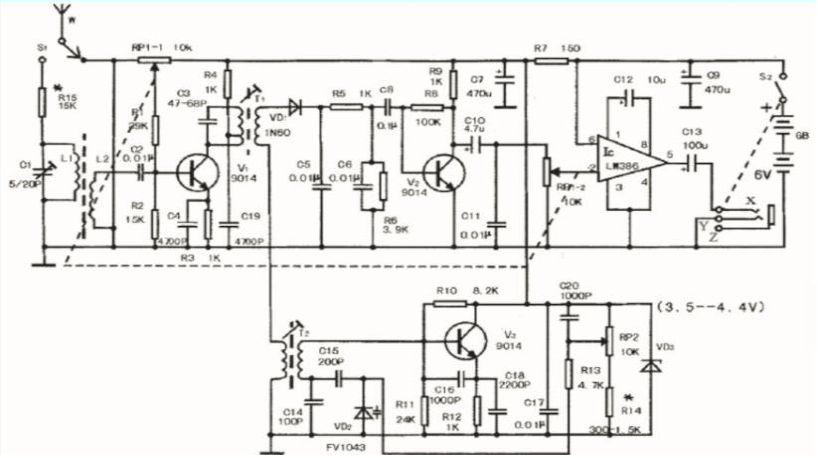
Tools Preparation

You don't have to own signal generator, oscilloscope, or spectrum analyzer. What I used is just an amateur radio transceiver, a 50-ohm dummy load, and a few other basic tools, like soldering iron, Philip screw driver, and a clipper.

Cannot Wait to Start Building?

No worries. It is highly recommended that you study the block diagram and schematic first. It is nothing to do with rocket science, you see, it is actually a simple direct conversion 80-meter band receiver. Okay, let's get started!





Step 1: Audio Amplifiers

In the first step, we will build two stages of audio amplifiers. One is the audio amplifier V2 (9014), and the other is the power amplifier IC (LM386). Please step by step follow us to build the kit. Once you finish one step, please check it.

[ ] Put earphone connector X (and the built in switch S2) in the place of S2 on PCB, and solder.

[ ] Put C13 (100 uF) in place and solder. The long lead should be inserted into the pad with “+”.

[ ] Put C12 (10 uF) in place and solder. The long lead should be inserted into the pad with “+”.

[ ] Put C9 (470 uF) in place and solder. The long lead should be inserted into the pad with “+”.

[ ] Put IC socket in place and solder. The notch should align with the PCB marking. Carefully bend the pins of IC (LM386) and insert into the socket. Check to align the notch again.

[ ] Put R7 (150 ohm, BRN-GRN-BRN-GLD) in place and solder.

[ ] Put C7 (470 uF) in place and solder. The long lead should be inserted into the pad with “+”.

[ ] Put C10 (4.7 uF) in place and solder. The long lead should be inserted into the pad with “+”.

[ ] Put C11 (0.01 uF, 103) in place and solder.

[ ] Put C17 (0.01 uF, 103) in place and solder. This capacitor is not shown on the schematic.

[ ] Put R9 (1k, BRN-BLK-RED-GLD) in place and solder.

[ ] Put R8 (100k, BRN-BLK-YEL-GLD) in place and solder.

[ ] Put V2 (9014) in place and solder. Check the PCB marking to make sure the orientation is correct.

[ ] Put VD3 (3.5~4.4V zener diode) in place and solder. All three diodes in this kit are very similar. Check the markings on glass body to differ them first. One is 1N60P, one is FV1043, the last one is this zener diode. The black band end is the cathode, and should be aligned with the marking on PCB.

[ ] Put C8 (0.1 uF, 104) in place and solder.

[ ] Put C6 (0.01 uF, 103) in place and solder.

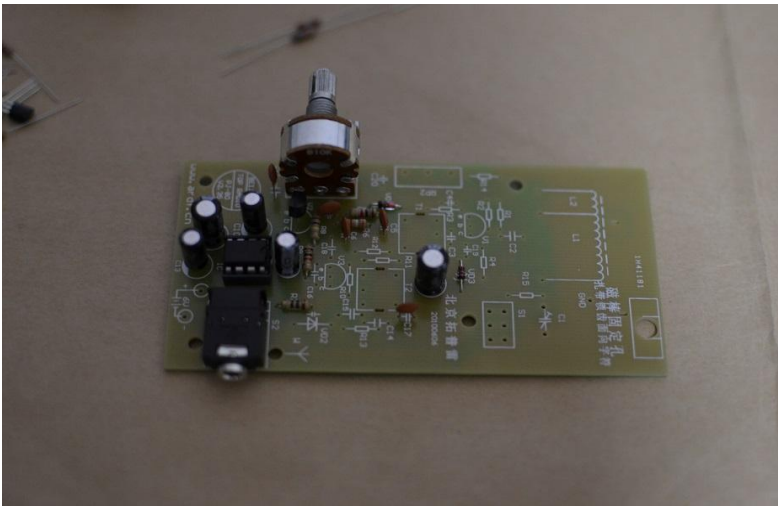
[ ] Put C5 (0.01 uF, 103) in place and solder.

[ ] Put R5 (1k, BRN-BLK-RED-GLD) in place and solder.

[ ] Put R6 (3.9k, ORG-WHT-RED-GLD) in place and solder.

[ ] Put VD1 (1N60) in place and solder. This diode has 1N60P marking on the glass body. The black band end is the cathode, and should be aligned with the marking on PCB.

[ ] Finally, put RP1 (two gang potentiometer) in place and solder. After this step, the board is shown as below.



[ ] It is optional to connect to battery holder now and test the audio amplifiers. If you do so, just solder the red wire to the 6V “+” pad, and solder the black wire to the 6V “-” pad near the earphone connector. Install 4 pcs AA batteries, plug in the attached earphone to the earphone connector, and it should automatically switch on the power. Turn RP1 to middle, and touch any pin on VD1 to inject some noise, and you can hear in the earphone. Turn RP1 will adjust the volume. After the test, please remember to unplug the earphone to switch off the power.

Step 2: Local Oscillator

In this step, we will build a oscillator and adjust the frequency range to cover 3.5~3.6 MHz.

[ ] Put V3 (9014) in place and solder. Check the PCB marking to make sure the orientation is correct.

[ ] Put VD2 (FV1043) in place and solder. This diode has FV1043 marking on the glass body. The black band end is the cathode, and should be aligned with the marking on PCB.

[ ] Put C18 (2200p, 222) in place and solder.

[ ] Put C16 (1000p, 102) in place and solder. If your kit has two 102 capacitors, one is ceramic and another is monolithic, please use monolithic here.

[ ] Put R12 (560 ohm, GRN-BLU-BRN-GLD) in place and solder. The part list and schematic have the old value of 1k, but recent kit has this updated value.

[ ] Put R11 (24k, RED-YEL-ORG-GLD) in place and solder.

[ ] Put R10 (8.2k, GRY-RED-RED-GLD) in place and solder.

[ ] Put R13 (4.7k, YEL-VIO-RED-GLD) in place and solder.

[ ] Put R14* (300-1.5k, in my kit, it contains 910 ohm, WHT-BRN-BRN-GLD) in place and solder.

[ ] Put C20 (1000p, 102) in place and solder. If your kit has two 102 capacitors, one is ceramic and another is monolithic, please use ceramic here.

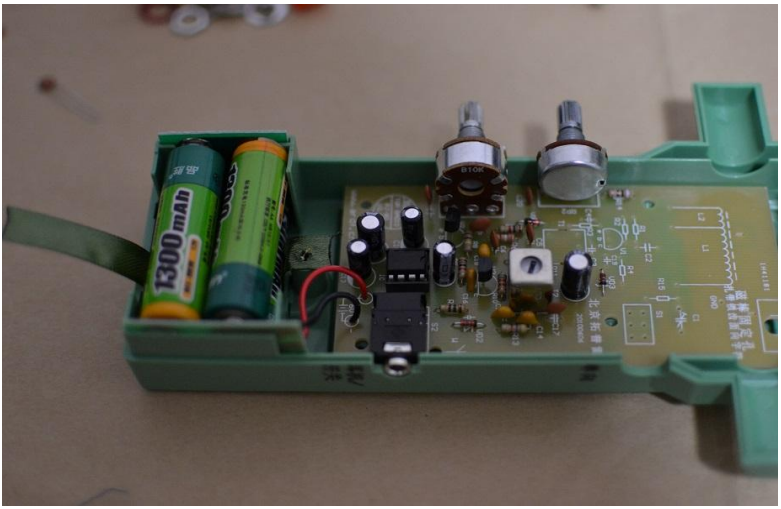
[ ] Put C15 (200p, 201) in place and solder.

[ ] Put C14 (100p, 101) in place and solder.

[ ] Put RP2 (one gang potentiometer) in place and solder.

[ ] Put T2 (shielded coil, white capped) in place and solder.

[ ] You will need to connect to battery holder now. If you haven't done previously, solder the red wire to the 6V “+” pad, and solder the black wire to the 6V “-” pad near the earphone connector. Install 4 pcs AA batteries, plug in the attached earphone to the earphone connector, and it should automatically switch on the power. If you haven't tested audio amplifiers previously, turn RP1 to middle, and touch any pin on VD1 to inject some noise, and you can hear in the earphone. Turn RP1 will adjust the volume. After this step, the board is shown as below.



[ ] Now you will need to use a SSB or CW receiver to align the oscillator frequency coverage. In my example, I connect a dummy load to the transceiver, and put the dummy load near the kit, and adjust the frequency near 3.55-MHz in CW mode. Turn RP2 to the middle, where you can feel a stop, and adjust shielded coil T2, so you can hear a tone in the transceiver. You can turn RP2 to the two ends to make sure the frequency coverage is a bit wider than 3.5~3.6-MHz. I don't want to

mislead you here, but you don't have to own an Elecraft KX3 to do the job. Any transceiver will do. After the alignment, please remember to unplug the earphone to switch off the power.

Step 3: RF Amplifier

In this step, you will build a RF amplifier, and connect the antennas.

[ ] Put T1 (shielded coil, black capped) in place and solder.

[ ] Put R4 (1k, BRN-BLK-RED-GLD) in place and solder.

[ ] Put R3 (1k, BRN-BLK-RED-GLD) in place and solder.

[ ] Put C3* (47-68p, in my kit, it is a 50p ceramic) in place and solder.

[ ] Put C19 (4700p, 472) in place and solder.

[ ] Put C4 (4700p, 472) in place and solder.

[ ] Put V1 (9014) in place and solder. Check the PCB marking to make sure the orientation is correct.

[ ] Put R1 (39k, ORG-WHT-ORG-GLD) in place and solder.

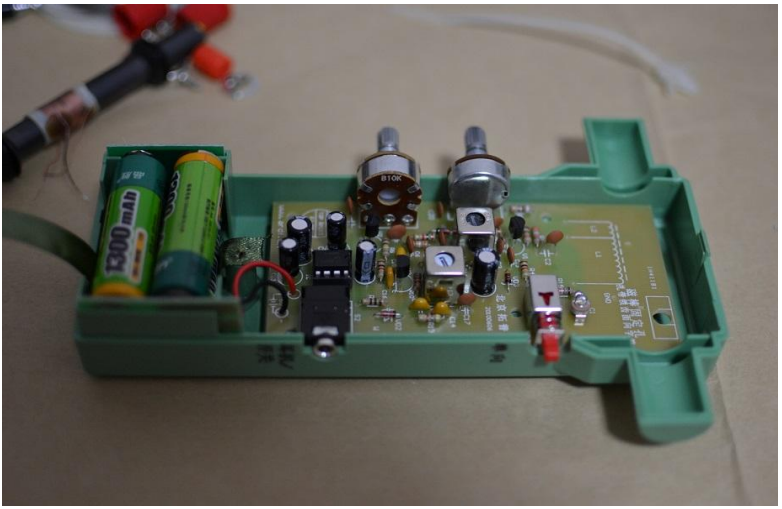
[ ] Put R2 (15k, BRN-GRN-ORG-GLD) in place and solder.

[ ] Put C2 (0.01 uF, 103) in place and solder.

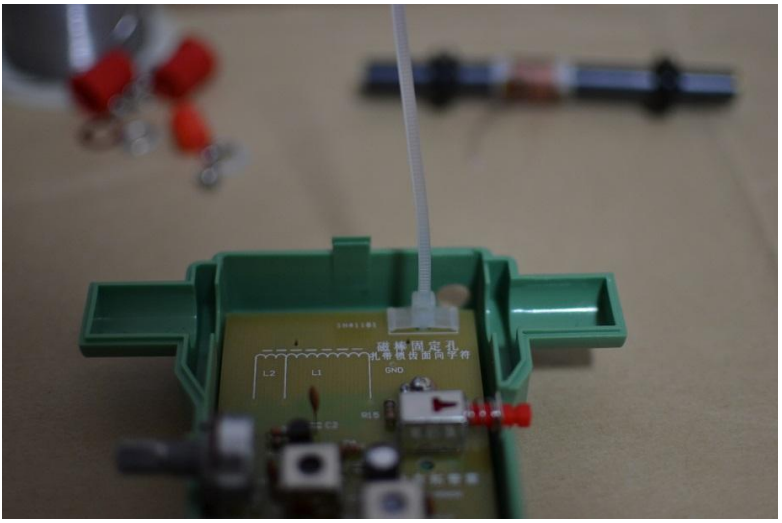
[ ] Put C1 (5~20p capacitor trimmer) in place and solder.

[ ] Put R15* (5-20k, in my kit, it is 18k, BRN-GRY-ORG-GLD) in place and solder.

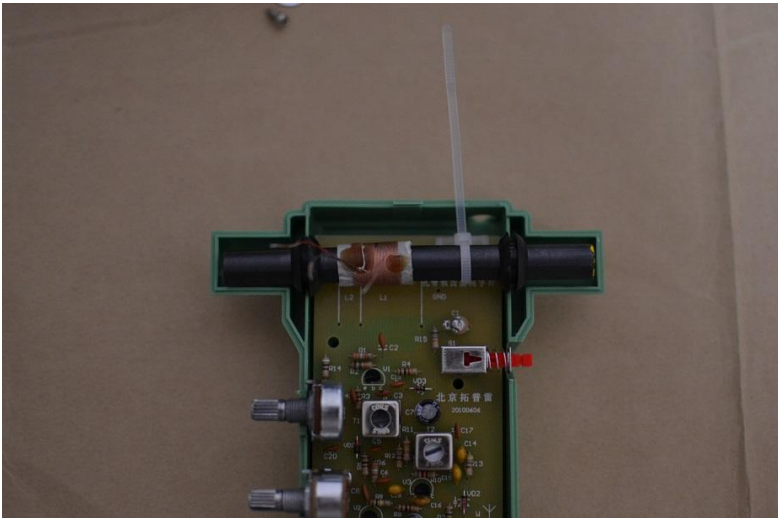
[ ] Put S1 (antenna switch) in place and solder. After this step, the board is shown as below.



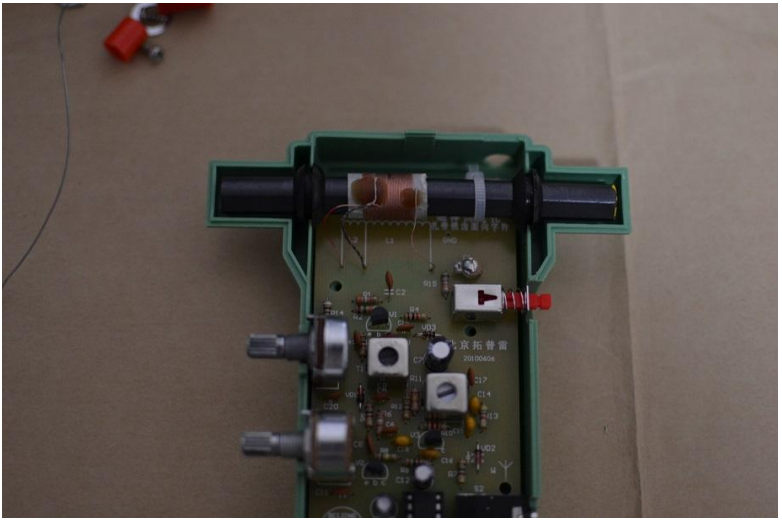
[ ] Plug the nylon strip in the hole, and make the studded side to face to you.



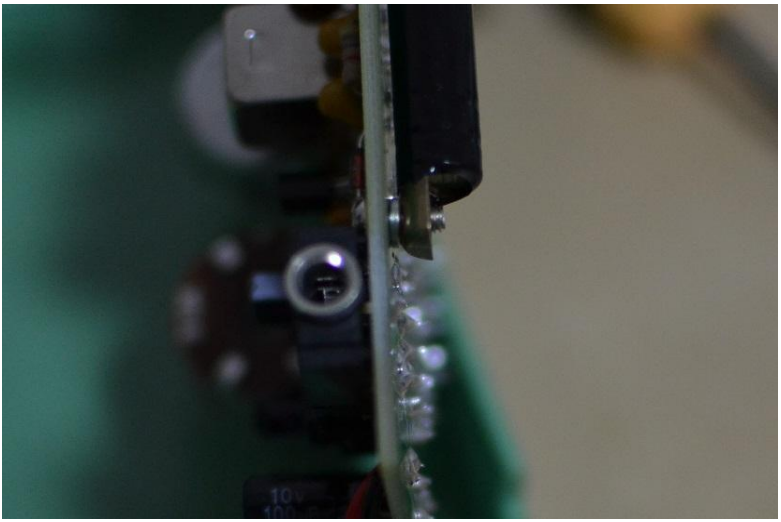
[ ] Bind the magnetic rod with the nylon strip, check the coil windings to the tap (with less turns on the left), adjust the location, and tighten.



[ ] Cut the extra strip. Solder 3 tinned ends of the coils on the magnetic rod to the board. See the PCB marking to connect the right windings (less turns on the left).

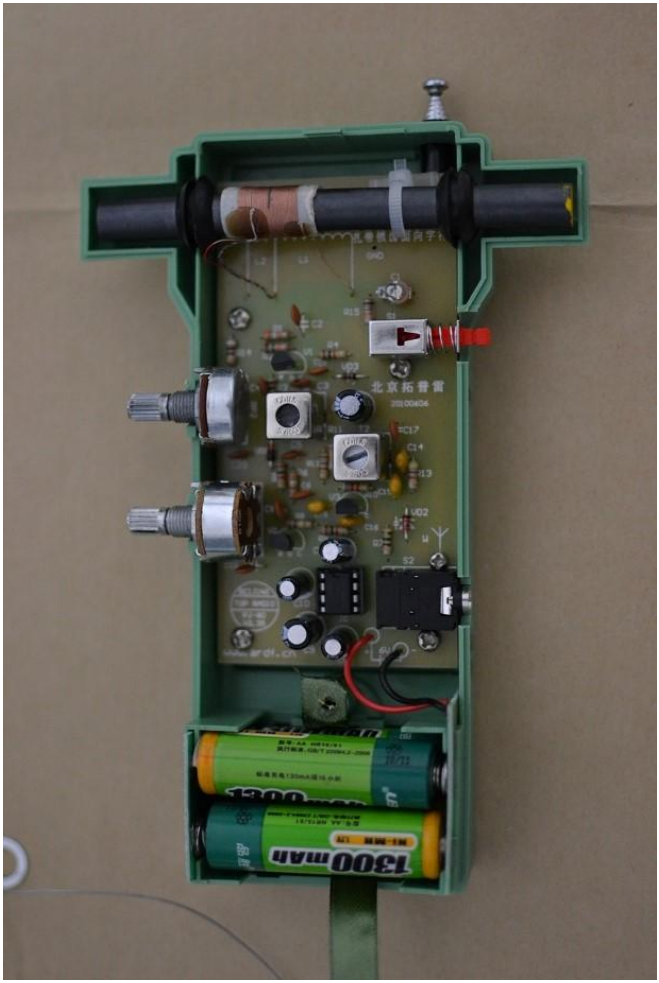


[ ] Finally, connect the telescope antenna W by a Philip screw driver. Place the lock washer in between the solder layer of the PCB and the telescope antenna. Note that don't scratch the cover paint on the antenna, or it will be easier to short circuit with the PCB.



Step 4: Alignment

In this step, you will need a transceiver (or signal generator) again to transmit test signals, so you can align the ARDF receiver sensitivity across the frequency coverage. If you haven't aligned local oscillator frequency coverage, you can do so first.



[ ] Place a transmitter nearby, and connect a dummy load. Adjust the RF power output to minimum (no bigger than 5 watts). Send CW signal and you should be able to hear from the ARDF receiver after fine tune. Follow the full manual instruction to send 3.53-MHz test signal, and adjust C1 to peak the signal. If not possible to peak the signal, you can adjust the location of the coil on the magnetic rod. Then, send 3.57-MHz test signal and you can turn T1 to peak the signal again.

[ ] Finally, you may need to follow full manual to fine tune R15 value to align the directionality.

Step 5: Final Assembly

In this step, you can finally assemble the PCB, the case, and knobs. After this step, your ARDF receiver is ready to go for a fox hunting.

[ ] Use 4 pcs shorter screws to fix the PCB to the front cover.
[ ] Cover the back cover, and use the long screw to fix it.
[ ] Use washers and nuts to fix the potentiometers.
[ ] Put on the red knobs. After this step, the final assembly is done as shown below.

If you are interested in this kit, please pay a visit to http://crkits.com and you can place order directly online.