Subject: Some questions on Power supplies
Posted by Manualblock on Sun, 27 Nov 2005 16:43:16 GMT
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Hi guys; Before we embark upon the PP 2a3 I have a project in mind. Since I have all of the neccessary components on had I am thinking of building and semi-designing a PP 6V6 amp from a scematic. The first thing I need to do is convert the existing tube rectified PS from a Cap input into a choke input and come out with the proper voltages from the PTrans. I have on hand a couple of transformers and am looking at transformer theory in order to decide which one will be most compatible.Next I would need to persue the proper specs for the output transformers of which I have several on hand. The maths of the applications should be reasonably simple for you guys and doable for me.So; what I would ask if it is o'kay; is to offer my take on each choice and see if the choices are correctly arrived at. Would that be of any help in regards to providing an opportunity to do some explanations on a level as simple as mine and see if they work for me?I can use a 5Y3GT so far looking for 365v out into the filter.The schematic calls for a filter of 20mk input to a 100ohm to a 60mk to a 5.6kohm to another 20 mk.I would like to convert that to a choke loaded input.Thanks in Advance.

Subject: Re: Some questions on Power supplies
Posted by Damir on Sun, 27 Nov 2005 20:01:56 GMT
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I suppose that B+=365V is for output stage, CRC filter, from 60µF cap, and second RC filter (5k6/20µF) is for phase splitter.Output DC voltage (365V) from L-input rectifier is 0,9*Utr, minus losses in transformer windings and diodes. In another words, you`d need Utr = 365/0,9 = 405,5V + Ulosses. To find out exact Utr, the esiest solutions is to use PS simulator, Duncan PSU II. You can choose various PS "blocks", and rectifiers. The first step is to measure (with Ohm-meter) primary and secondary resistances of your transformer(s). With full-wave (say 450-0-450V) secondary, measure the resistance of half of the secondary, from 0-450V, rs. Let`s say it`s 50 Ohms. Then measure rp of the primary (0-120V), let`s say it`s 8 Ohms. Then find the turns ratio N=Usec/Upr = 450/120 = 3,75 in this example. Compute the resistance of the transformer, Rtr = rs + N^2 * rp, in this exampleRtr = 50 + 3,75^2 * 8 = 162,5 Ohms.The program needs Utr and Rtr. Put a resonable choke, say 10H/100 Ohms and C~100µF after tube rectifier of your choice, loads (constant-current, say 70mA for output stage) and you can see various numbers - currents and voltages, and graphs.See, for example my 300B "story" , part 3...

Subject: Psud II example
Posted by Damir on Sun, 27 Nov 2005 20:51:45 GMT
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Here`s the our example - we get little lower voltages, about 344V. For higher B+ you can use the another rectifier or choke with lower resistance.Note that choke must be dimensioned for ~130mA, and transformer for about 90mA.

Subject: Re: Some questions on Power supplies
Posted by 2wo on Sun, 27 Nov 2005 20:56:50 GMT
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Hi Guy, if you know what the AC output of transformers that you have, you can go right to Psu2 and cut and try. Measure the DC resistance per Damir. Or just using the dc resistance of the secondary will be close enough to tell if the transformer could work.As a rule a choke input filter will give you about .7 of the rated voltage cap input about 1.4 Remember if you have say a 250-0-250 transformer, in Psu2 with a full wave rectifier (normal hook up for a 5y3) you state the transformer as 250V.If you can't get a high enough voltage, switch to a full wave bridge (SS or tube) and try again. Only in this configuration, you state the above transformer as 500VHave fun…John

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Subject: Re: Psud II example
Posted by Manualblock on Sun, 27 Nov 2005 22:31:57 GMT
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Damir; thanks much. What is the value that shows for C1; is that 220nf?What is the process for replacing a resistor in a pi fiter with a choke?

Subject: Re: Some questions on Power supplies
Posted by Manualblock on Mon, 28 Nov 2005 03:05:43 GMT
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Guys; I see that the 6v6 will not work with 750vct trans since it needs 350v plate voltage. 6l6 can get by with 300vplate voltage which shoulod work with 750vct. But I wonder what effect a different rec tube would have. Say a 5u4 which should be able to pass greater current to the filter; no?Thats the kind of speculation I am interested in. Ie; If you find a rectifier circuit that will provide 300 volts on the plate with 150ma current. What changes will occur with the use of different rec tubes?What is the best way to rectify AC if you need a cap input or a choke input. Doesn't the type of rectifier tube affect the performance of the filter and how much benefit you gain with using a clc or lc filter?I can run the specs through PSUD II but I am looking more for a theoretical opinion of how to implement the different types of filters/the way to combine rec tube types with CLC or LC

ladder filters. In reading different analysis of PS types there are some universal aspects of design that people apply to circuits in specific circumstances. Example: LC filters should be used in applications where there are wide variations in load current.Output voltage decreases with increasing current in the LC filter.These are the types of information that can frame the choices available to the builder. By expressing these simple truths it makes it much easier to begin the design process for a novice.When you guys start out with the maths and the design programs; those types of facts seem to get lost to the begginner.Is this helpfull at all?

Subject: Re: Psud II example
Posted by Damir on Mon, 28 Nov 2005 11:56:22 GMT
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The purpose for C1=0,22µF=220nF (1000 VDC ratings) is to remove voltage spikes and improve HF filtering, see "Valve Amplifiers" by M. Jones - good and detailed explanations about L and C input rectifiers. RDH is a good info, too.For L-input you must "draw" the minimum, "critical current", about Im~Utr/Lch ~ 45mA, to avoid Udc=1,4*Utr, like in C-input case.And you can substitute 100 Ohms resistor in CRC filter with a choke with sufficient current ratings, and Rw~100 Ohms, beter filtering.

Subject: Re: Psud II example
Posted by Manualblock on Mon, 28 Nov 2005 18:41:10 GMT
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Well; I guess I will purchase Morgan's book on amps. It seems to be the bible for home constructors. Thanks Bud.

Subject: Re: Some questions on Power supplies
Posted by 2wo on Mon, 28 Nov 2005 20:39:17 GMT
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I think you can get the 750VCT transformer to work. If your not dead set on a choke input filter.Go back to the example that Damir posted.(how do you do that?) Change the transformer voltage to 275, then tinker with the value of the first cap. As you slowly increase the value, the output voltage will rise.With 10uf I was able to get ~365with 5Y3's 10uf- 10h- 50uf With a 70ma CS...John

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Subject: Re: Some questions on Power supplies
Posted by Manualblock on Tue, 29 Nov 2005 01:12:48 GMT
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Thanks John; thats a huge help. I will run it by PSUD 11 and see if what I do is the same; what about using another rec tube? Maybe a 5U4?

Subject: Re: Some questions on Power supplies
Posted by 2wo on Tue, 29 Nov 2005 02:14:52 GMT
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There may be no best way. If you make a design decision, to use a cap input or choke input, (which is best to use in a given application, I will leave that to Mr. Jones) Then you must work backwards. Do you have a bit of iron that you want to use, an off the shelf item, or will you have something custom wound. If I were to start with a clean sheet of paper I would use a CT full wave rectifier as my first choice, one tube, most of the time or two SS diodes. clean and simple. And buy the transformer that supply's, the needed voltage. There are some good multiple tap transformers such as the Angela universal or the DIY lady day that can fill many applications.If I have a given transformer and a full wave bridge, will get me the voltage I need, then that is what I will use. As to what rectifier to pick, well this gets personal. Of course there is tube versus SS. Let's keep it to tube for now.First any tube we choose must be able to supply the current and voltage we need. Next, are we constrained to 5V or 6.3V heaters? Or not. That's the easy part. Next we can divide the remaining tubes, into directly heated, such as the 5U4 and 5y3.Or indirectly such as the 5v4 or 5ar4. One advantage of the indirectly heated rectifier is a slower ramp up of the B+. How much this matters is up for debate. Next up Voltage drop. Depending on the tube 20V to more than 70V, more or less. This can be useful when you need a bit more or less voltage.From here on it's my tube is better then your tube. So let your ears and your wallet be you guide…John

Subject: Re: Some questions on Power supplies
Posted by 2wo on Tue, 29 Nov 2005 03:03:53 GMT
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Give a go. I think you are underestimating the teaching potential of this tool.Set something up, then change one thing at a time, try different tubes see what it dose to your voltage . Gee dose raising the second cap from 100uf to 220uf do much? Take one transformer, say your 275-0-275 and run it thorough it's possible permutations full wave. Cap input. Full wave Choke input full wave bridge same as above. Hey for extra credit try have wave.A few pointers on using Psu2 referring to Damir's post. You see that he runs for something like 2000ms after a delay of 0 sec.I like to change the delay to say 30 sec sometimes to see what is going on after things settle down. Just beware that the graphs will look nasty , until you look at the Y axis

and see how small it really is …John

Subject: PSUDii and settling
Posted by PakProtector on Fri, 02 Dec 2005 00:29:03 GMT
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I have played with many variations of tube PS with that Sim program. I don't thing that the tube warm up was properly modeled. I have examined two slow heating tube diode PS. Both were L-C and both showed considerable overshoot with PSUDii. No such overshoot was observed in the real world with tubes warming up fairly slowly. I did try a hot switching ON-OFF-ON and found it did behave as PSUD predicted, leading me to the conclusion that they have a single parameter set for the tube diodes(or pairs of diodes) which does not truthfully show the warm-up behaviour.When I used Hg-vapour diodes, such as a pair of 816's I was able to see the current waveform in the brightness of the pretty blue glow. Even caught the oscillations as predicted by PSUDii.cheers,Douglascheers,Douglas

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