DL7MAJ, Oct. 31st 2012

Modification of the HV-Circuits of HP 8614 and 8616

First of all:

Voltages higher than 50VDC may be lethal! This article describes circuits operating with voltages up to more than 700 (sevenhundred) volts!
This may be immediately lethal!
Don´t continue reading if you have not sufficient knowledge and experience to handle such circuits.

You´re still reading? Welcome and let´s start.

The HP8614 and HP8616 are GHZ-generators from 0.8 to 2.4GHz (8614) and from 1.8GHz to 4.5GHz (8616) equipped with klystrons 6BL6 and 6BM6.
On flea markets I acquired two 8614´s and one HP8616. They worked as promised by the sellers but the output was rather noisy and showed a lot of hum. The source of the trouble was quickly found: The DC-supplies of the klystron (320VDC and 720VDC) had a ripple of > 10Vpp and other random noise.

The reasons were:

1. Bad electrolytic capacitors in the HV-DC-supply
2. Maybe some dying tubes in the HV-regulating circuits

Had no new tubes available and on the other hand I wanted to reduce the heat dissipation inside the generators. So I decided to design a new HV-circuit for these generators to replace the old tube-based voltage-regulator by a modern transistor-based circuit.

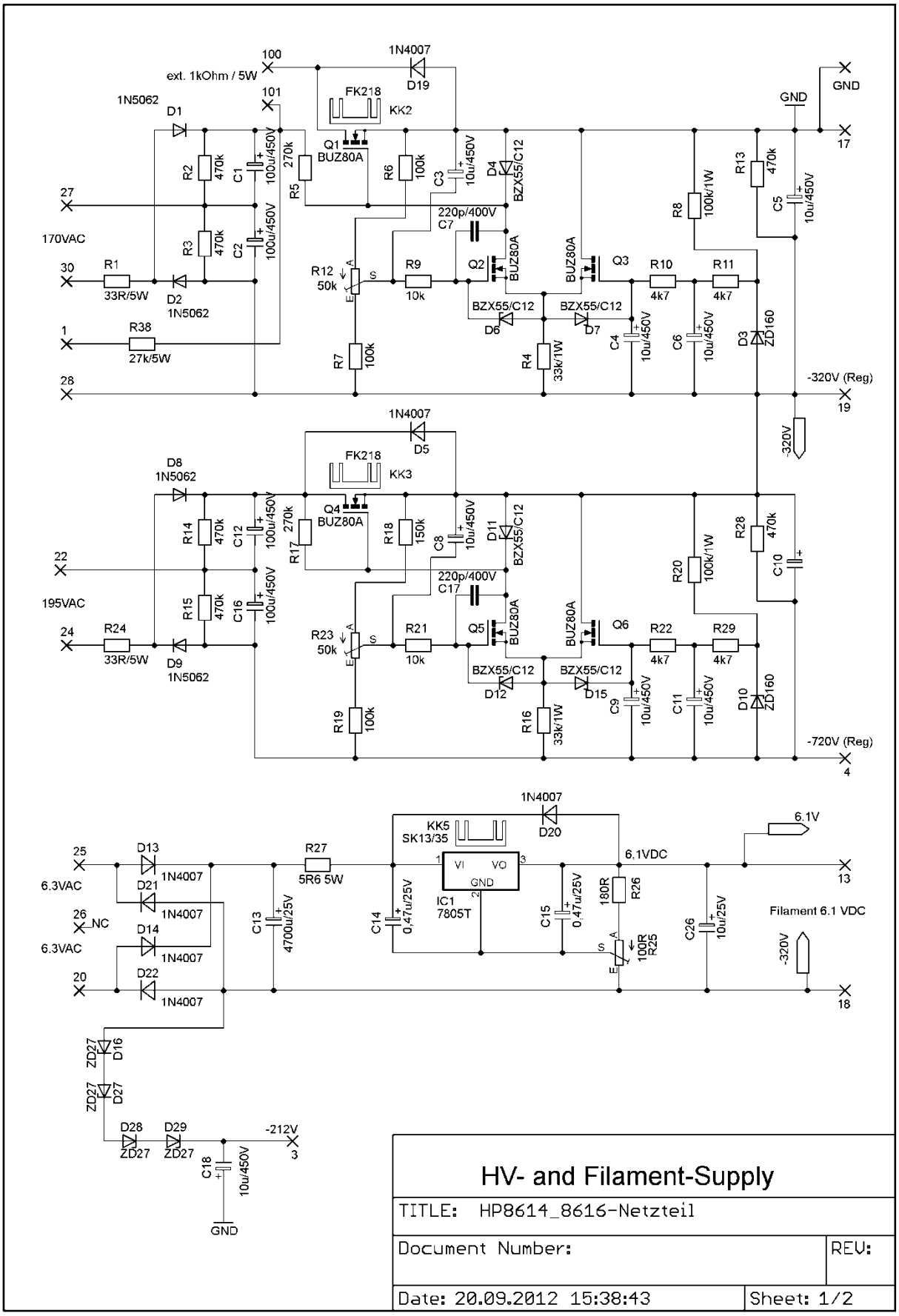
Using some BUZ80A´s, the circuit is a transistorized mirror of the original tube-circuit /1/ and supplies the -212VDC, -320VDC and -720VDC (8616) / -670VDC (8614) including the 6.1VDC filament supply (picture 1).

The internal square-wave generator (1kHz) is replaced by a TTL-based circuit with a bigger tuning range from app. 400Hz to 3kHz (picture 2).

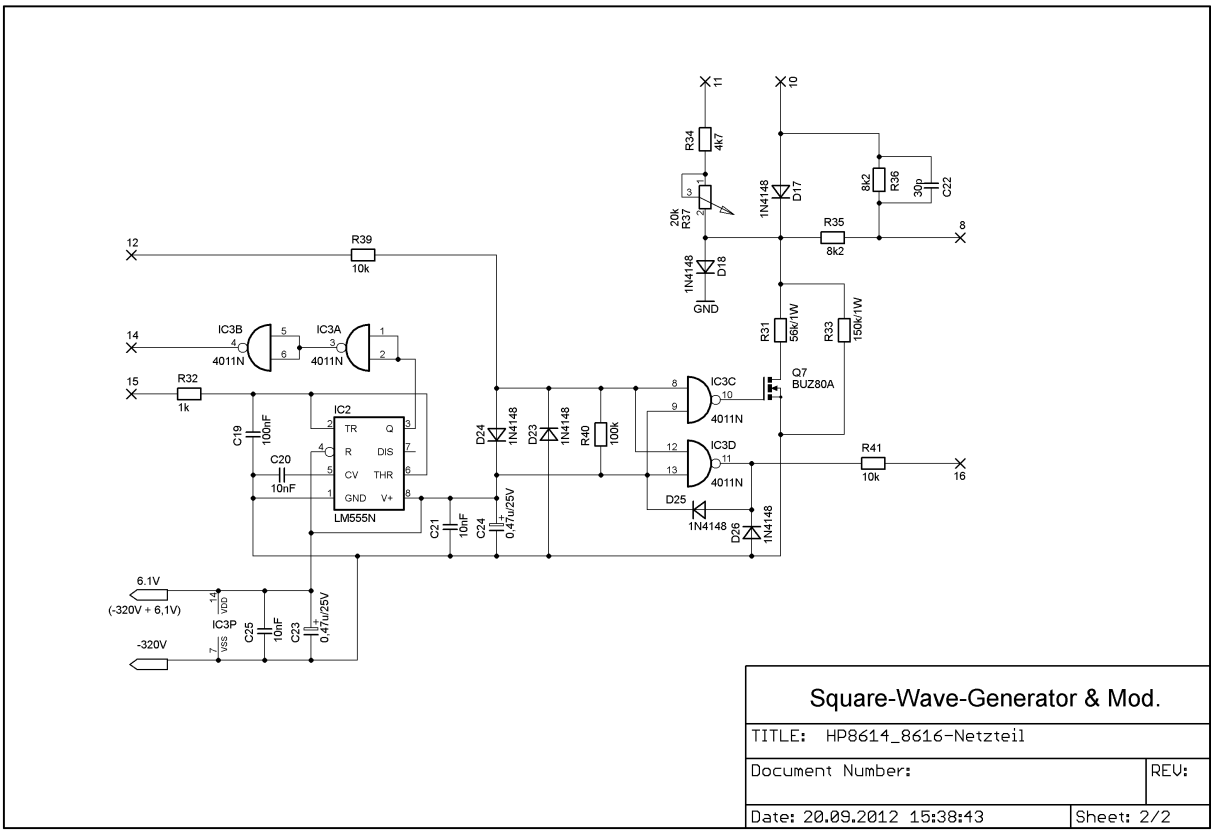
Note: The pin numbers in the new circuits are identical to the original circuits and have to be connected 1:1.

Picture 3 is the original inside view showing the tube-based HV-circuit.

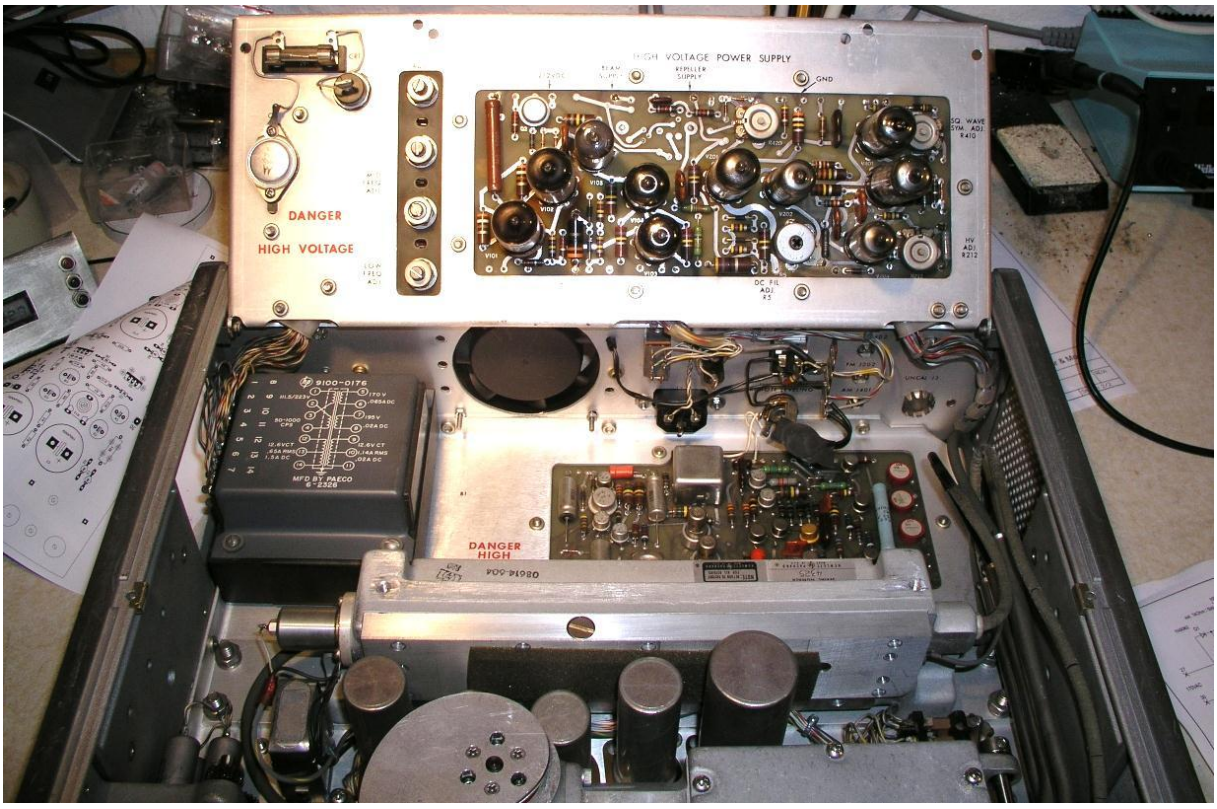
The following pictures 4 to 13 show the modification step by step.



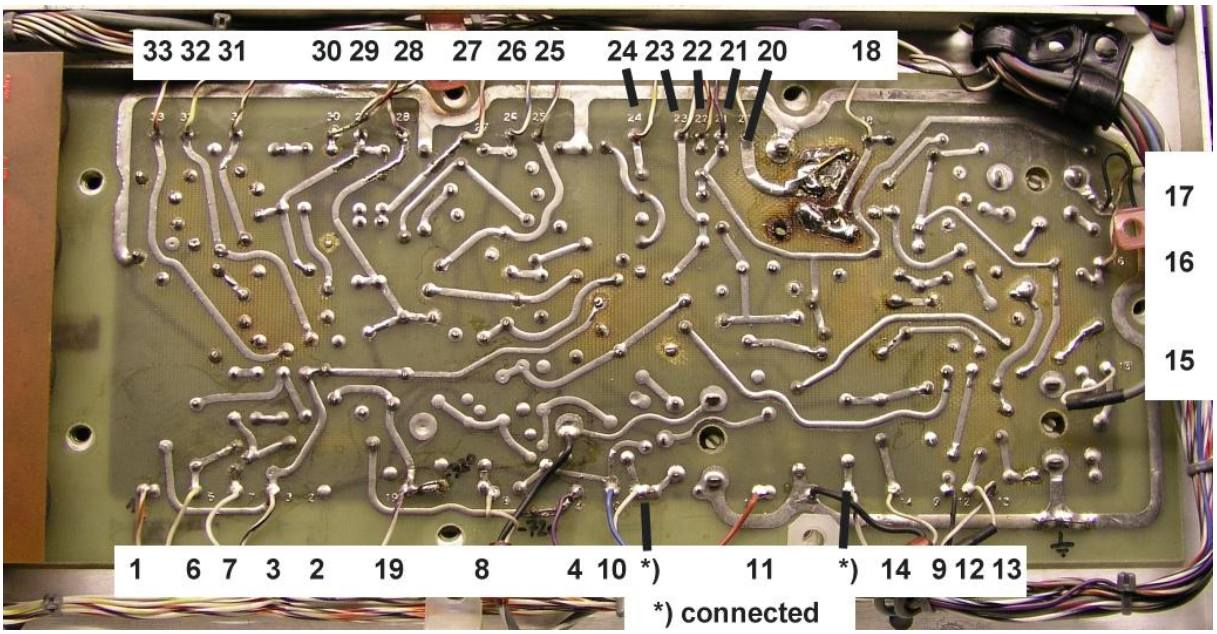
Picture 1: HV-circuit for -212VDC, -320VDC, -720VDC and filament supply



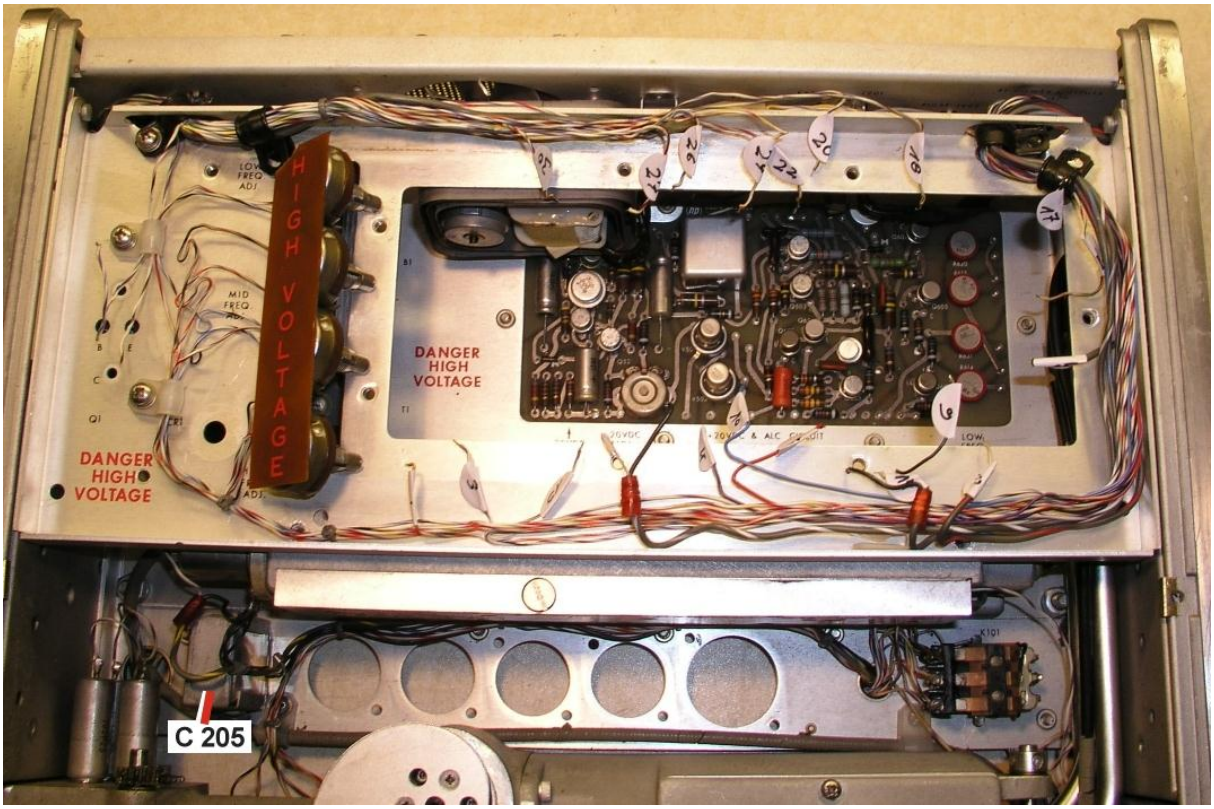
Picture 2: Square-wave-generator



Picture 3: Original inside view

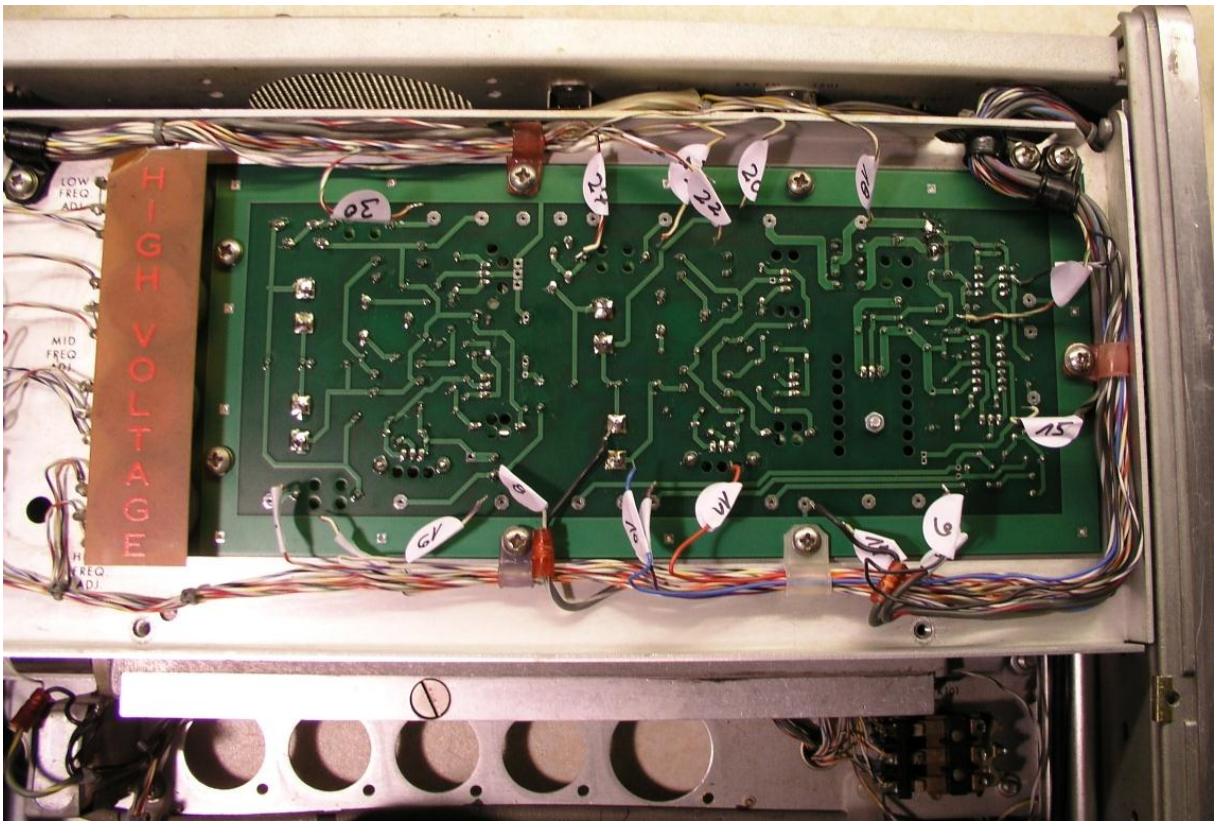


Picture 4: Layout of "old" circuit with pin numbers – don´t forget labeling !

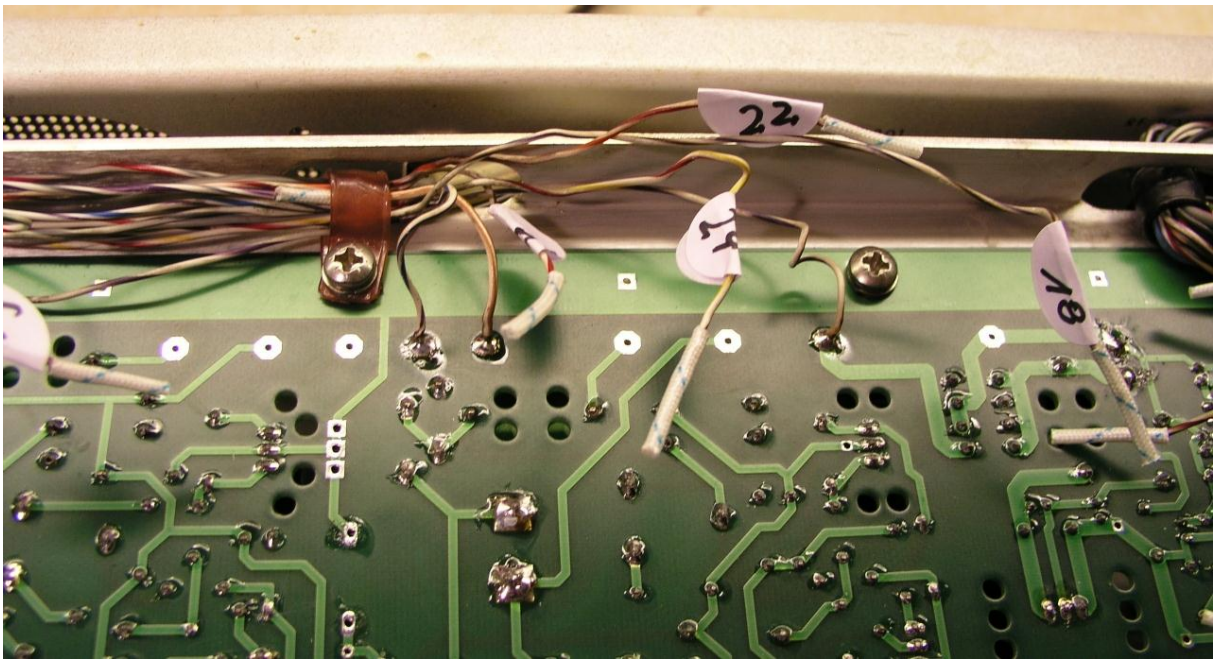


Picture 5: Removed HV-circuit, filament supply regulator and electrolytic capacitors
(The "old" ALC-board can be seen)

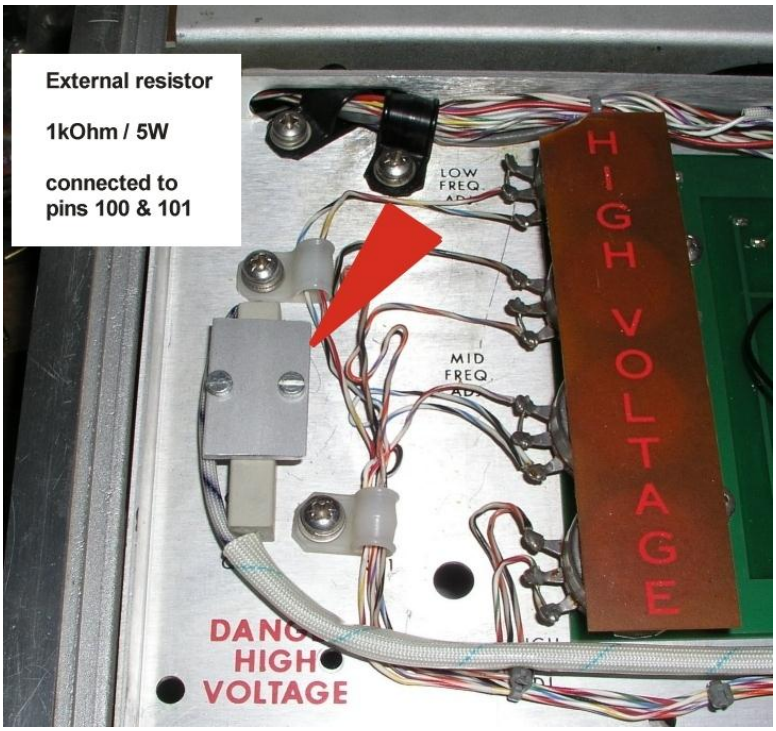
Picture 6: The new HV-board



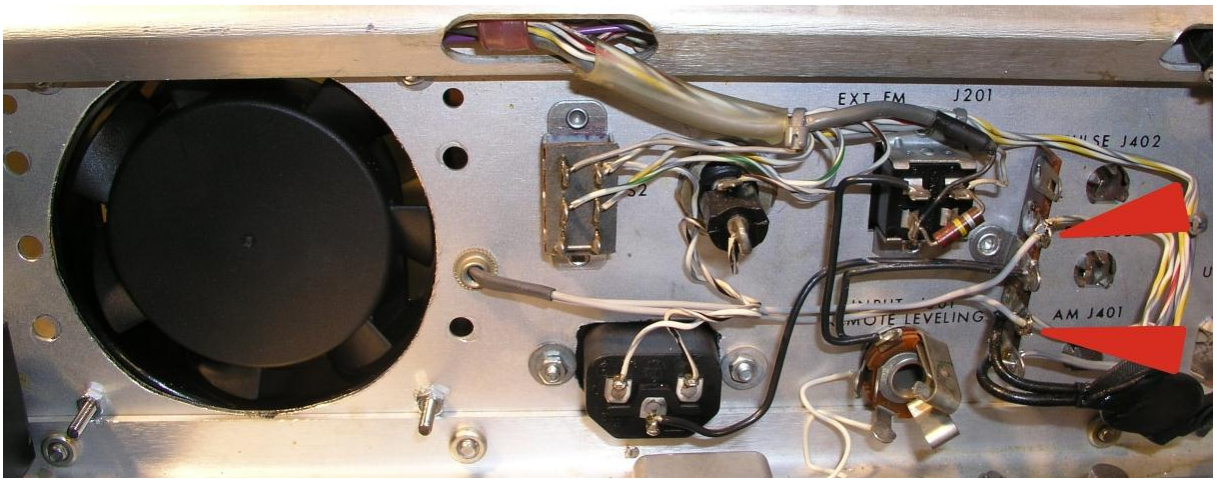
Picture 7: New HV-board before soldering



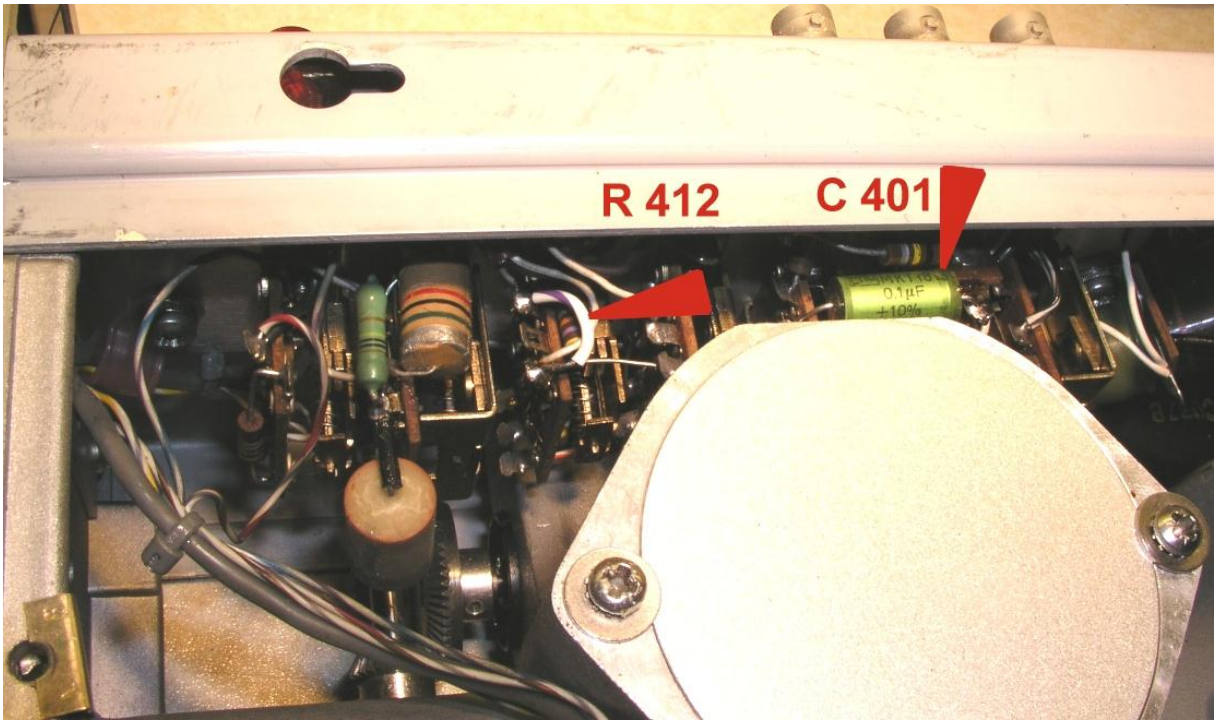
Picture 8: Some details



Picture 9: Additional external resistor (reduces heat dissipation in Q1)



Picture 10: New fan 230VAC, connected to 115VAC for low speed



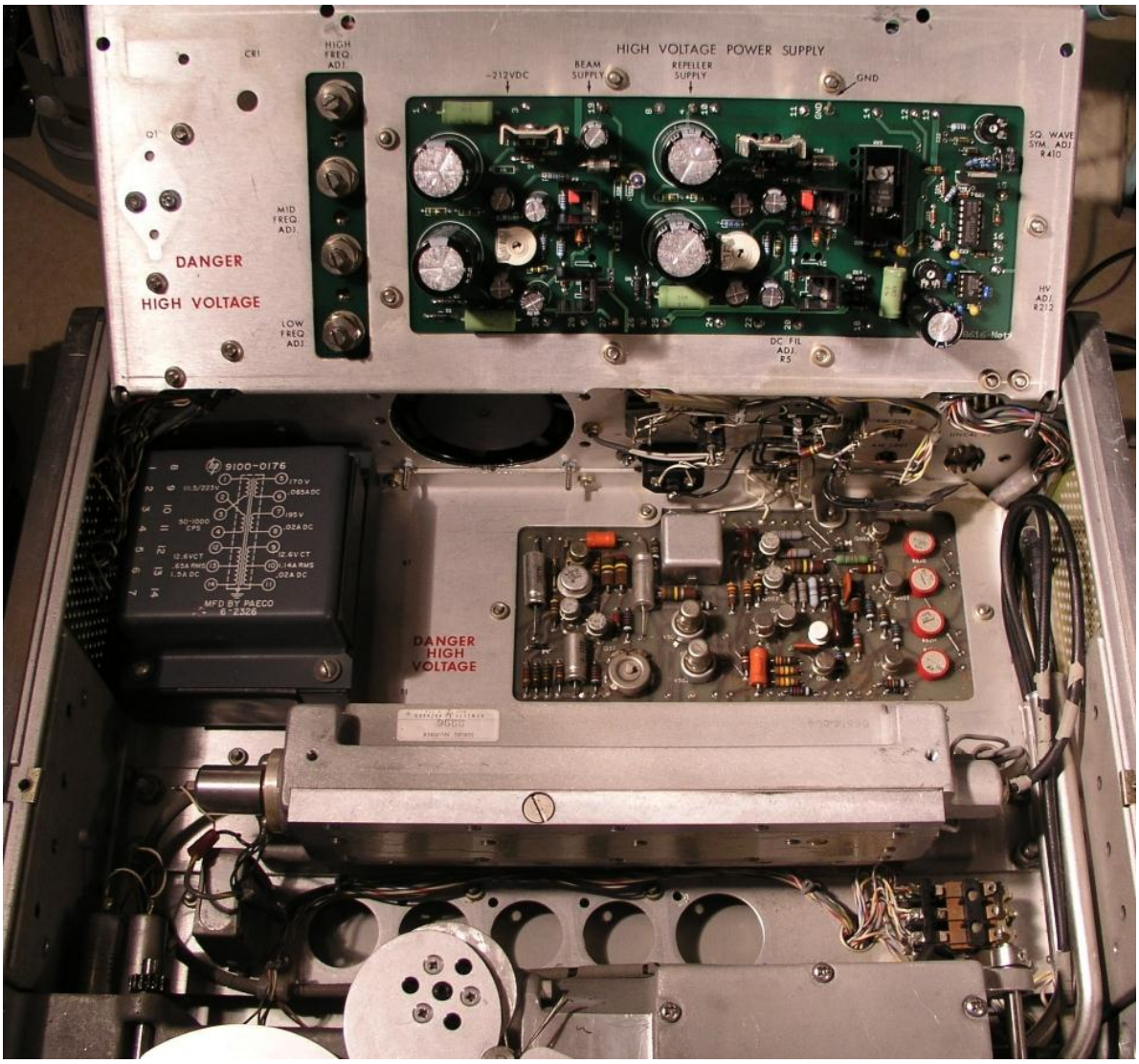
Picture 11: R412 bridged; C401 replaced by a better isolating type (MKT)

R412 has to be bridged to get a better frequency variation of the internal square wave generator.

Picture 12: Alignment of filament supply

The alignment of the modified generators can be done acc. to the manuals /1/.

Picture 13 shows the finished generator; the “old” ALC-circuit with transistors and nuvistors is still in use.



Picture 13: ALL IS DONE & READY

>> It was a crazy project and I don´t recommend to do it … smile <<

Please don´t ask for PCB´s – I don´t have any and won´t produce them!

/1/ Service and maintenance manuals of the HP8614 and HP8616

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