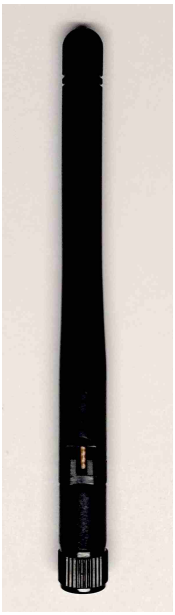
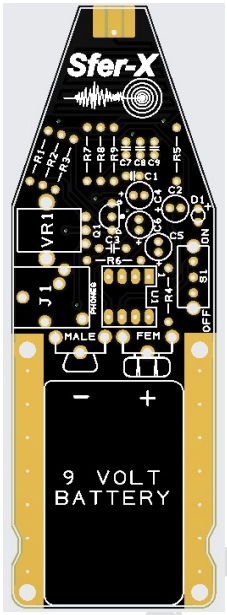
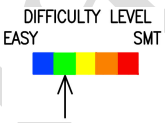
QRPBuilder K8TND Sfer-X Receiver







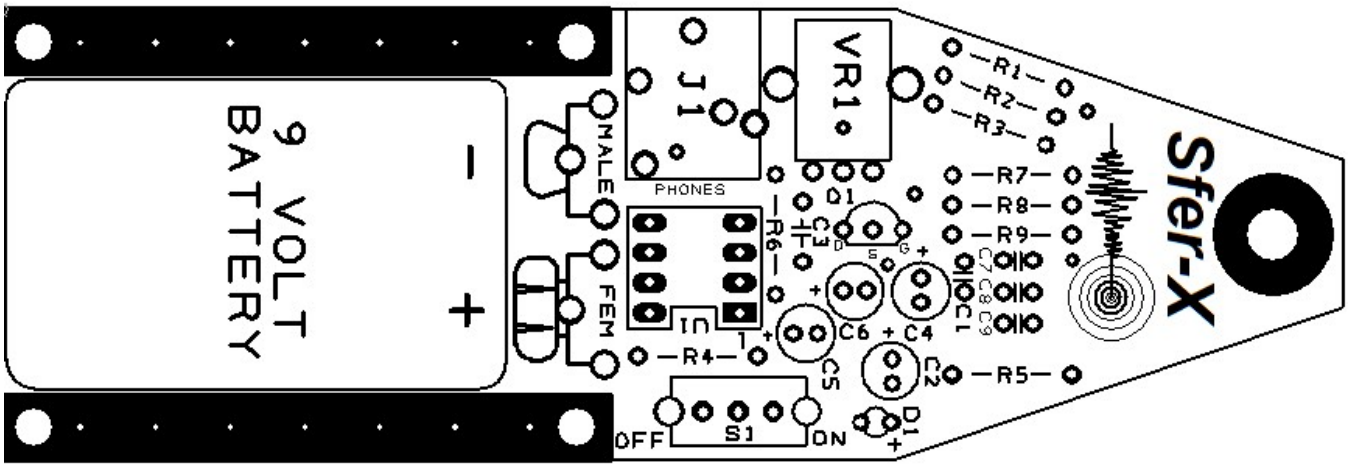
First, familiarize yourself with the parts and check for all the components. If a part is missing, please contact us at grpbuilder@gmail.com andd we will send you one.

Please read all the instructions before starting to assemble the receiver. Read the tips carefully in the appendix. Also, the appendix contains information to help identify the various small components.

Parts List

1 – QRPGuys K8TND Sferics Receiver PCB
1 – U1, LM386 DIP IC
1 – Q1, J310 transistor
1 – D1, green LED
1 – R1,8,9, 3.9M resistor (orange-white-green-gold)
1 – R2, 10K resistor (brown-black-orange-gold)
1 – R3, 6.2K resistor (blue-red-red-gold)
2 – R4,6, 820 ohm resistor (gray-red-brown-gold)
1 – R5, 4.7K resistor (yellow-violet-red-gold)
1 – R7, 1M resistor (brown-black-green-gold)
1 – VR1, 10K vertical pot
1 – C1, 220pF MLCC capacitor, marked 221
2 – C2,5, 10uF electrolytic capacitor
1 – C3, .47 uF MLCC capacitor, marked 474
2 – C4,6, 1uF electrolytic capacitor
1 – C7,8,9, .001uF MLCC capacitor, marked 102
1 – J1, 3.5mm stereo pcb jack
1 – S1, SPDT slide switch
1 – 9V battery clip-female
1 – 9V battery clip-male
1 – 8 pin DIP socket
1 – SMA female pcb connector
1 – SMA antenna

Using the guide below, you start assembling with the smallest parts first.



[ ] Install C1, 220pF C0G capacitor, marked 221

[ ] Install C7,8,9, .001uF, marked 102

[ ] Install R1,8,9 3.9M resistor (orange-white-green-gold)

[ ] Install R2, 10K resistor (brown-black-orange)

[ ] Install R3, 6.2K resistor (blue-red-red-gold)

[ ] Install R4,6, 820 ohm resistor (gray-red-brown-gold)

[ ] Install R5, 4.7K resistor (yellow-violet-red-gold)

[ ] Install R7, 1M resistor (brown-black-green-gold)

[ ] Install D1, green LED, *observe polarity, the long lead is "+"*

[ ] Install 8 pin DIP socket*, match the board outline*

[ ] Install Q1, J310 transistor*, match the board outline*

[ ] Install S1, SPDT slide switch

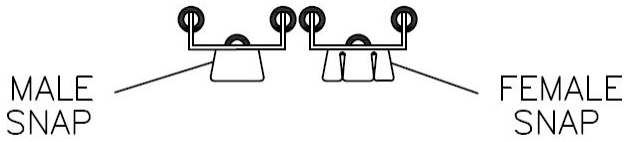
[ ] Install C3, .47 uF mono capacitor, marked 474

[ ] Install C2,5 10uF electrolytic capacitor, *long lead is "+"*

[ ] Install C4,6, 1uF electrolytic capacitor, *long lead is "+"*

[ ] Install J2, 3.5mm stereo jack

[ ] Install 9V battery clips, as shown below. *Do not mix them up.*

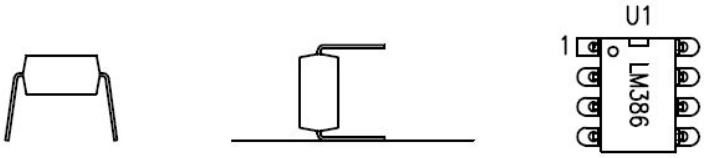


[ ] Install VR1, 10K vertical pot

[ ] Install The SMA antenna connector at the small end, as shown with the center pin on **top** of the pcb, as shown in the picture below. Solder all pins, both sides.

This completes the assembly.

[ ] Next, power up the receiver with a 9V battery, and secure it with the supplied rubber band in the board notches. Turn on and the LED should illuminate. Check for 9V on pin #6 of the U1 socket. If all is ok, turn **off** and install the LM386 into the socket noting the position of pin 1 shown in the graphic below.



When inserting IC, the pins are flared so that they can be retained by automatic insertion tools. Gently rock it on a flat surface so the pins are parallel and it will insert into the socket more easily.

Operation:

Before turning the receiver on, put the rubber band around the board and battery where the notches are. It will hold your battery secure.

Take your Sfer-X Receiver outside, and you're also going to want to stay away from trees, they are absolute dead zones for what you want to receive.

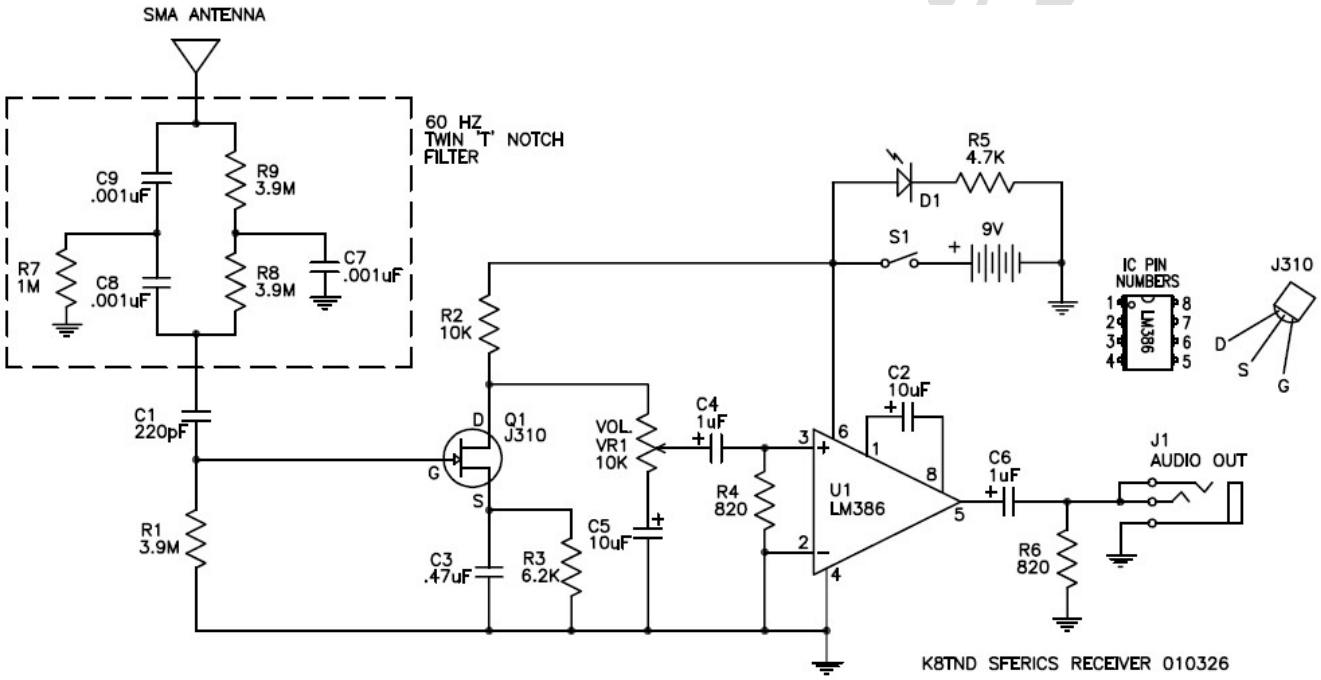
The Sfer-X receiver is quite simple to operate, with nothing but a volume control to adjust. Next, turn the volume control all the way down, fully CCW, and plug the headphones in. If the headphones are quiet, go ahead and put them on. Gradually turn up the volume and you should be hearing the clicking

and popping sounds of lightning up to a thousand miles away. If you walk around outside, you will pick up static electricity generated from your feet touching the ground or walking through grass. If you opt. to use your own larger antenna, you may start to pick up some more domestic 60Hz hum. Just move away from power lines and civilization further.

Congratulations, your receiver is now working. Enjoy the many sounds of nature and PLEASE do not use your receiver if lightning is close by.

Cliff/K8TND

Schematic:



We designed the board for two assembly options. A handheld option as described here, and for those that want to utilize a chassis. The chassis option would involve **not** installing the pot, earphone jack, spdt switch and the antenna connector. These items or more appropriate chassis mounted styles would be installed in your case. In this situation, a small die cast aluminum chassis would be ideal. Ensure that your metal case is grounded to the pcb.

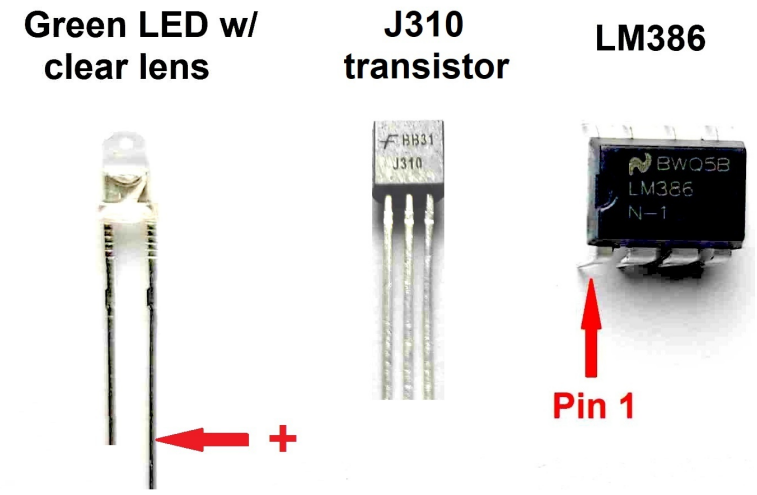
Appendix:

You will need the common electronic tools for pcb assembly. They include:

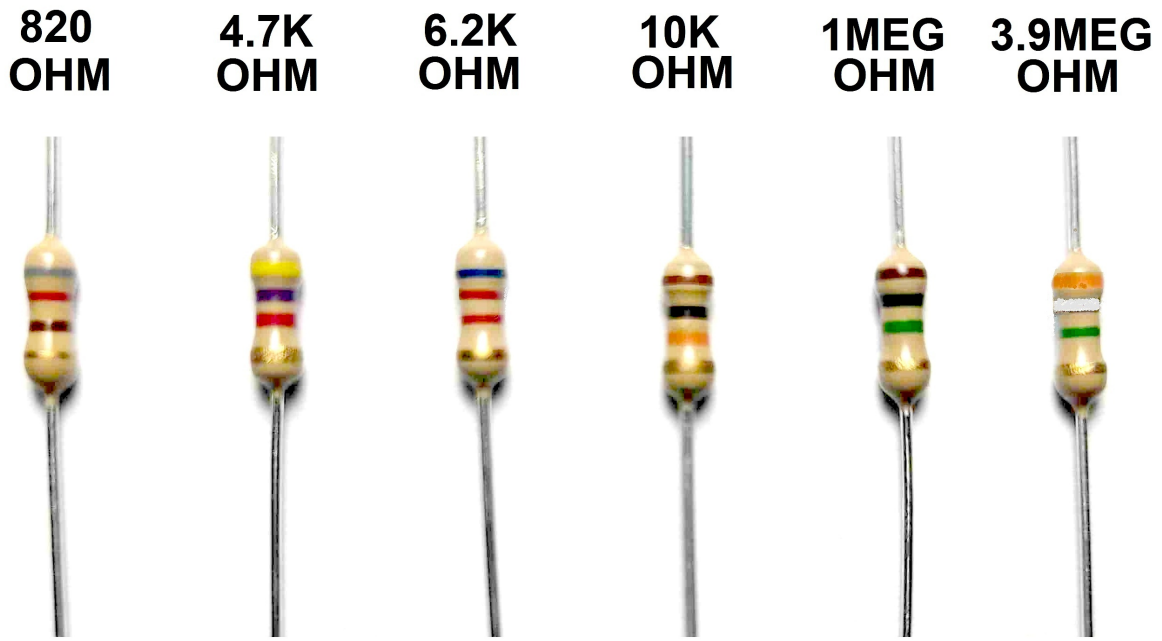
25W soldering iron, with a fine tip
General purpose rosin core, 60/40 solder .03” -.04” diameter
Small side cutters to trim wires
Small needle nose pliers are helpful
Magnifier to read small component markings

Other notes and thoughts:

- All the resistors are 4 color, 1/4 watt, 5% tolerance, carbon type, having a tan colored body so the colors are easy to identify using the chart below.
- Ceramic disk and multi-layer ceramic capacitors (MLCC) capacitors are all clearly marked, although some may quite small and may need magnification. Tolerance code may be omitted.
- Electrolytic capacitors are polarized, clearly marked, and for this kit, can be 16V, 25V, or 50V. Body colors may vary, and the long lead is “+”.
- The led has a long lead, and is “+”.
- Some of the integrated circuits, diodes and transistor markings may be quite small and require some magnification.
- Note the small notch or dimple marking on the LM386 integrated circuit designating the end for pin1.
- Mount the transistor matching the silkscreen outline.
- Ensure the battery clips are not mixed male/female, or the battery will not be installed correctly.
- On any component or socket, I always solder a single lead first, align the component if needed, then solder the other pad(s).



Semiconductors

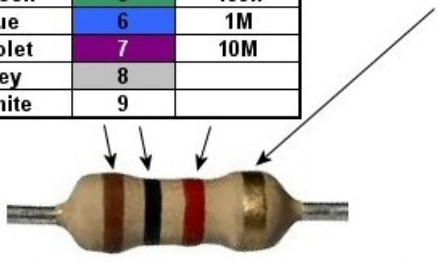


Resistors

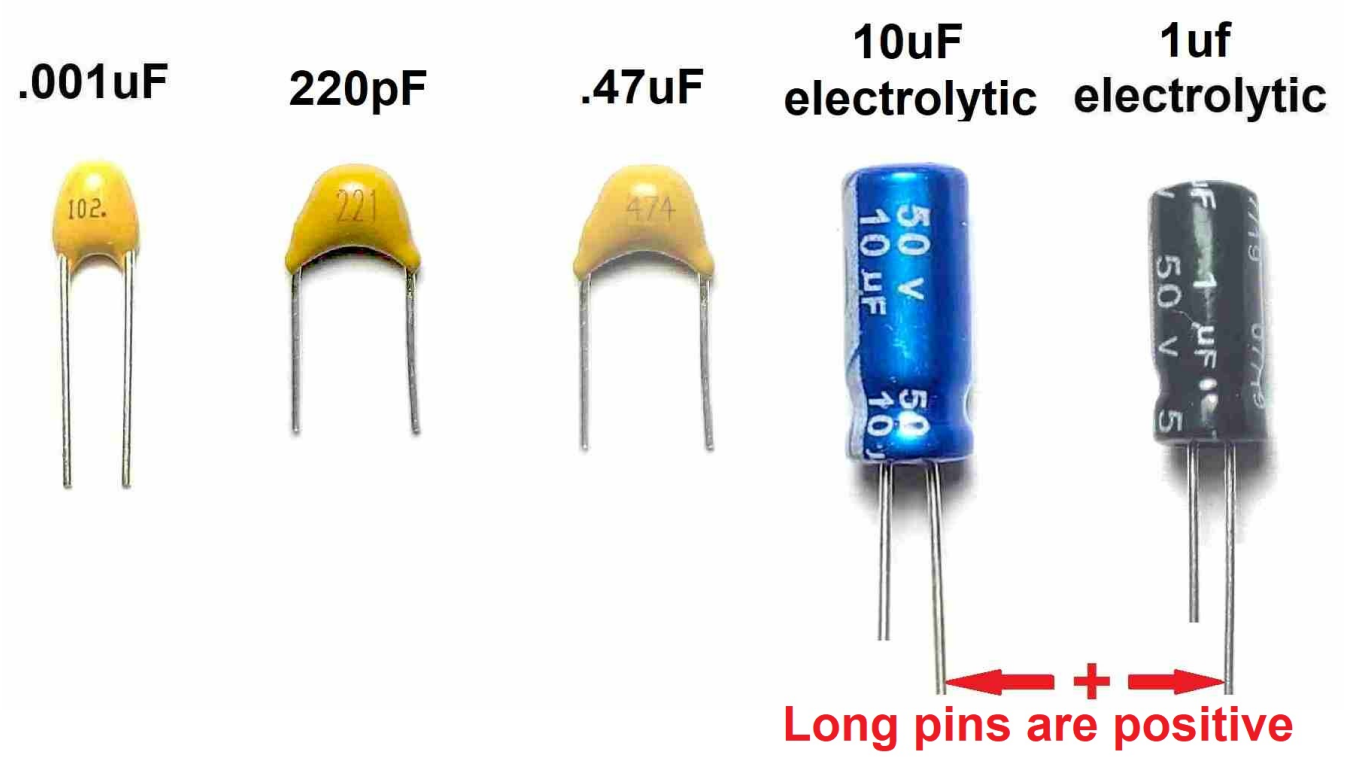
Resistor Color Codes

	Value	Multiplier
Black	0	1
Brown	1	10
Red	2	100
Orange	3	1k
Yellow	4	10k
Green	5	100k
Blue	6	1M
Violet	7	10M
Grey	8	
White	9	

	Tolerance
Silver	10%
Gold	5%
Red	2%
Brown	1%

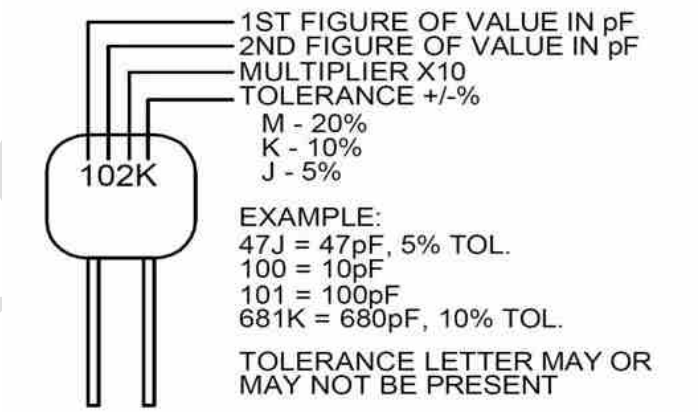


1 0 2 = 10*100 = 1k Ohm



The component body color can change by supplier selected

Capacitors



Ceramic capacitor markings

Note: When reading the ceramic/mono capacitor values, do not confuse the manufacturing codes with the component value. If it looks strange, it may be a manufacturing code, look on the other side of the component. Also, the tolerance letter may be omitted.

Notes: