KANGA PRODUCTS

Kanga Low Pass SCAF Filter

This filter is designed for radios that don't provide any filtering for CW use, in the early days radio designs were primarily for CW use with SSB as an extra but now it's the other way round.
CW is often an afterthought, and the CW operator has to make do with barn door audio with a passband of several KHz, it's like trying to pick out one instrument in an orchestra when you listen for a CW signal on a busy band. The other option is to buy a very expensive filter (if the radio will allow one to be fitted), for many older radios these filters (Crystals) are made from unobtanium!

The only viable alternative with many sets is the use of an external audio filter. This is where the Kanga SCAF filter comes in.
The Filter here is never going to replace a sharp Crystal filter, but it will give you a marked improvement by reducing all the audio interference and signals above the frequency set by the bandwidth control. The effectiveness of these type of filter is reduced if the radio already uses active audio filtering but on none filtered radios the effect is amazing, I used this filter with an old FT817 and it transformed CW for me with that radio.

Power Supply :-11-15V DC
Max Filter Bandwidth :- Approx 1.6KHz : Min Filter Bandwidth :- Approx 300Hz
Stop Band rejection : 40dB Filter Type:- 5th Order Low Pass SCAF

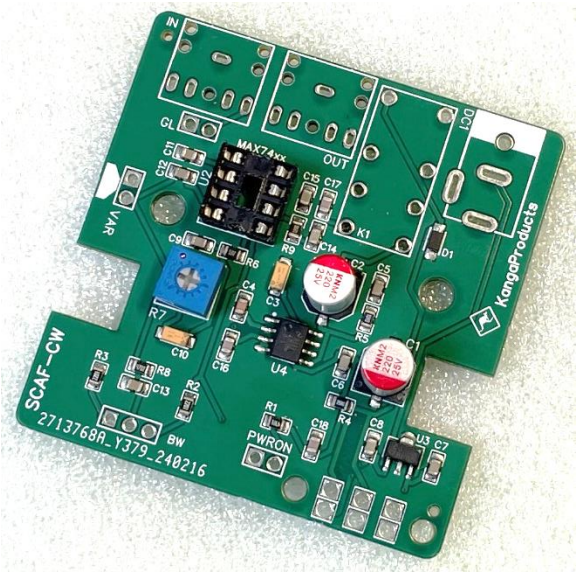
Parts List;

SCAF PCB
2 X 3.5mm Audio Jack Socket
1 x 2.1mm DC Power Socket
12V PCB Relay
ON/OFF Switch
Spacer Stick
Varicap Diode
Bandwidth Control & Knob
MAX7426 SCAF Chip
2 Pin Header & Jumper
Power 3mm led
Case, Fixing Screws & Stick on feet.

Building the Filter

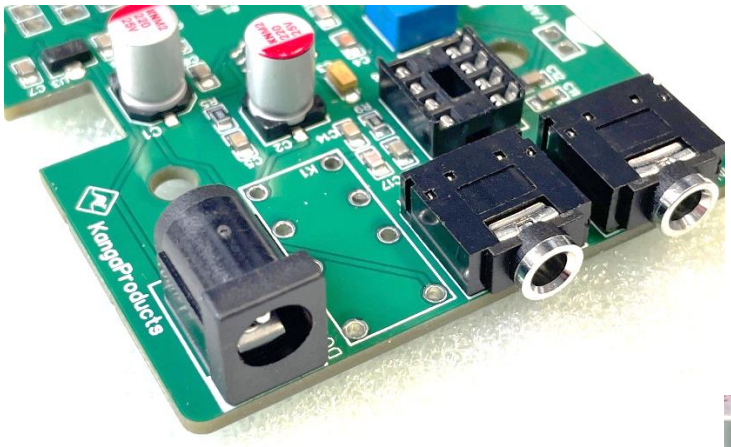
First step is to look over the PCB You can see that a lot of the parts are pre-installed for you.

So, let's make a start fitting the remain parts.

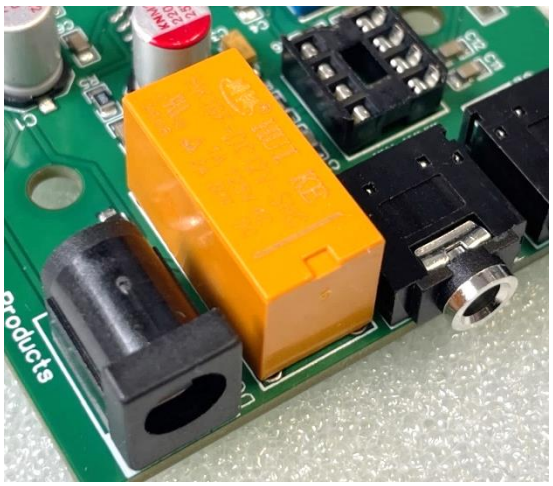


To start with, find the two 3.5mm Audio jack sockets and the DC Power socket.

Make sure the Audio sockets are flush to the board and solder. Next fit the DC socket, make sure it lines up with the outline on the board.



Next find the relay, this can only fit one way as some of the pins are offset, just make sure that no pins are folded under the relays body, it should sit right down on the board. Solder all the pins in place.



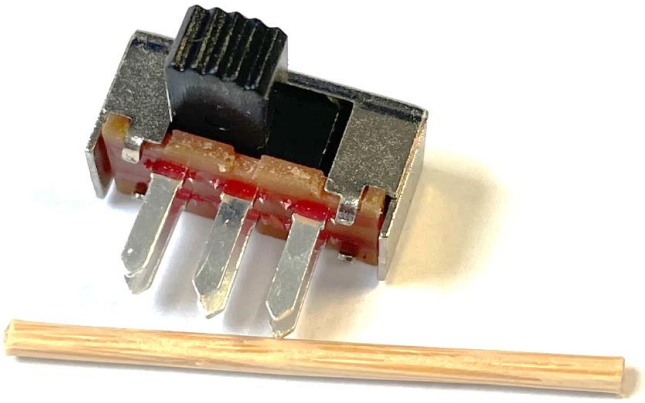
Next fit the two-pin header and jumper. This is located just be hidden one of the 3.5mm jack sockets and is marked GL.

The next stage is the power switch, getting this the right height was hard until I found this easy ‘hack’ to get the height just right.

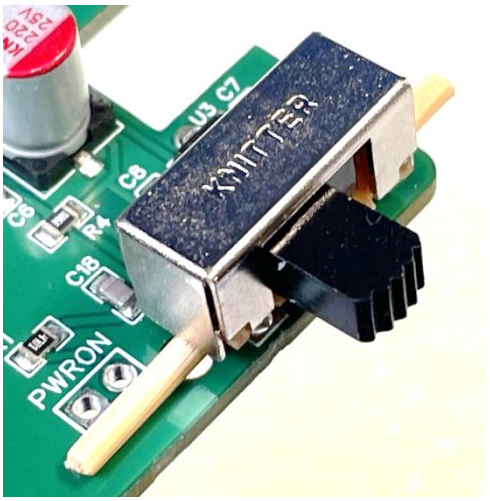
Find the switch and the spacer stick.

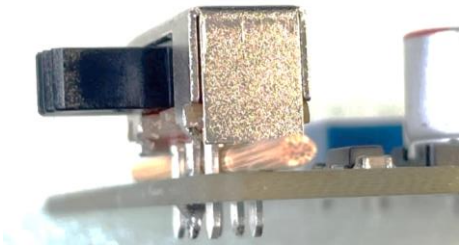
The spacer is just a standard cocktail stick cut down in size.

Put the switch on the PCB and insert the stick though the legs as shown here.



Now you could do with a couple of extra hands I know but hold the switch on the board and solder ONE of the centre pins only, check that the alignment of the switch is square on the board.

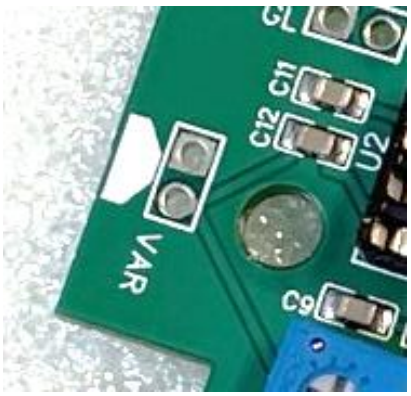




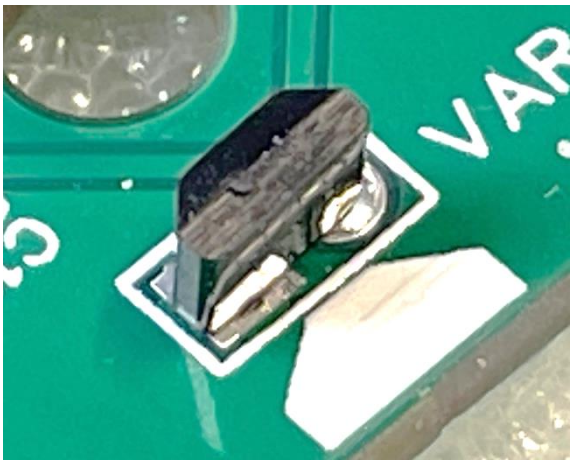
When you are happy that it’s sat correctly solder the remaining pins. When finished pull out the stick.

Next fit the Bandwidth Control potentiometer. The body of the control should be sat directly on the board.

Now we can fit the varicap diode, it's a device that looks like a two-leg transistor,



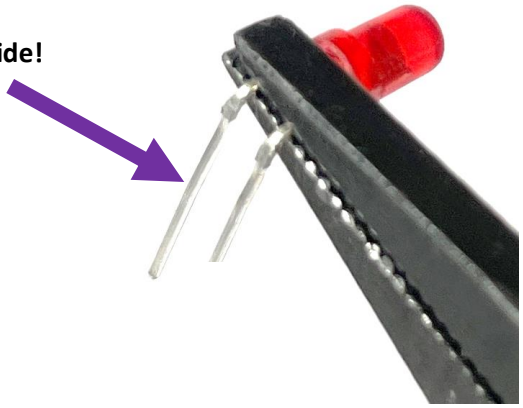
On the PCB you will see a two pin rectangle marked VAR. This is where the varicap diode must be fitted, by the rectangle the outline shape is shown. Make sure you fit the varicap the right way round. The widest side should be nearest to the edge of the board.



The last part is the power on indicator LED.

The LED needs to have its legs bent over at 90 degrees about 3mm from the back of the body. LED's can only be fitted one way and so when you bend the legs you need to allow for the longer leg to be on the side nearest to the switch.

Longer leg this side!

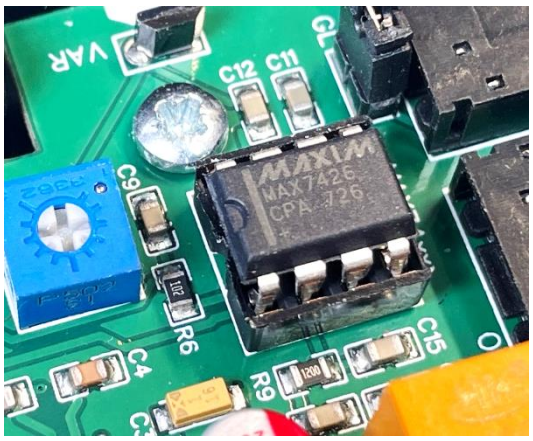


The best way to fit the led at the correct hight is to temporally fit the front panel. Only loose at this point. Drop the LED into place (again make sure the long leg side is nearest to the switch) and pop the front panel in place, I tend to tighten the bandwidth nut a little by hand to hold it in place. Then carefully position the LED so it protrudes through its mounting hole and sits at the correct hight, turn the board over and solder the LED pins in place.

Now find the case and remove the top section and the two plastic blank end plates. These two plastic plates are not needed.

Drop the punched end panel in place, that's the end further away from the two raised case mounting points. Then position the board with its fitted front panel in place, secure the board to the case with the two 6mm self-tapper screws provided.

If you haven't already, fit the chip into the socket, make sure you fit it the right way round.



See the picture here to make sure it's fitted the right way.

That's the filter built now a quick alignment.

The filter needs to be adjusted to balance the audio levels when it's on or off, that's all,

Connect the filter to the radio and the headphones or speaker, you will have to check the cable wiring between the these so checkout the connecting lead details at the end of this set of instructions (now is a good time for that). The filter will also need a 12v (typical) supply to, the centre pin of the power connector is the positive side of the power lead.

When you have the cabling correct you should hear the radios audio in the headphones or speaker with the filter turned off just the same as if the filter wasn't there, the LED should be off.

With the filter still turned off set the blue trimmer on the PCB fully anti-clockwise. Turn the bandwidth control fully clockwise to its widest setting.

Turn on the filter, the LED should light and if you have adjusted the trimmer as above there will be very little if any audio from the headphones or speaker.

Adjust the trimmer to bring the level up to the same point as when the filter was turned off, turn the filter off and on to double check that the two levels are balanced.

Now a quick check while listening to the audio you should notice a cut in the bandwidth even if listening to just band noise, normally a sound a little like someone blowing over the top of an empty bottle as you reduce the bandwidth.

If all well it's time to fit the two halves of the case together, also fit the 4 stick on feet to the bottom of the case.

Your filter is now ready for use.

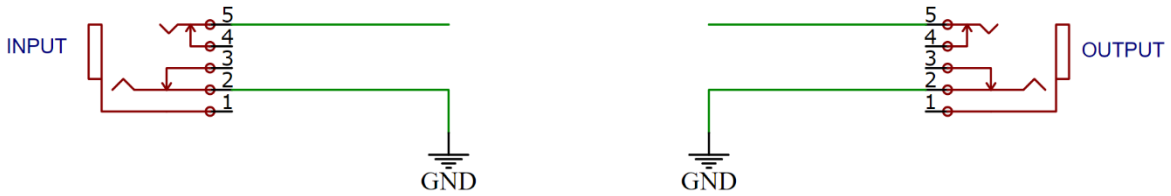
Depending on what you're connecting the filter to you may need to make a suitable connection lead so read the connection cable section below.

Connection Cables for the SCAF.

Different radios use different audio configurations, some have outputs for stereo headphones, some mono, some stereo outputs are configured as true stereo output, a left, right, and common connection. Others are connected with the output connecting the left and right headphones in series to give a higher impedance and other with the headphones left and right connected together giving a lower impedance. Its not one size fits all.

Let me start by telling you how the filter connections are wired.

The easer side to understand is the output, you can use either stereo headphones or a mono speaker connected to this side. Job done!



The audio input connector: -

It's fitted with a stereo socket that will allow a mono input (mono 3.5mm plug) or a stereo plug wired with the ring and tip connected as the input.

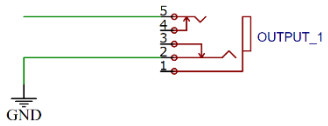
For the input side a mono plug can be used if the tip is the 'hot' side of the audio and the sleave is the ground side. If a stereo plug is used then the input goes to the tip and the ring, not the sleeve. With some setups when the filter and the radio are sharing the same power supply for example you can get ground loops that cause problem with the audio. In these exceptional cases the header pins and jumper can be used to break the ground connection from the audio signal and reduce the hum, 99% of the time the header should remain on the pins.

We know some customers will use the filter with the Rooster and so here are the details to make a Rooster to Filter cable.

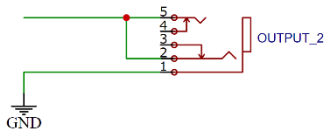
On the filter end the easiest option is a mono plug, at the other end (The Rooster) use a stereo plug and connect the 'hot' side to the tip and the sleeve to the ground, DO NOT connect to the ring terminal, do not use a mono plug as that will case a short on the Roosters output.

There are 3 typical audio outputs on radios.

Here is output 1 this is used for stereo headphones connect in series (higher impedance)

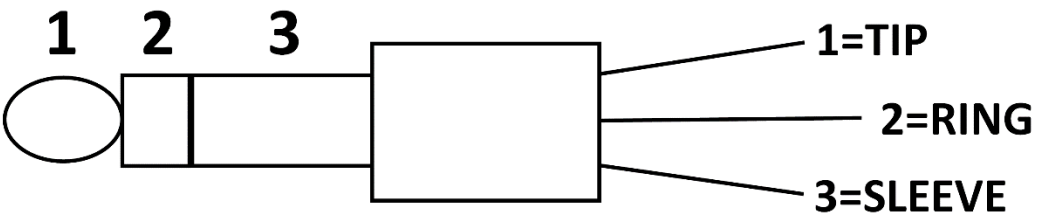


Output 2 is stereo headphones with the elements connected in parallel for lower impedance.



Output 3 is a mono output, audio would be in one side of headphones only with this one.

The Rooster uses Output type 2 .



THE ROOSTER OUTPUT PLUG MUST BE A STEREO PLUG

USE THE TIP AND SLEEVE ONLY

Of course, other radio may need a different lead so you may have to experiment a little but a quick test is to plug in headphones to the radio, if you only get audio in one side then its likely that that radio is a type 3 output. If the audio is in both sides of the headphones then its output 1 or 2.