

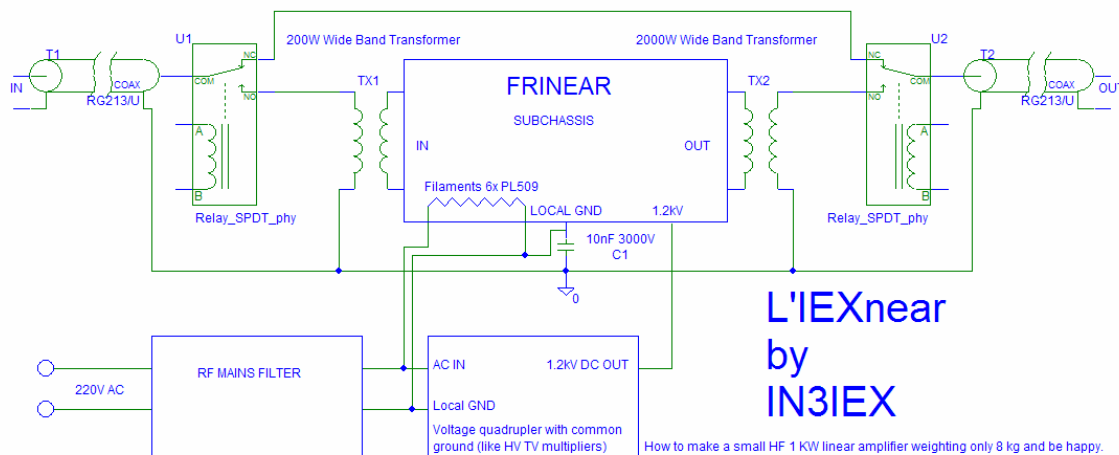
# HOW TO MAKE A 1 kW HF LINEAR AMPLIFIER WEIGHTING ONLY 8 kg

In this semiconductor era everything is lightweight and small. Right?

Well, a 1 kW output HF linear amplifier made with the “solid state” must indeed have heat sinks, switching power supply and various protection circuitry, which push the weight to about 25 kg (ICOM IC-PW1). Tube amplifiers are about 35 kg, so what can we do?

Glass sweep tubes are very lightweight, therefore the “mass” certainly is somewhere else, in fact it is all concentrated in the power supply transformer. BINGO !! We do not need a power supply transformer !! Money is saved !!

Insulation is guaranteed by very small RF toroidal transformers and by a subchassis structure. Safety is the highest. If you open the main chassis and touch any part, your house differential switch will remove the power to the entire house.... Do this with your normal amplifier and you will be allowed to touch! Anyway a small differential switch is incorporated in the cabinet.



For a suitable SUBCHASSIS complete design please refer to the excellent PA0FRI page:  
<http://www.xs4all.nl/~pa0fri/Lineairs/Lineairs.htm#I>

Some hints and facts:

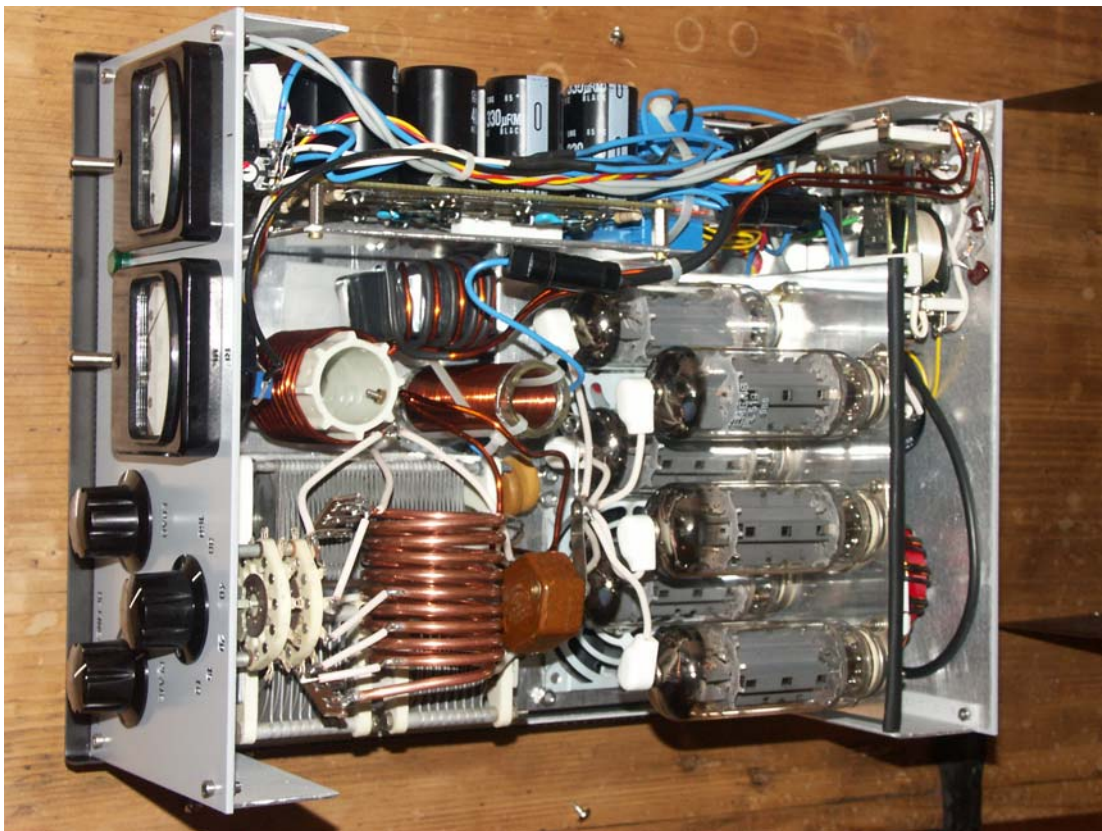
- TX1 is a 2:1 trifilar transformer, therefore the input transformer of the FRINEAR is not required. The 100 ohm swamping resistor is connected to the primary winding (left winding).
- My TX2 is 1:1 bifilar, but you may want experimenting with different ratios to optimize the FRINEAR output Pi network.
- I use two computer fans under the tubes. There is electrostatic shielding: the fans have ICs inside. The material has been taken from discarded PC power supplies.
- Provide fuses: I use a 2.5A fuse for anode supply, 500 mA fuse for the filaments. 10 A on 220 V.
- My L'IEXnear has “exactly” the same size of my Drake TR4. I have not installed 160 m.

- Install a 5 turns coil wound on a 47 ohm 3 W resistor on the anode of each tube, they are not shown in the pictures but they are fundamental!
- If you choose a real transmitting tube you will probably need 2.5 kV. A voltage multiplier by 8 could be probably used. Capacitors are lightweight: no problem. At 144 MHz or higher the usual link impedance matching will remove the need for toroidal wide band transformers. Filaments will require a small switching power supply like those for laptop PCs.

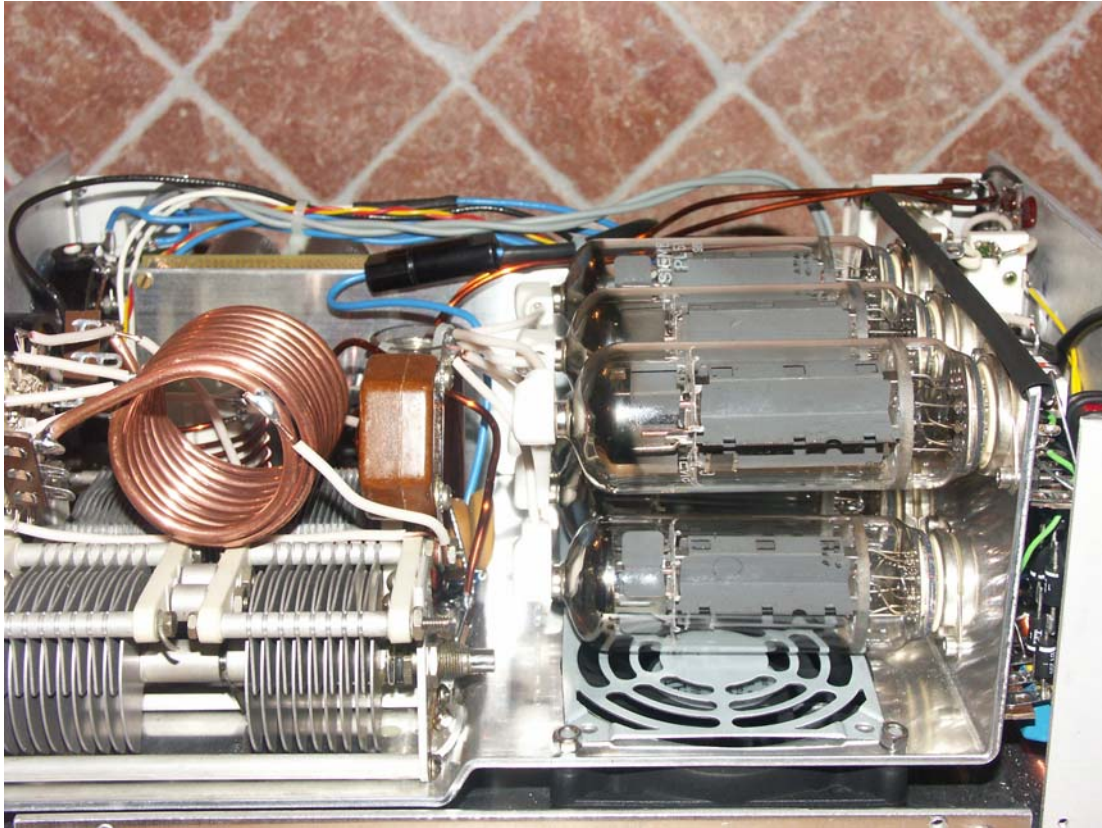
You may think that this is a great idea.... wrong, in the '60 all cheap radios and TVs were powered this way. It was then considered unsafe. Now with the use of differential safety switches, it can be considered safer than the “normal” technique.

Now some pictures, and remember that the anode suppression coils are not shown, they suppress 100 MHz oscillations:









Ham Radio Guys, be careful: this document is NOT a design, the responsibility of doing proper design and checking the performances is YOURS. Good Luck.

Best Regards. IN3IEX Giorgio  
See [www.qrz.com](http://www.qrz.com)

March 2006 *“better late than never”*