After all that total failure with the sub-mini valve, I decided to rebuild my confidence a bit and try to build the 20MHz crystal oscillator next. Crystal oscillators should be easier to do than VFO's, right? Stick with what works - in this case the triode Pierce oscillator used in my 1-valve CW transmitter .
For the triode I used one half of the dual-triode 12AT7. Perfect, it worked - testing with various crystals in the junk box found many were 3'rd overtone - but I found one on 20MHz fundamental, perfect for this.

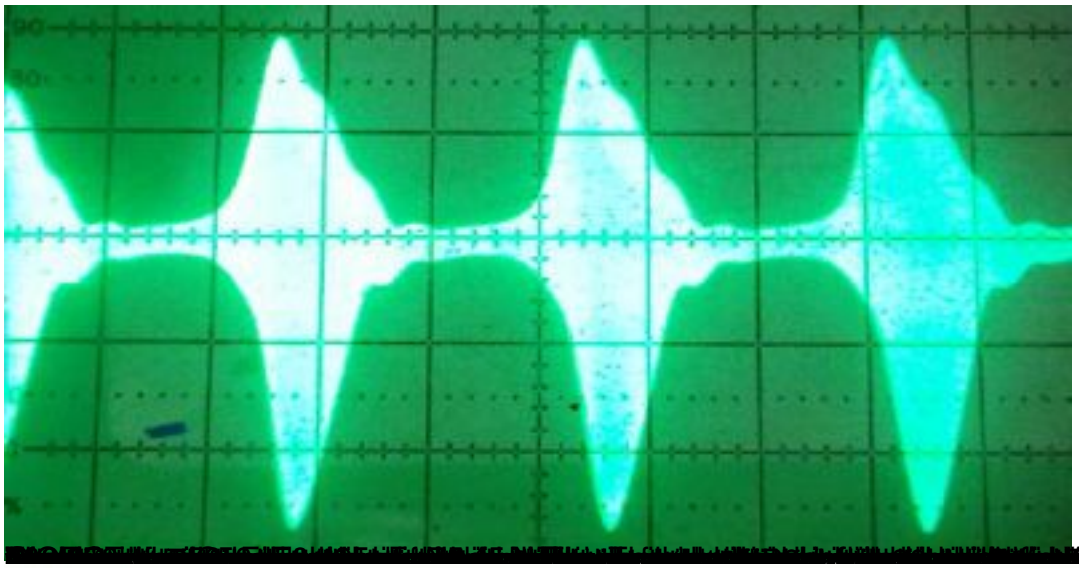
Next for the other parts of the circuit - for which I relied heavily for inspiration on various circuits in my 3'rd edition RSGB handbook, published 1961. The VFO part of the oscillator is a Colpitts oscillator in the other half of the 12AT7. I used a 6BE6 pentagrid mixer, with a 26MHz tuned circuit in its anode circuit, driving an EF91 buffer, with another 26MHz tuned circuit.

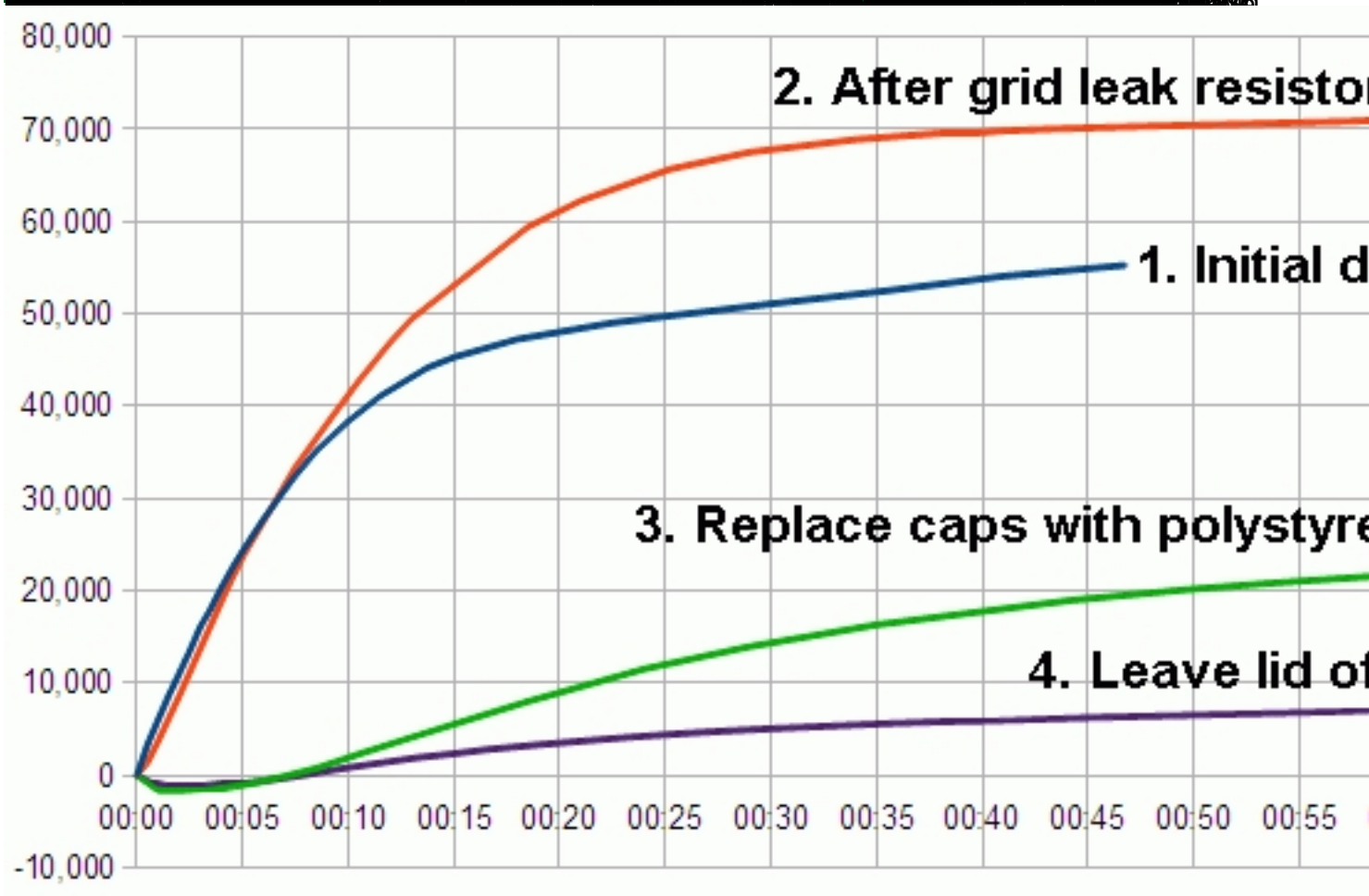
These photos show the VFO construction in a box made from PCB material. Size was 90 x 75 x 70mm approximately. The heat dissipation inside that small box totaled 10.7W! Bear in mind the heater filaments alone consume 6.3V at 300mA each - which itself is nearly 6W. Consequently, that box got HOT, so hot, you couldn't put your hand on it and keep it here. RF output was by RCA (phono) socket and feedthroughs for the power connectors. The top and bottom lids fixed on with nuts soldered into each corner. Note: these photos were taken BEFORE I heard that toroids are not stable with temperature, so I removed the toroid in the LC tank circuit and replaced it with an air-cored 4uH inductor.

{gallery}tubevfo/2{/gallery}

Below see the circuit diagram, a nice photo of the power supply (260V HT and 150V regulated from the VR150/30 valve on the left), and the HP1741A oscilloscope and Racal 9911 frequency counter showing the nice 26MHz output. Note that there are two variable capacitors for tuning: one is the main tuning capacitor, the other one is for bandspread (fine tuning) - it adjusts the frequency by approximately +/- 3kHz. The circuit diagram of the tuning capacitor arrangement isn't shown in the diagram below, but it's the same as in the battery valve circuit seen later.

{gallery}tubevfo/2a{/gallery}

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