Subject: 300B project, part 3 - PS model
Posted by Damir on Mon, 22 Aug 2005 17:16:08 GMT
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I simply use the parts I have and PSU Designer II (Duncan Amplification). I have 370+370V/0,3A transformer, and L-input PS is not possible, I need B+ about 410-430V. Then, I choose C-input with small first cap, two independent PS on the same HV winding, each with its own tube rectifier (5V4G) and CLCLCLC configuration... Let`s see:-I1 current tap (4mA) is actually resistor load, about 100k-I2 current tap is 300B (80mA) -I3 current tap is driver (18mA)Actual parts I used:C1 = two 4,7µF/630V Wima MKP4 in parallelC2 = 200µF/500V Mundorf M-Lytic HV electrolyticC3 & C4 = 47µF/600V M-Tubecap polypropyleneL1 = 10H/250mA/98 Ohms, AE-EuropeL2 = 10H/150mA/140 Ohms, SchmidbauerL3 = 10H/~50mA/285 Ohms, salvaged/old stock Current ratings of the chokes is overdimensioned. All parts (especially caps) must be for 500V working voltage minimum.On PSUD diagram we can see 30ms "segment", 1s after "turn on".-The green line is ripple voltage, Vc1~80Vpp, from 400-480V. The DC voltage is Vc1 = Vc1p - Vripple/2 = 480 - 80/2 = 440V.-Vc2 is yellow line, after first Pi-filter (L1/C2).Vc2 = Vc1-RwL1*IL1 = 440 - 98*(0,018+0,08+0,004) = 430V. We have little ripple, Pi filter lower it S1=Vrc1/Vrc2 = (2Pi*f)^2*L*C == (2*3,14159*100)^2*10*200*10^-6 = 789,57 times, and Vrc2 == Vrc1/S 0 80/789,57 = 0,1Vpp.-Vc3 is blue line, our B+ for output stage, after L2/C3 filter.Vc3 = Vc2 - RwL2*IL2 = 430-140(0,08+0,018) = 416,5V. Our second Pi-filter lowers the ripple voltage 185,5 times and we theoretically have just 0,54 mVpp ripple here.-Vc4 is a white line, our B1+ for the driver, after L3/C4 filter.Vc4 = Vc3 - RwL3*IL3 = 416,5 - 285*0,08 = 411V. Third Pi-filter lowers the ripple voltage to just 0,003mVpp theoretically.-Red "spikes" are ripple current waveforms on C1. Although we "draw" about 158mArms from our transformer, C-input means sharp peaks of 465mAp! That`s why we prefer L-input, if we can...-Actual measured voltages on breadbord shows only a few volts difference in comparison with simulation.

Subject: 5R4GYB
Posted by Damir on Mon, 22 Aug 2005 17:23:11 GMT
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Larger internal impedance rectifier, PS is a little better "damped" (no overshoot or "ringing"), but B+ is just 392V... Also, "turn on" is slower with 5V4G - about 10-15 seconds no voltage, then another 10-15 seconds slow rise to max. voltage. With DH 5R4GYB, B+ is "there" in couple of seconds...

Subject: Re: 300B project, part 3 - PS model
Posted by Manualblock on Wed, 24 Aug 2005 13:23:18 GMT
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Hi D; Why such a complicated supply? Four caps and three chokes? This is the SE 300B correct?Can you say why it takes that much filtering to get acceptable ripple rejection?

`Cos I like it that way:-)Seriously, after the first choke there`s 200µF electrolytic capacitor, and ripple is still high for the SE amp, 100mV. Then I used another choke/cap filter, this time with polypropylene cap of smaller value. This cap is actually in the output "current loop", or signal path, and must be quality one. (More in Part 4).We can use simple RC filter for the another stage (driver), but there`s not much voltage left - we can "lose" only a few volts. I have cascode driver in plan - needs >400V and low ripple (low PSRR of the stage). Then I just used another LC filter for the driver.Probably I`ll use larger, 20µ first cap - I`ll get few more volts and according to the PSUD not much larger current "spikes".Ideally, we need low PS impedance too (in series with output tube)- hard to get with "traditional" tube rectifier and multiple chokes. But, every design have some compromises, etc...