Subject: Re: Wide Spread RIAA Phono Stage Inaccuracies by Manufacturers
Posted by positron on Thu, 27 Jan 2022 23:32:03 GMT
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If I may Gofar, I think I can help with a closer, more accurate, and long term stability/success. I agree, no negative feeback loops, except for a very small amount of current feedback from the cathode resistor to give biasing etc (in my design). You may wish to use separate biasing technique, but that also has considerations.

The miller capacitance's effects depend upon the RIAA design. Using higher capacitance in the network (lower value resistors), the Miller capacitance will have negligible effects. If using a lower capacitance designed network (often seen with 12Axxx or even 6sn7 tubes), the miller capacitance will have more effect on the RIAA curve. So changing tubes with different Rps and miller capacitance will affect the RIAA more. Just a matter of how you wish to design and feel comfortable with.

A second point, I generally use a low Rp tube, and high R1, so the RIAA variance is small when changing out tubes. A low Rp tube will also give me a factor of 5 or 7 times less RIAA change than using a high Rp tube and high R1.
Very general figures.

When using 12XXX type tubes with generally high Rp, the margin of design is also quite slim "balance" when considering moderate+ deviations from RIAA. Thus using a cathode follower to the RIAA network is generally an advantage for RIAA stability. However, every added stage generally deteriorates the musical quality.

It is true that all the stages should be accurate in a system, but RIAA is one place to start that is inexpensive for those with a TT. One can also compare their phono system to that of digital. Following that, one can then judge component auditions more accurately in one's home.

Working in a university Lab for a while, a scope is not accurate enough for a close accurate measurement imo. A quick, accurate, somewhat easy way to design an accurate RIAA netowrk, is to plug in a proper value of R1 resistor (which includes Rp and RL values) at this site, which uses Stanley Lipshitz's equations. I found it works wonderfully. (Personally, I use a Tektronix capacitance/resistance meter, but there are other accurate meters one can purchase to check values.)

http://www.mh-audio.nl/Calculators/CalculateRIAA.html

Using this site allows me to be withing 0,1db initial, and it stays quite close as the tube ages due to R1 resistor being much larger than Rp/RL.
As mentioned earlier, I agree that no negative feedback if possible.

Cheers and continued good fortune tweaking your system.

pos

positron wrote on Mon, 24 January 2022 09:36gofar99 wrote on Sun, 23 January 2022 20:21Hi, I have found the various sets of formulas to be more or less close. They don't tell the whole story as the compliance with RIAA requires the output of the preamp to be right, not necessarily any individual stage. I use a 1% accurate inverse network with a very accurate signal generator. Then measure the output as a Bode plot on a calibrated scope with a suitable load. Doing it this way compensates for changes the actual circuit (not the EQ) usually causes. A qualifier is that with tube gear (all mine is) the brand, lot number and individual tubes will vary. It is unpredictable. When I hand select the tubes (same lot etc) it is possible to get matching within 0.5db when first installed. After 6 months or so the matching is not likely to be quite that good. I only use passive eq and no NFB in designs, if you use NFB you can get a slightly better long term result. IMO is that NFB is a double edged sword. Yes the numbers can be better, but I always hear some subtle changes in the presentation. Possibly it is just me, but I avoid NFB when ever I can.

Anyhow the site for calculations is a good one and I have used some calculations they had for speaker crossovers and box volumes.
If I understand you correctly, the actual accuracy of the rest of the system also needs to be investigated. With that in mind, I don't seen any reason not to start with the RIAA network as it costs very little.

I have tried different tubes and the specs seem to stay close. I try to use the best tube manufacturer possible. Sourcing from a cathode follower would definitely keep deviation in milli db range.

The input following the passive network needs capacitance (including Miller capacitance) to be included in the network, and resistance to be high for accurate bass reproduction. Some include a pole at very low frequencies, but personally I don't include such a pole.

Hope this helps the diyers as it costs virtually nothing to get the RIAA correct.

I agree, I also do not use negative feedback type.

Stanley also addresses other poles, especially high frequency pole around 50khz. A recording RIAA emphasis network and associated circuitry cannot indefinitely increase gain as the frequency rises, so a high frequency pole exists. I have found that if I create a super high frequency pole as well, I notice a sonic difference. I am not sure it is worth it. Very interesting to investigate though.

cheers
pos