Subject: Re: Why SE in SET amps?
Posted by Thermionic on Wed, 26 May 2010 05:38:20 GMT
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Pano wrote on Sun, 23 May 2010 17:54Harmonic structure relates best to what and how we hear. THD does not. It's more complicated than that, but that gets us started. A good SET amp does not give dominant even order harmonics, it give a very regular fall off of all harmonics, odd and even. This is very important.

Welcome to ART, Pano! A great post; thank you for making this very important statement.

It's often said that "even order harmonics are good, and odd order harmonics are bad," but that stops short of telling the whole story. While it's indeed true that odd orders are more dissonant than even orders, the big picture is that the higher the overtone series of the harmonic distortion products present, the worse the amp will sound, regardless of whether the distortions are odd or even order in nature. The other facet of this is that all harmonic distortion products are just that, distortion, and represent a deviation from the original input signal.

In light of that fact, I've always maintained the position that SET amplifiers sound good in spite of their high 2nd harmonic content, not because of it as many contend. As Pano noted, it's because their distortion spectrum typically drops off like the proverbial rock past the 2nd harmonic, leaving them relatively void of high order harmonics (both even and odd). In agreement with Pano's post, I've found during my 25 years of experience with tube amplifiers that this end is best achieved by using highly linear, low-mu triodes. How you operate them is also highly critical, with load impedance and bias point being major determining factors in the all-important harmonic distortion structure.

Matts wrote on Tue, 17 November 2009 11:38My guess is there are some micro-variations in the a.c. signals that are lost when a neg. feedback loop "blends" slightly different parts of the signal together, and this causes some loss of the cues that give our brains the sense of "live" music.

Yep, for sure. The error signal in a global NFB loop is always time-delayed and phase-shifted with respect to the main throughput signal, so that the two cannot ever "mesh together" perfectly. This is mainly caused by the reactance of the signal path capacitors and the output transformer.

Also, as Wayne stated, the error signal will always be tainted by the back-EMF from the speaker drivers, which itself is phase-shifted as it travels back through the crossover network and speaker cables. In short, it's impossible to fix something that's broken with something else that's broken even worse.

While global NFB does greatly lower the overall THD, it multiplies the remaining distortions into higher, more dissonant orders. In a sense, you distort the distortion, so to speak. My take on the matter is that if avoiding this means you must end up with an amp that produces only 2 watts per channel, then so be it, because sound that's been repaired is never as good as sound that wasn't broken in the first place. By all means, I'd much rather listen to mindblowing sound at mundane levels, than mundane sound at mindblowing levels. Besides, I'm too old to handle it loud any more.....