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Subject: Coupling cap/grid choke, etc.

Posted by [Damir](#) on Tue, 14 Feb 2006 12:51:22 GMT

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My grid chokes are 1700H/8k amorphous "C"-core devices. The "Q" of the RCL circuit (choke model - inductor in series with resistor, and paralleled by winding capacitance) is  $Q = [(L/C)^{0,5}] / R_w$ . If we (simplified) observe L as a constant, and  $R_w = 8k$  constant, too, then we can lower the Q (and avoid subsonic resonance) by enlarging the coupling cap, or by adding external resistance. Series external resistance  $R_{out}$  of the driver "dampens" the Q, and parallel R can also help a bit. I simply used 4,7 $\mu$ F Mundorf Supreme coupling cap, "good compromise" between the cost/dimensions and value. In the next couple of days I'll post about this experiments on "Group Build" forum, but in short: -E182CC cascode with ~20mA and  $R_a = 15k$  has output impedance  $R_{out} = R_a \parallel R_{in} / R_a \sim 14k\Omega$ . Amplification is  $A = g_m \cdot R_a$ , and with  $g_m \sim 4ma/V$  and very large (infinity) loading impedance (grid choke,  $Z_{gch} = 2\pi \cdot f \cdot L$ ) our amplification is  $A = 4 \cdot 14 = 56$  times. We can say that we approach this on high frequencies, say 10kHz, where  $Z_{gch} = 106,8M\Omega$  theoretically and simplified. On larger frequencies, say 20kHz and up,  $C_w$  "comes into play" and with  $R_{out}$  of the driver forms low-pass filter. On the lowest frequency of interest, say 20Hz, our  $Z_{gch}$  is "just" 213,6k $\Omega$ . In parallel with  $R_a \parallel 14k$ , we have  $R_a \parallel 14 // 213,6 = 13,139k\Omega$ , and amplification is "only" 52,55 times. But, when we express this in dB, it's a difference of only 0,55dB. Is this negligible? In my listening tests these days I found that high  $R_{out}$  cascode in combination with grid choke isn't really the best solution. Sound was bright, and bass was "anemic". When I used the CCS parallel with  $R_a$ , and used Mu-out, then I got the "right" sound, from "bottom to top". Unfortunately, I don't have measuring devices for objective evaluation of the circuit, just the subjective sound" results :-). I didn't notice bass boost / subsonic resonances, although Mu-out has low  $R_{out}$  (no ext. damping). As I said, good sound, bass "punch" returns, and amplification is ~55.

<http://audioroundtable.com/GroupBuild/messages/1489.html>

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