Subject: Re: An amazing listening session with the H290C
Posted by Wayne Parham on Wed, 24 Apr 2013 16:17:26 GMT
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There are a couple of mathematical abstractions in electronics, the voltage source and the current source. Basically, an ideal voltage source is one that has zero internal impedance and the ideal current source has infinite internal impedance. In practice, a voltage source has low internal impedance whereas a current source has relatively high internal impedance, compared to the load impedance.

Basically, you'll find that most modern amplifiers act as voltage sources. They have low output impedance - typically much less than an ohm - and provide good electrical damping for their loads. This makes them absorb back EMF from resonance pretty well, and impedance fluxations aren't terribly troublesome.

But add some resistance to the circuit and it begins to act like a current source. This resistance can be from a passive crossover, the connection cables or an output transformer, as in the case of tube amplifiers. Even the heating of the voice coil can create a similar effect, because even though it is a change in the load device, it acts much like a series resistance to the load.

optionally Rs and C1. Careful manipulation of these values provides just the right balance to lock in a specific transfer functon, even as parameters shift in the source or the load.

As an aside, you can use the constant current method to expose reflections and standing wave modes. The impedance spikes created by these reflections are sometimes damped well enough by a voltage source that they aren't immediately obvious. That doesn't mean they won't show up with a vengeance if used on a tube amp with low damping, or even because of parameter shifts, like what happens at high power levels.

So it is useful to examine the impedance chart for evidence of standing wave modes and reflections. They are sometimes small blips in the impedance chart, but when amplitude response is measured using a current source, these small blips will sometimes transform into surprisingly large ripple that isn't there on a voltage source. This is usually an indication of internal reflections, which are responsible for the nasal "horn honk" sound of some horns and the "spitty" or "splashy" sound of others. The nasal quality is usually from standing waves at the low end of the range, and the spitty/splashy sound is from reflections at higher frequency.

That's why it was so important to me to optimize the H290C to avoid internal reflections. Its oblate spheroidal flare provides a nice translation from planar wave to spherical section, and its depth/area ratio provides the right beamwidth with smooth response through the passband.