Subject: Small HV caps, and pentodes driving power triodes
Posted by PakProtector on Fri, 30 Dec 2005 23:48:53 GMT
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Hey-Hey!!!,Been considering a page from Damir's pentode driver, 300B amp. With PP cross neutralization can be done with small caps(the size of the driven tube's grid-anode capacitance).Since the PP 2A3 project is moving ahead smoothly, the task goes to laying out a driver stage. The Sovtek 2A3's can run 300V into 6k6 a-a and remain solidly class A. I have some small diameter TFE insulated co-ax, with a ridiculous capacitance per foot. A short length of this stuff looks like just the ticket. It is too bad it can't work for SE. Connect internal to the driver plate and the braid to the opposite 2A3's plate. I think I read that this is a WE trick from a looooong time ago. Either way, all ov a sudden a pentode can run a power triode.For example a 12BY7A with a 10k plate load, a 300V plate supply, and 90V g2 will swing +/- 100V comfortably. With the PP circuit canceling the 2nd HD, this circuit will be quite clean. At this sort of swing, few triodes can compare, let alone in a single stage.I have a bunch of ~20W 6k6 OPTx's...I smell a shoot-out/Tasting between them. The losers to eBay, the winner to the cloning winder. The nice side effect is that I'll be rid of a big pile of Iron when it's all over.cheers,Douglas

Subject: Re: Small HV caps, and pentodes driving power triodes
Posted by Damir on Sat, 31 Dec 2005 13:49:30 GMT
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Hi, first thing (when I find a little time) is to try CCS parallel to Ra with cascode and pentode, and use a Mu-out.Some of those pentodes are fantastic on paper (P. Millett`s measurements), say 12BY7, 7054, D3a, ... even EF184. Even distortion profile isn`t bad, the only think I don`t like is rel. low bias (say 1-2V) for the most of those high-gm tubes. With common triodes, PP driver/splitter with more then 2 x 40Vrms clean "swing" and only 300V supply isn`t easy. Do you think about (pentode) driver and ct choke as a splitter, or...?And yes, I can`t find small values HV poly caps, "Wima" has 33pF and more...Happy New Year - and lot of interesting projects!

Subject: Re: Small HV caps, and pentodes driving power triodes
Posted by PakProtector on Sat, 31 Dec 2005 14:00:56 GMT
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Hey-Hey!!!,No plan to use the autoformer/ct choke as a PI. Going to use a diff pair, with a common g2 supply. The g2 would be resistor dropped, and c-bypassed to the common cathode node(riding a MOSFET CCS). This would be the same sort of thing the cascode achieves by referencing Ec2 to the common cathode as drawn in the Merlin schematics.The autoformer/ct choke also leaves only 1/4 of the end-to-end inductance, instead of 1/2 the end-to-end inductance one gets when driving it balanced, in pure grid choke form. It's the same effect as a Class A v.

Class AB OPTx load. Interleaving also increases the Cw...and I'd prefer to have that as low as is achievable, given the other design requirements. On the capacitive load, the better sonics of the cascode MOSFET CCS is largely due to reducing the shunt capacitance(IMO), and reducing the Cw of a choke is going to contribute in the same direction. Capacitive loads sound screwey to me, hence the interest in the Cw measurments of the inductive loads. Which gives me another thing to try when I get those interleaved phase splitter chokes in my hands and on the measurement bench...more later when I have developed the idea a bit further.cheers,Douglas

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Subject: Hey Doug
Posted by Russ on Sat, 31 Dec 2005 15:02:07 GMT
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I dropped Damir an email about a post over yonder from J.Rankin in regards to questions I had about grid chokes. He is a very knowledgable guy and had some great info. I encourage you to look for the post. He states, "the self capacitance of the choke is multiplied by the Miller Effect and this also degrades the higher frequencies". Not sure I see why this should be but if we take it as fact it is something to consider. He also states a mu follower should not be used with an inductive load and perhaps even that a CCS loaded stage would be a poor choice.When you drop an inductor on the grid things get complicated in a hurry. For example many will point to a lower DCR path if and when grid current is drawn. True for grid current caused by gas molucules but false for grid current from driving the grid positive. Moral being a resistor across the choke is likely to be required.Thorsten has good info using coax in the way you mention and has always been willing to answer questions.Why all the interest in pentode/cascode stage? Just to get a lot of gain? I think I'd want a buffer between a pentode/cascode and a reactive load. Never cared for cathode followers...maybe an anode follower (if not a PP stage)....you can pick the feedback ratio to strike a balance between gain and output impedance. Likely you guys have thought all this thru but I have not followed y'all so forgive me if i suggest things that you have already worked out.Russ

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Subject: Hey Russ...
Posted by PakProtector on Sat, 31 Dec 2005 16:58:57 GMT
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Well now, I don't know about Gordon's analysis on the gird choke, but I have my doubts. I remember which side of the PP loading issue he weighed in on, and it was the same as Mike. This of course gives me great concern as to any other conclusions he might reach.I could see the Cw in parallel, or adding itself to the driving stage's capacitive load(grid-cathode, and grid-plate multiplied by gain, or Miller effect). The units just don't add up. Capacitance times capacitance does not yeild capacitance but what I suspect would be a meaningless quantity. Mass*length^2/time^3 is a means of expressing power...I'll leave the capacitance exercise to the student...:)The choke's Cw would present a load to what ever is driving it. It's not referenced to the

grid, but elsewhere in the circuit, so I have additional doubts on the 'multiplied by Miller' that you attribute to Gordon. I think a schematic with all the pieces represented, and the math behind them would be of great use. The cascode and pentode offer a high output Z device for use in the E-Linear circuit. The circuit has a fair amount of short path NFB, and the additional gain is useful there up to a point. Considering how easy it is to build a linestage with gain, the amp's gain is pretty much a non-issue within reason.On the grid current, I have some similar suspicions about chokes. Signal caused grid current is AC in nature, and since the choke only pays attention to AC...one should be very careful about using too much.cheers,Douglas

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Subject: BTW, That wasn't Gordon...
Posted by Russ on Sat, 31 Dec 2005 21:26:18 GMT
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it was John...same last name but different guy.I agree with many of your points. I can't see the miller thang either...maybe he did mean with regards to the driver tube....but I didn't read it that way and neither did Mark.The way I see it any choke small enough to provide a low enough impedance path to ground when the tube was driven positive at higher frequency would have too low of an impedance at 20 hertz (even 250 henries at 1K is more Z than many output tubes can handle). Me thinks a grid leak resistor near maximum allowable value is prudent. Add in the fact a choke is an energy storage device and balance with the notion that it's impedance might go to hell once grid current sets in and we have a host of things to consider (with no good manf. info to design from and I won't even go into the 3dB points and Q).I suppose you might feel I weighed in on the wrong side of the 1/2-1/4 a-a thing. IIRC my main comments were 1/2 the OPT does have 1/4 the Z and the normal way of picking a load line was nothing more than an easy mathmatical convention not based in reality. But regardless, if I have not done so before, allow me to publically state beyond any shadow of a doubt that you were right.Nice chewing the audio fat and have a happy new years.Russ

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Subject: hmmmmm...
Posted by PakProtector on Sat, 31 Dec 2005 21:37:05 GMT
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I remember some of your posts on the loading. I don't recall ever disagreeing on the 1/2 the OPT has 1/4 the a-a Z. It was what happened when the two halves were working together that caused all the enthusiastic discussion. I was quite satisfied once the energy balance was equal.I think the resistor in parallel will also change the Q, not to mention getting rid of the whole reason to go with the choke in the first place: different AC and DC performance. I am about to play with some 813's and they have a 30k maximum gird circuit resistance. I don't feel like driving that...:)A reasonable inductor, say 250/1k Hy will show 500Hy to each phase of the driver stage. At 20 cps, this is also *WAY* past the 813's 30k. There is a precision gap in the core, so it will deal with a little bit of grid current. Also, if one is dealing with grid current, the minimum gap L will loose inductance, as it

saturates, and this might be a good thing(maybe?).Happy New Year to you as well, nice discussing audio with you too.cheers,Douglas