Re: Transformer question

Source: http://newsgroups.derkeiler.com/Archive/Rec/rec.audio.tubes/2006−06/msg00401.html

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- *Date*: Wed, 21 Jun 2006 18:19:22 GMT

robert casey wrote

> > My instincts suggest going in one direction
> > might help the low end at
> > the expense of the high and vice versa in the
> > other.
>
> If you reduce the desired power output by half(?) you can get
> back to the
> orginal frequency response.
>
> > This one I still don't get. I mean, I do get the saturation aspect but
> > if the low end response is falling off because of low inductance why
> > will running at half power help?
>
> Lower power would mean lower voltage on the primary, which needs less
> inductance. At least I think it works that way (I'm somewhat outside my
> expert knowledge area here...) :−)

A simple model, which explains the formula for the LF −3dB point I have already posted, answers most questions.

Consider, for the purpose of LF, that a transformer comprises:

A resistance equal to the output load multiplied by the impedance ratio, in parallel with an iron−cored inductor, Lp.

A series resistance equal to the winding resistance.

Now, if the instantaneous current passing through the inductor rises beyond a certain point, inductance will fall off according to the B−H curve, and the core is likely to saturate.

The current clearly depends on the voltage and the frequency. At low frequencies, effective resistance of the inductor will become comparable to the load resistance and the source resistance, and that is why you get the roll−off. For the same reason, for a given AC voltage, the current through the inductor increases, and at some point will be enough to result in saturation (doesn't necessarily follow if the winding resistance or source resistance is large, BTW, but neither should be). Note the role of the source resistance, Raa, *and* the load in this model.

So the roll−off and the saturation are inextricably linked. Ensuring a margin between the two phenomena is part of the art of arranging the right materials in the right proportions. Patrick does that.

You may add to this model some representation of how the inductance rises and falls depending on the instantaneous current through it, so that the greater the current variation, the greater the distortion resulting from traversing the B−H curve, but that is a relatively minor effect.

cheers, Ian

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