EDDYSTONE 680X PRODUCT DETECTOR INSTALLATION.

The 680X is, by its design, a very good radio. It was designed for the reception of AM and CW signals. SSB can be resolved by turning down the RF and turning up the AF control however its not very satisfactory. The best way is to install a product detector to resolve the SSB and CW signals. The basic idea is that the original BFO module is removed and rebuilt using a 6BE6/EK90 heptode valve, part of which acts as the BFO frequency oscillator and the rest as a mixer. There are various circuits available based around the 6BE6/EK90 and the one I used is shown in Fig.1 below and was kindly given to me by M0MLM. (Every component within the dotted lines goes inside the can).

Start by removing the case. (obviously!!) The BFO module is the module behind the BFO switch with a valve sitting on top of the can. Looking under the chassis there are 5 connections to the module. See Fig.2 below

Remove the BFO valve and unscrew the two screws between the connections and unsolder the 5 connections which appear to be soldered onto wire ended stand off's. Remove the whole can, then the two side screws and remove the cover allowing access to the components. See Figs 3,4,5 & 6. below

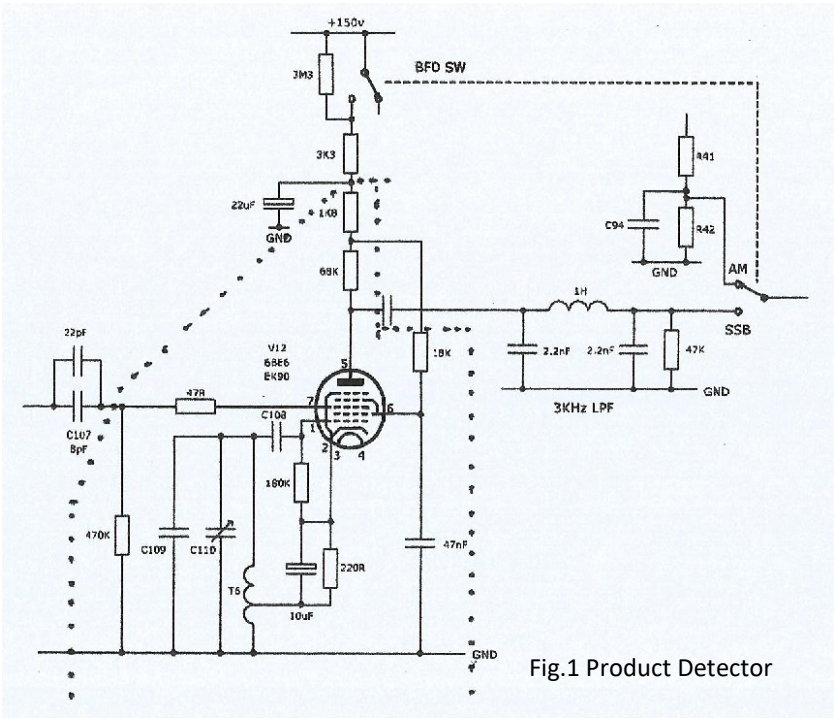


Fig.1 Product Detector

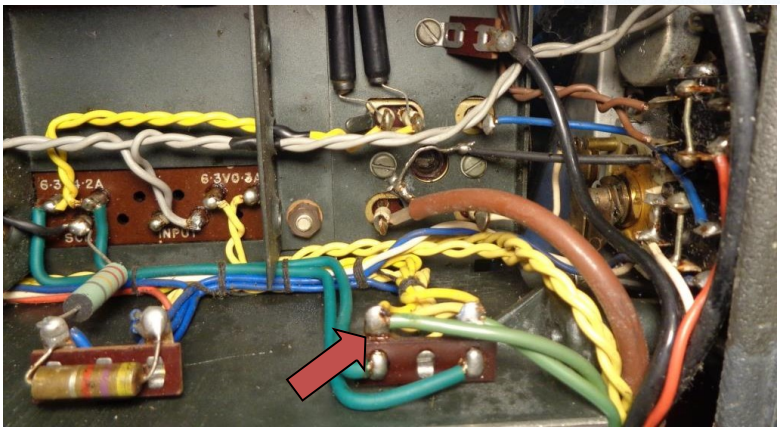


Fig.2.


Fig.3.


Fig.4.

Fig.5.

Fig.6.

Now comes the interesting bit. Remove all the components within the can except the heater connections and the two silver mica coil tuning capacitors and coil as shown on Figs 7,8 & 9 below

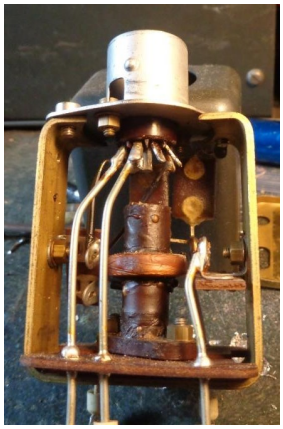


Fig.7.

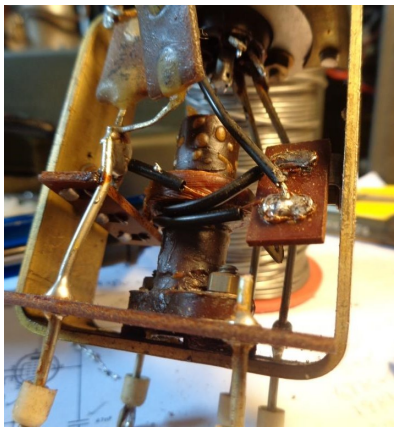


Fig.8.

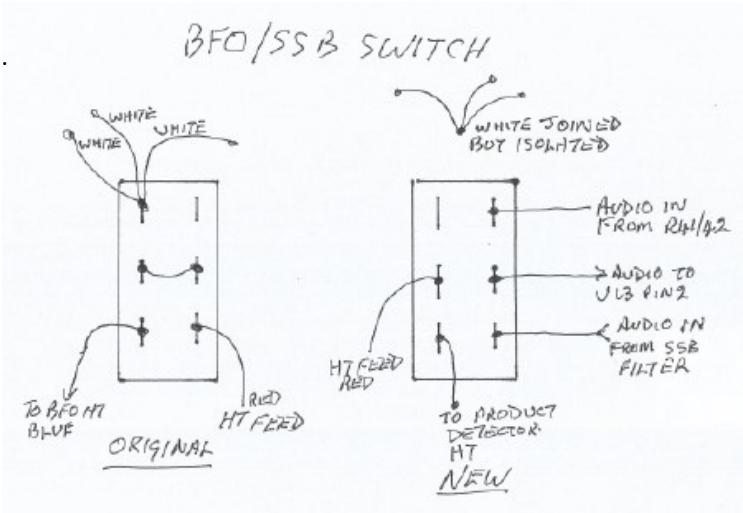
Fig.9.

Re-model the components by moving the grid connection from pin 2 to pin 1 and fit the new components within the dotted line as per the circuit diagram (Fig.1). Extend a lead (I used 14 gauge solid wire) from the anode connection down and through the spare hole (put some insulation over it as it passes through the hole in the bottom of the can base) to form a pick up point for the Audio output to the coupling capacitor like the other 5 base connections. See Fig.10 below

Fig.10.

NB: I used 2 watt resistors for the current carrying components which are the 68k, 18k and 220 ohms. This is to allow better heat dissipation as I don't want to have to take the can out of the set once it is re-installed.
When you are happy that the components are correct and in the right place put the can on one side and go onto the next bit.
To allow the audio and HT to be switched between the original set and the new product detector we have to modify the BFO on/off switch. (Fig 11 below)

Fig.11.



In my case, and probably in your case as well, the switch at present basically is A an anchor for a set of wires at the top side and B a switch to connect HT to the old BFO circuit.

The centre contacts are bridged which has to be removed. Then the top (white wires in my case) are all un-soldered and reconnected as a group and isolated. This leaves the HT connected to one side of the bottom contacts with a (blue in my case) wire feeding the old BFO can on the other side. Re-connect the main HT feed to the centre contact from the bottom contact to the same side as the dangling feed to the old BFO can.
See Fig.12 on next page

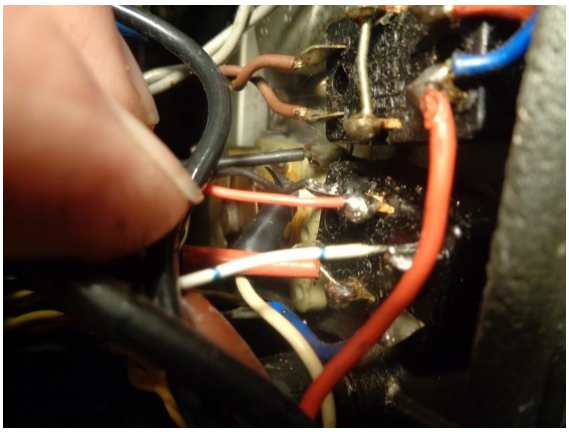


Fig.12.

As you will see in the new circuit there is an audio filter to be made consisting of a LF choke and a couple of capacitors (a Pi network in fact) It asks for a 1 henry choke which I didn't have so I used the primary of an old transistor radio output transformer as the choke and adjusted the capacitor to give me a cut-off at about 3 kHz using an audio generator and an oscilloscope.

Once you are happy with the filter put it on one side.
See Figs.13. 14 & 15

Fig.13.

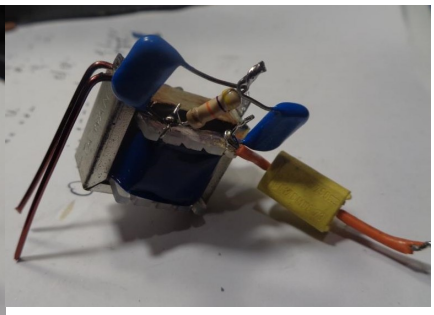


Fig.14.

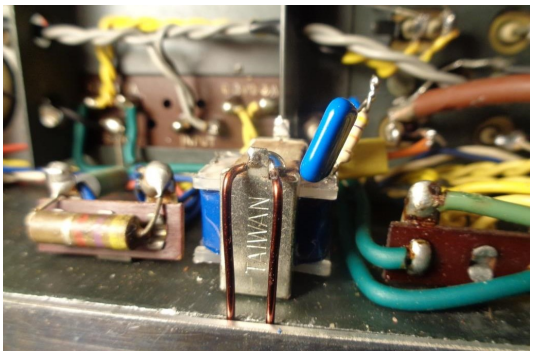


Fig.15.

Next we have to re-route the existing audio via the BFO on/off switch so moving to the opposite corner of the set we have V7 and V13 next to each other. Looking at pin 2 of V13 follow the wire (green in my case) up to the junction of two 100k resistors which are R 41/42. Remove this wire.

Now using either a screened twisted pair cable (I used a bit of Type 1 audio screened cable) or alternatively a couple of thin screened coax's, connect pin 2 of V13 to the centre of the empty side of the BFO switch and the junction of the two 100k resistors to the top contact of the BFO switch (so reinstating the existing audio routing.)

Whilst we are down in this area it would be prudent to solder the extra 22pf capacitor across the 8pf capacitor that is at the end of the coax leading to the ex BFO can. NB: 22pf may be to big and give detector overloading but use this to start with or alternatively a 30 pf trimmer for better adjustment after finish).
See Fig.16 below

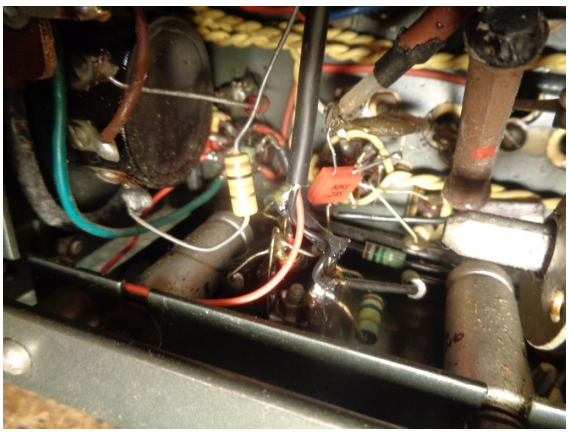


Fig.16.

Having completed the connections around V7 we now move to the reinstallation of the now ssb can (ex BFO can)
Replace the two side screws at the top side of the can and slip the can through the chassis and inspect the new anode feed isn't touching the chassis. If it is then bend and insulate.

Once happy, replace the two holding screws at the bottom through the chassis.

Next reconnect the BFO variable capacitor. We now have to extend the feed from the EX BFO switch to the HT connection on the SSB can using the 3.3k 2 watt resistor and smoothing capacitor (10uF is recommended however I used what I had which was an 8uf and it didn't make any difference).

As shown on the circuit diagram (Fig.1) bridge the HT contacts with the bleeder resistor 3.3 M ohms on the back of the switch. (this is there to keep the 8/10 uf cap charged and thus giving an instant voltage onto the product detector on selection to stop frequency blip.)

Having completed the audio filter network I mounted mine adjacent to the coil pack and supported it using a bit of 12 gauge wire clamped under the coil box lid. Connect the new anode feed from the ssb can through a 0.047 uf cap (in my case all I had) to the filter and the output across the 47k to the free bottom terminal on the ex BFO switch for the audio feed. See Fig.17 below.
Don't forget to plug a new EK90/6BE6 valve in.

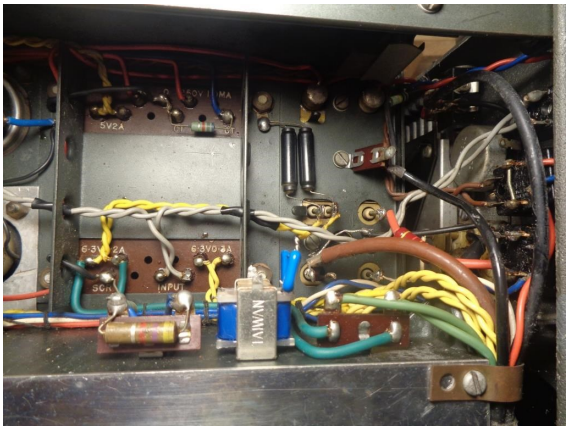


Fig.17.

So its a final check over of all the changes and switch on.

With all these changes the oscillator section of the product detector will have shifted in frequency so we need to set its frequency.

Now the IF centre freq is about 450 kHz +/- 1.5 kHz so we need to obtain a stable frequency to give a steady signal.

No matter what you use, tune the receiver to it on MAX selectivity for a maximum reading on the S meter. (CRYSTAL to OFF) Select the product detector and set the BFO variable capacitor plates by eye to half way. Set the white dot on the knob to centre on the eschaton if needed by undoing the grub screw and rotate to suit.

Adjust the coil in the product detector can for zero beat.

That's it job Done.
Hope all goes well Cheers
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