Subject: Re: 300B cascode + grid choke Spice simulation
Posted by MQracing on Sun, 04 Dec 2005 16:52:57 GMT
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Hi Damir:Neat post. It invites so much discussion... that it could keep us busy for quite some time...I'll try to keep some of my comments and observations and speculations a bit more brief...first observation:presumably the data derived is a product of the WHOLE circuit... not a subset of the circuit or an individual stage or etc...which leads to (and this of necessity to an extent) that the resultant behaviours apply to the whole circuit and not to any specific part of the circuit...for example... it appears that the output transformer's primary is treated as having simply a reflected impedance of 3,000 ohms... but it to could be modeled like the grid choke... by adding the other relevant parameters of an output transformer. the power supply is not included in the analysis... it too may have an effect on the amplifiers performance in the real world. In fact... in a study that Paul Joppa did modeling resonances the worse case he came up with was a series fed se output stage which resonanted quite distinctly with the last cap (8 mfd) in the series circuit. simplifying (which all models do by their very nature)... has it's limitations and advantages... knowing all of these and ferreting them out isn't always so easy.but let's run with the spice analysis you provided...::::Our driver has some good properties (low Miller capacitance, amplification ~35, good sound), but unfortunately, has Rout~Ra, or 12kOhms in this example.::::which means that if you choose this drivers it will present a set of different challenges and design requirements than if you had chosen an alternative driver tube. fair enough. but we should all be aware of this.::::The simulated frequency response we can see in lower diagram - high frequency started to fall after 20kHz,::::I put up a small post it note to try to decipher the X and Y values and I was getting somewhere btwn -1db and -2db (with my imperfect eyes) at around 50 khz. If this is correct.... not nearly the end of the world or in-and-of-itself anywhere close to rotten in my book. I'd want to listen to the circuit and decide not decide it's merits on this spec.:::and we have LF resonance (~8dB) on 10Hz. For later, if we want to avoid this and have a linear response down to 2Hz, we must use a much larger coupling cap Ci, about 4,7µF.::::the above was with use of a .22uf cap. On Joel Tunnah's site he has a resonance calculator as well as a Q calculator...in line with p-spices result... the resonance calculation also agrees that .22uf and 1700 henries will resonate at 8.23 hz. if we change the cap value... make it larger... here are the calculated resonant frequencies (keeping 1700 henries constant).5uf will resonate at 5.46 hz 1uf will resonate at 3.86 hz 4uf will resonate at 1.93 hzinterestingly, as voltsec sez in his post... when you change one parameter invariably you will effect or change other parameters as well...let's look at the Q.... again calculated on Joel Tunnah's website...1700 henry choke with a dcr of 8,000 ohms... then by varying cap size not only do we change the resonanct frequency but we will change the Q ....22uf cap with 1700 henries and a dcr of 8,000 ohms will have a Q of 10.988.5uf cap with 1700 henries and a dcr of 8,000 ohms will have a Q of 7.2891uf cap with 1700 henries and a dcr of 8,000 ohms will have a Q of 5.1544uf cap with 1700 henries and a dcr of 8,000 ohms will have a Q of 2.577so that not only does the resonanct freq change with the cap size but also the Q... so the magnitude of the resonant peak and behaviour of the resonance will change...all of which goes.... in my view... to the point of... this is where the designer and his\her skill comes into play... it's knowing how to opitimize the circuit... what values to use... what tubes to use... and how to optimize a whole range of values to acheive a specific performance goal.and it could very well be possible... that given certain design requirements or certain choices of other components... that perhaps LC coupling is not optimal in the particular application being looked at... but... juggling the parameters and knowing which parameters need attention or need to be

optimized is part of the "skills package" that the designer brings to the table. Some designers bring more enhanced "skills packages" to the design table... others bring less developed or refined "skills packages" to the design table...be interesting to run some of the pspice simulations with the differing cap values shown above and see what ya get...on the surface.... my first hunch is that your circuit is close to being pretty darned good... maybee a bit more fine tuning will get it where you want it to bee...cheers,mslAnd for HF - use a grid choke with smaller Cw, or another driver - with lower Rout. If we use, say, common cathode 6C45Pi, our Rout would be much smaller, about 1/10 then cascode, and now HF "falling" problem is gone, but 10Hz "hump" would be even larger - need larger Ci...