

Sub-mini valve vfo

Written by Hans Summers
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The battle starts with an attempt to build a stable 6MHz VFO using a type CK512AX sub-miniature tube, originally used in hearing aids. The idea for this comes from [Andy G4OEP's page in which he describes an extremely stable oscillator using a sub-miniature XFY43 valve](#).

Andy believes that the extreme low filament power of this valve (1.4V, 10mA) and operating it at 12V supply creates conditions for excellent stability. I had wanted to try out this circuit for a long time, in fact I have a feeling it was Andy who sent me the CK512AZ tube some years ago.

Here are some photos (please click): the circuit diagram I used (left), power supply (middle) and CK512AX circuit (right).

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The power supply is all-tube too - a rectifier valve on the right, and VR150/30 voltage regulator on the left, to provide a stable 150V supply for such things as oscillators. I used resistors to drop the voltage to 25V to suit the CK512AX. Similarly a series resistor in the 6.3V filament secondary. The CK512AX has a directly heated cathode and is intended for DC filament operation. Such mis-use of DC filaments by powering them with AC will become more common as you read on further down this page.

There is an **ERROR** in my circuit diagram, arising through lack of education on my part and from misreading Andy G4OEP's diagram. The 15pF capacitor that you see between the grid and the LC tank circuit, should be 0.1uF. 15pF is far too small for any chance of success. However even after I changed that, there was still no oscillation. I changed the chokes in the filament leads, I changed the ratio of the Colpitts capacitors, I changed everything I could think of, but NO oscillation. I discussed this with Andy G4OEP. Eventually he concluded from a study of the CK512AX datasheet and all his knowledge of such matters, that the CK512AX is designed for audio and the gain is insufficient for use as an RF oscillator.

I have several other sub-mini tubes here in the junk box but all of them seemed from study of their datasheets, to either be no more suitable for this application than the CK512AX, or to be the kind of sub-miniature tubes having 6.3V 300mA filaments in a very tiny glass envelope and therefore lose the benefits of the low power which Andy thinks causes the excellent stability. So, here ended the sub-mini adventure for now.

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