

Dave's RB-980BX repair and upgrades:

Main repairs:

Left channel's large -15V DC offset:

All output stage transistors and capacitors checked and found to be fine. Fuses replaced and all fuseholders cleaned, inspected and tightened for a better fuse grip.

Now both channels seemed ok with an output offset of about 22mV.

Protection relay circuit not working:

Identified that the schematic's R814 value of 100K had to be a misprint. Analysed the problem, changed it to 56R, and the relay circuit now works.

Idling temperature problems:

VAS transistors Q613-616 were running very hot due to a much too high (18mA) DC bias. Reduced this to the original 8mA whereby each VAS now produces less than 0.5 W which the original heatsink is capable of handling. VAS temperature is down to 45 °C without extra heat sinking.

Cleaned the bias trimmers and adjusted the bias down to the recommended 10mV across R663/664 from too high settings.

Main heatsink temperatures now stable at around 46 °C.

Improvements and upgrades:

Added a pair of emitter follower (EF) transistors between the input and the VAS transistors. This greatly reduces the load on the input stage – and allows lowering the currents through Q601-608 from 1.4mA to 1.0mA.

However, there is an intricate inter-dependency between the input pairs, their current sources and the VAS circuit stages. So, all resistors from R605 to R612 and R615 to R618 have now been carefully recalculated and replaced with new values.

Replaced the input capacitors with 4u7 WIMA films.

Then added 47pF NPO Miller capacitors around the new EF-VAS pairs for HF stability. Removed Rotel's heavy VAS loading and put in a single 15pF NPO.

All this will linearise and reduce the distortion of the amp, it already halved the output offset to 11mV and also greatly stabilised the bias setting.

Actually, the entire amp now seems to be in a new, nicely balanced state.

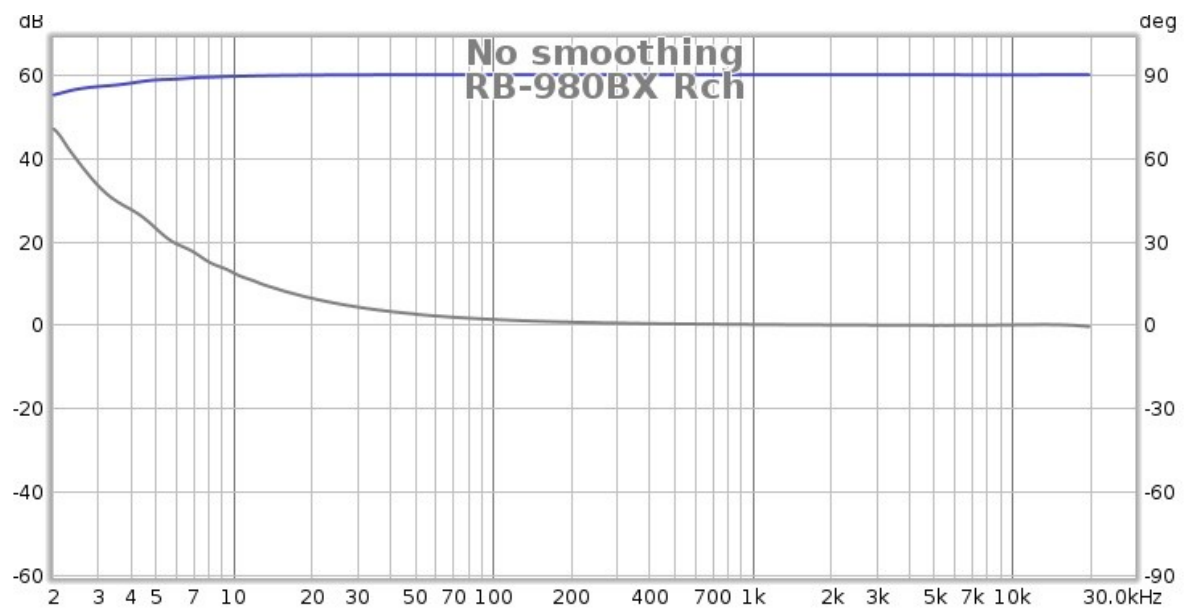
What I didn't do:

I left the Silmics in place, they are a matter of personal preference and the Vishays were left in, except those for which new values were needed.

I could not use my CM1 and VAS3 modules due to the high voltage rails, but the discrete EF transistors do most of the same job.

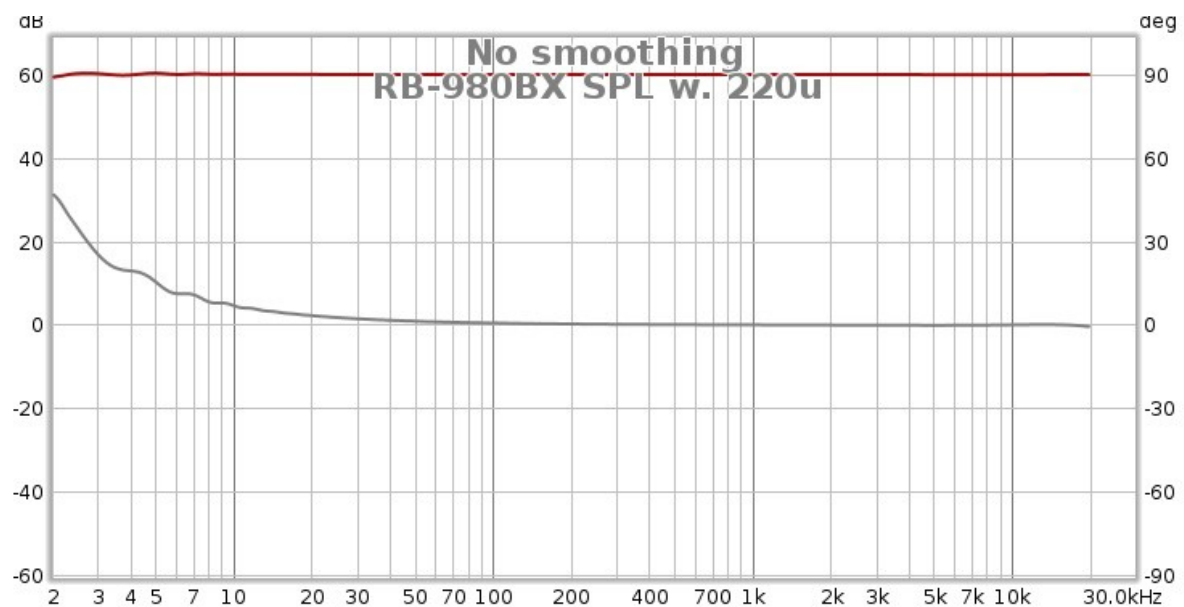
Next on to measurements and listening tests.

Sound Pressure Level (SPL):



SPL (blue), Phase (grey)

Not bad, but the phase response below 100Hz could be improved.



Better, amp phase linear from about 40Hz, and shift now a mere 3° at 20Hz. (Sorry Dave, but your Silmic II had to give way to a Panasonic FM 220uF.)

Total Harmonic Distortion (THD):

Unmodded Lch: 0.0014%
Modded Rch: 0.00097%

A nice 30% reduction – pretty chuffed about that.

Listening test:

The only setup with a volume control was that in my lab with two bookshelf Mission speakers.

These normally good, albeit a bit lazy Missions definitely soon found out that they had been connected to something else! Wow!

They really came alive and seemed to enjoy a new lease of life. Superior bass control, detailed soundstage, etc....

Conclusion:

Well, at least I am quite happy with the repair and transformation result, and you can now safely claim to have ***the best RB-980BX in the world!***

But of course, the ultimate verdict on the result can only be made by your ears.

Best,
Per