

Instability of XV432 with K2 & K60XV

The equipment

My rig is the K2 with K60XV and the XV432.

The XV432 is jumpered for 1mW input, the K2/K60XV is set for maximum 1mW output acc. to the manuals.

Description of my problem

All is operating well with the exception of one problem:

In CW-mode with carrier keyed permanently, the output-power of the XV432 cannot be adjusted smoothly. When rising smoothly from zero to maximum 20W (power tuned at K2/K60XV with key down), the XV432-output hangs up at app. 6W and with further power-increase at the K2/K60XV, the XV432-output suddenly peaks to 20W (=1mW at K60XV).

When reducing the output smoothly, there is the same effect but vice versa:

The XV432-output hangs up at app 15W and then suddenly drops down to zero when decreasing the output of the K60XV smoothly. There is a big hysteresis in both directions!

The Test

I solved the problem by using a 30MHz-Lowpassfilter between the output of K60XV and the 28MHz-input of the XV432 (see picture 1).

Therefore, i believe there is a problem with the ALC of the K60XV:

The UHF-output of the XV432 (20W) couples into the 28MHz-line (1mW) and affects the ALC in the K60XV. The difference between 20W output of the XV432 and 1mW input (at 28MHz) is 43dB, so the isolation should be >50dB - maybe it's not reached inside the XV432.

I observed, that this problem depends on the length of the coax-cable between XV432-transverter-input and K2's transverter-output. Maybe, a resonance occurs in this cable, e.g. at $\lambda/2$ or $\lambda/4$. In my rig, i used a RG58 with BNC-connectors; maybe this problem doesn't arise with other cables and/or cynch-connectors – i didn't check it.

Elecraft told me, that i have a problem with selfoszillation of the PA-module.

Yes, i had this problem before. But after all actions against self-oszillation (inductor and 10pF at the module, good grounding, removing paint, etc.) the selfoszillation disappeared – i could see this on my widebandscope.

But my problem described above was still present!

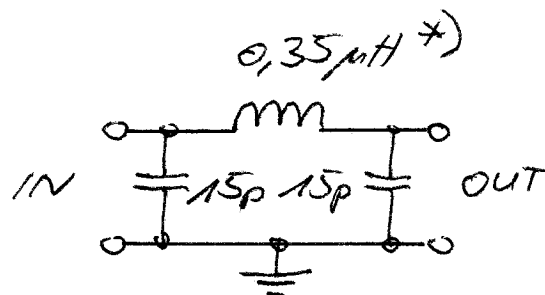
So, i am sure that my problem has nothing to do with selfoszillation of the PA.



Picture 1 Test with Lowpass-Filter

The solution (1)

I decided to install a lowpassfilter into the XV432's 28MHz-transverter-input to avoid this coupling. The calculation of a lowpass-filter with app. 100MHz ($Z = 100\text{Ohms}$) gave me following components (picture 2):



* $) A_L = 9\text{nH}$, $n = 6$ turns
Material: 417 (Epcos)

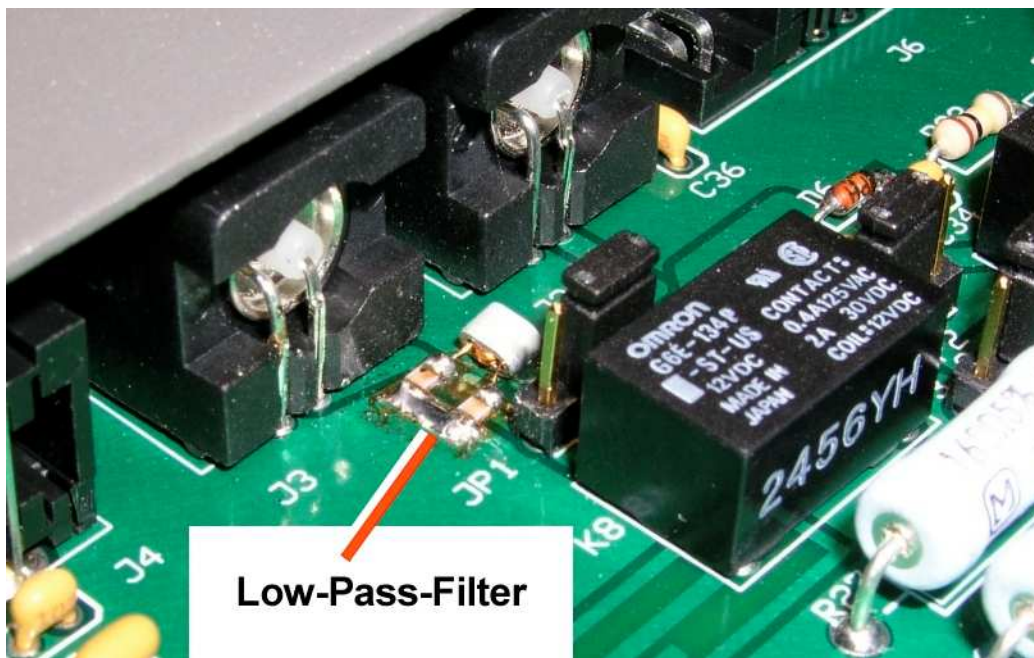
Picture 2 Components of Low Pass Filter

First, i installed this LP-filter in the TX-IN input of the XV432 (picture 3).

Procedure:

- Interrupt the wire to coax-connector J3 with a sharp knife and remove app. 2mm.
- Remove the color on the pcb for soldering the three elements.
- Solder the two C's (15pF) and the inductor (0,35 uH).
- Fix the inductor with some glue.

The inductor is wound onto a binocular ferrite core; for example 6 turns onto $A_1 = 9\text{nH}$.
The two C's (15pF) are SMD-types.



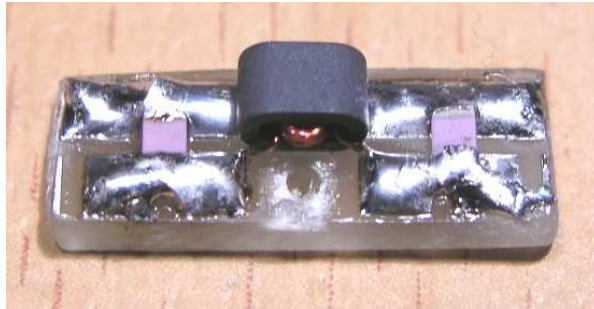
Picture 3 Low Pass Filter in the XV432

The Result (1)

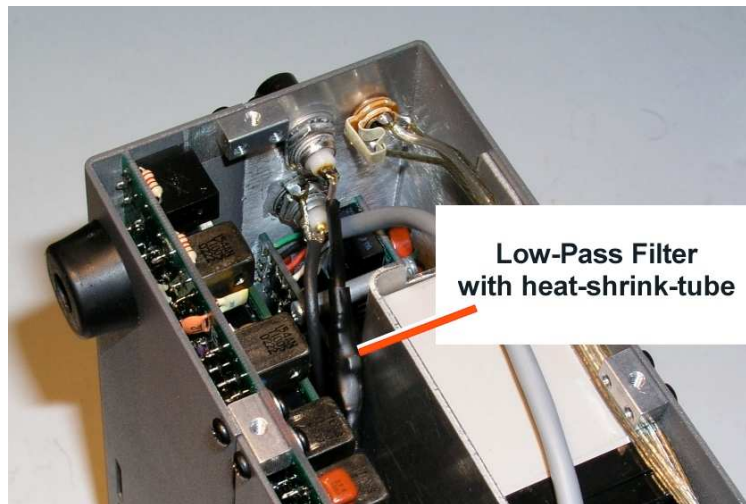
With this modification, the problem nearly disappeared – but not completely!
There was still a small hysteresis when increasing and decreasing the power.

The solution (2)

So, i decided to install a second lowpassfilter, but now in the K2's transverter-output.
A second LP-filter with the same elements as for the XV432 was prepared and soldered onto a small piece of an experimental-pcb (12mm x 5mm), see picture 4. This filter is soldered into the output-line of the K60XV and protected with a heatshrink-tube, see picture 5.



Picture 4 Readily prepared LP-Filter for the K2



Picture 5 LP-Filter installed in the K2

The Result (2)

With this second LP-filter, the problem completely disappeared, a smooth setting of the power at the output of the XV432 between zero and full output (>20W) is possible without instabilities!

Conclusion

A coupling of the transverters 432MHz-output into it's 28MHz-input can be avoided by this modification. The fact, that i had to use two LP-filters (one in the XV432 and the other in the K2) seems to prove that a resonance-effect in the cable between both units occurred.

If you want to contact the author:
Stefan Steger, DL7MAJ, eMail: dl7maj@darcl.de
Homepage: www.dl7maj.de