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Subject: Re: Distortion

Posted by [beun](#) on Mon, 27 Jul 2009 00:30:29 GMT

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Basically he is partly right. All tubes, MosFets and bipolars distort on their own. The big difference is that tubes and Fets are primarily second order devices while bipolar transistors are exponential devices. So in a tube or Fet amplifier without (much) feedback the distortion components are mostly even (2nd, 4th) while in a bipolar amplifier it will be primarily odd (3rd, 5th, etc).

Additionally the exponential bipolar device will produce more of the higher order odd components that a tube will of the lower order even components. This means that in any amplifier you need feedback to reduce the distortion. Let me put this a bit stronger, all amplifiers use feedback even the ones that say they don't. They may not use global feedback but they will have local feedback (also called degeneration).

Since transistors usually have more available bandwidth than tubes you can trade that with global feedback against distortion. The bandwidth of the amplifier will go down (that's Ok, since you had too much of that anyway) while the distortion will go way down.

As you already mentioned there is a difference in clipping behavior. Strong global feedback will keep the distortion great right until the end when you start to clip hard. An amplifier with low or no heavy global feedback (most tube amps) will clip a lot more slowly which may sound better to the ear. In my opinion though when you operate close to clipping you need a more powerfull amp.

Also the design is more important than the components used, a tube amp with heavy negative feedback will function like a classical transistor design while a transistor amp with low global feedback can mimic the classical tube design.

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