



Amplifier Differences and Lack of Tests

Everyone is aware of the tube versus transistor, feedback, and other debates that have existed for decades. Only recently have I seen papers that actually attempt to test and explain the results with real data, such as the Nelson Pass paper on negative feedback. I believe *audioXpress* printed an article on perceived differences in harmonic structure of amplifiers. That article made a lot of sense to me; I have noticed that 1% of second harmonic is not audible to my ears, yet I seem to notice lower levels of higher order harmonics that seem common in many commercial transistor amps!

Now, I am not an audio engineer; I'm an RF Tech by trade, and maybe the AES has all kinds of data on these things and prefers to keep secrets from the common masses. In RF, we do extensive testing on devices: harmonics, intermod, behavior over varying temps and load impedance, even transient effects such as "ghosting." Transistors can do strange things under the right conditions! But try and find anything past harmonic distortion on the web if you're not an AES member. Kudos to National Semi for giving lots of hard data on their amplifier chips, but what happens when you put a reactive load on it, such as, a speaker?

A few years ago, I decided to try building a tube amp—just out of curiosity—even though there's no way it could be better than an LM3886, right? It was a cute retro project that was fun to build (just 2W), and brought back some memories. I hooked it up and played something. . . WOW! It sounded cleaner, more dynamic even. One engineer said it was just some "Euphonic" artifact. . . how can an artifact be cleaner and more detailed, more like live acoustical sound? When pressed for details, these guys can't explain why, so it's clearly not a rational argument.

Sadly, neither side seems capable of proving and explaining the differences; doesn't that seem odd? I think that performing the following tests would help, and none of these should be unusual or very time consuming:

1. Harmonic and two-tone intermod tests into a real two-way or three-way speaker. I would think the varying phase angles from a reactive load must have some effect in the feedback loop!
2. Waveform test (time domain) of transients, again, with real speaker load. I am convinced that transient peaks come through better in my tube amp. . . the LM chip sounds dull and lifeless in comparison. I can imagine a possible reason for this: the combination of low source Z of the amp with higher reactive load is providing an over-damped condition. Or I might be wrong—but I believe my ears.

One experiment I have tried is listening to clean acoustical music through both amps, then trying processed and compressed studio-produced music. The chip amp does well with compressed music, but not as well with uncompressed quality recordings. In other words, transistor amps are great for the music that kids listen to with their subwoofers. They would see no benefit with anything else. But if you know the sound of acoustic guitar or drums, high-feedback transistor amps seem to consistently fail to sound right. My tube amp does a surprisingly good job.

There are other tests that should be done. Some types of tests have been done on the human ear, but do we know what level of distortion is audible for any given harmonic, or for intermod levels? There are complications to doing this, but a well set up and documented test could be very instructive. Out of my own curiosity, I would love to do these

tests, but I don't have the equipment. I thought that someone would have done this long ago.

Perhaps I am looking at this all wrong. Maybe AES knows all this stuff, but needs to cater to the current market of compressed music. (Isn't it funny how overly compressed music "sounds dynamic" to the kids? They really have no idea what the term actually means—ignorance is bliss!) And maybe the audiophile market has worked too hard at being magicians—they believe being scientific about it will destroy the magic.

Yeah, that's it. . . clearly, the audio market is even more insane than politics. I think I will just try to ignore it, and enjoy the music on my good-sounding system.

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POSTSCRIPT

As a follow-up, I just did a test with my son who plays drums, as a sanity check. Musicians know the sounds of their instruments and will notice things the rest of us don't. I used music from Sheffield Labs that is compression free. He immediately noticed that the drums sounded correct with the triode amp (no feedback).

With the LM3886 amp, the "overtone" (he described it as a sustained tone from the drum cavity) of the bass and toms was overemphasized (as in an over-damped system response). He also noted that the high-hat was muted, especially the effect you hear as the cymbals open and close. He said that both of these effects are common problems in recorded music, in spite of efforts to damp the drum overtones with absorptive materials.

I just don't believe now that all of the problem is in the recording. Further, I am sure that if I can hear this effect, it can be measured, if someone is willing to specifically test for this. *aX*