

|                                  |                       |                          |                      |
|----------------------------------|-----------------------|--------------------------|----------------------|
| <a href="#">START NEW THREAD</a> | <a href="#">REPLY</a> | <a href="#">PREVIOUS</a> | <a href="#">LIST</a> |
|----------------------------------|-----------------------|--------------------------|----------------------|

Read 75 times

|                 |  |
|-----------------|--|
| <b>From:</b>    | <b>Steve A.</b> ( <a href="mailto:steve_ahola@yahoo.com">steve_ahola@yahoo.com</a> ) |
| <b>Date:</b>    | 1/3/2002 2:37 AM   |
| <b>Subject:</b> | <b>Specs for such a choke?</b>   |

ken:

Can you give us a mfg part number, or some specs for a choke used in such a configuration?

You are referring to using the choke AHEAD of the plates and initial filter caps—right? I'd read about that before but thought that it was just for hifi audio but from your post I see that it has applications in a guitar or bass amp, too.

I bet that those chokes are expensive... would it be cheaper to just buy an off-the-shelf PT with the correct ratings? Or is there an advantage to using the power supply choke?

--Thanks!

Steve Ahola

|                                  |                       |                          |                      |
|----------------------------------|-----------------------|--------------------------|----------------------|
| <a href="#">START NEW THREAD</a> | <a href="#">REPLY</a> | <a href="#">PREVIOUS</a> | <a href="#">LIST</a> |
|----------------------------------|-----------------------|--------------------------|----------------------|

Read 95 times

|                 |   |
|-----------------|---|
| <b>From:</b>    | <b>kg</b>                                       |
| <b>Date:</b>    | 1/3/2002 4:51 AM                                |
| <b>Subject:</b> | <b>first diatribe of the year... chokin' it</b> |

steve,

choke input supplies are largely overlooked in today's atmosphere of large-value, low-cost electrolytic caps... it's much cheaper/lighter to use the brute force approach of massive banks of caps as opposed to a magnetic component like a filter choke.

the benefits are all due to the "flywheel" effect of a choke... instead of the diodes only conducting current for very short pulses, they conduct current *during the whole cycle*. that relaxes the strain on ALL the components in the power supply--the diodes, the power tranny, the caps downstream, etc. there is NO turn on surge in a choke input supply, so you don't have to overcurrent spec your fuse, and you don't have to use a slow blow. the transformer is used more efficiently, and the supply is better regulated, ie the difference in rail voltage from idle to full tilt boogie is smaller. for this reason they are preferred in amps that draw variations in current with wide variations of output power, like class B amps.

the problem with big ass cap approach is that the high current pulses they draw from the tranny winding cause a lot of IR drop in voltage. this is exactly what causes so much sag, or lack of regulation, in a cap input supply. there is also more  $I^2R$  heating of the winding itself, raising its temperature and increasing the R even more. during the portion of the cycle where neither diode is conducting (a large portion indeed) the supply is *completely* dependent on the stored charge of the caps. making the caps bigger and storing more charge lessens the decrease between refreshes, but it also exacerbates the magnitude of the current pulses while the diodes ARE conducting. these high current transients are rich in harmonics and can be difficult to filter.

choosing a choke

look at the maximum rail current you need for the power supply... you could determine this easily if your rail is fused, but only if your fuse is AFTER the first filter cap. say 250mA for a pair of e134's, pushed moderately hard, as a first guess. 300 would be safer. the more current, the bigger the choke's gonna be, so there's tradeoffs. a very low DCR choke (ie a high current choke) is never a bad thing, though.

determine the rail voltage you want for the output section. the choke input supply gives an output that is 0.9 times the input RMS voltage, so divide that rail voltage by 0.9. that's your necessary power tranny 2ndary voltage output.

your minimum inductance can be approximated as follows... the minimum current (aka critical current) is the point at which the diodes are no longer conducting for the entirety of their halves of the waveform. ironically, the supply's rail voltage will go UP, way up to the peak value of the input waveform, 1.41 times the input. the supply topolgoy is now changing from choke input to cap input. this value of current in milliamps is approximated by the rail output voltage divided by the value of the choke in henries.

you should set some minimum current that you expect to draw from the supply. since you know the value of the rail voltage, you can solve for the choke value. ironically, the higher your output current, and lower your output voltage, the smaller the choke can be.

i would not get a choke much bigger in inductance than the value you solved for above. more inductance means more turns, which means more resistance unless you up the guage, which then means more window space, which means a bigger core, which means more money and more weight. larger, higher inductance chokes also swing a lot of AC electromagnetic flux around, which means they're physically noisier and radiate stronger fields. if you fudge too small on the choke value, drop a bleeder off the rail and it will raise the minimum current, and improve regulation. don't take this too far and blow your advantages of efficiency, though.

so now you know how to find the choke specs of Lmin, and Imax, and the power tranny's Vout, which is good enough!

ken

oh yes, the "swinging choke" is designed to start to saturate at high currents, which causes it to decrease in inductance and somewhat compensate for the heavier load. when the current is small, the choke's inductance is higher, which leads to a smaller value of critical current. they're nice, but not too easy to source new. nos is really the way to go for a swinging choke.

|                                  |   |                          |                      |
|----------------------------------|---|--------------------------|----------------------|
| <a href="#">START NEW THREAD</a> | <a href="#">REPLY</a>   | <a href="#">PREVIOUS</a> | <a href="#">LIST</a> |
| Read 35 times                    |   |                          |                      |
| <b>From:</b>                     | <b>JWK</b> ( <a href="mailto:jkilmer@usadatanet.net">jkilmer@usadatanet.net</a> ) |                          |                      |
| <b>Date:</b>                     | 1/3/2002 7:25 PM  |                          |                      |
| <b>Subject:</b>                  | <b>Great news for my SEKT88 - do I have this right?</b>                           |                          |                      |

I forgot the idea for my low powered pp amp using the 400-0-400 Hammond PT I have, BUT after reading this I figure this would be perfect for a SEKT88 amp, \*I think\*. Please tell me if I have this correct.

The PSU2 program tells me I'll get about 340 - 344 volts B+ with this tranny and an input choke with 66 ohms resistance. Slightly lower than what I wanted, but it puts me square in the middle of class A according to the load line I drew. Close to 110mA at idle with fixed bias. The choke is a Hammond 193H. 5H, 200mA, 66ohms. So I divide the rail voltage (about 345) by the H (5) and get 69 as my minimum current. Since I'm running class A, the current will always be around 105mA, so I'm perfectly safe, right? I can see from this that you might need a higher value in L for a low powered pp amp with its small idle current draw.

If I've got this all straight, I can now use affordable 100uF caps rated at 450v (maybe even 350v - maybe that's pushing it) since there won't be any big surge at turn on.

I've got a spare experiment chassis to work with. Someone tell me I've got this correct and I'll order the iron today.

John

|                                  |   |                          |                      |
|----------------------------------|---|--------------------------|----------------------|
| <a href="#">START NEW THREAD</a> | <a href="#">REPLY</a>                                       | <a href="#">PREVIOUS</a> | <a href="#">LIST</a> |
| Read 33 times                    |   |                          |                      |
| <b>From:</b>                     | <b>kg</b>   |                          |                      |
| <b>Date:</b>                     | 1/3/2002 8:31 PM  |                          |                      |
| <b>Subject:</b>                  | <b>Re: Great news for my SEKT88 - do I have this right?</b> |                          |                      |

hey john,

that choke sounds good. you're right about the min current being 69ma. since you are running the amp in class a, the rail current won't drop below the idle value... in your case, 105ma. that gives you a bit of leeway as well if you ever decide to drop the idle current--the choke input will still operate properly.

the caps can also be derated since the rail voltage won't go higher... BUT that assumes that you will NEVER operate the amp with a lower current draw. you COULD use it without the output tubes installed (i.e. testing/tweaking on the bench) but you MUST install a bleeder which will ensure you draw at least 70mA. if you don't the voltage will rise up to 400\*1.41 or 560vdc and your caps will fizzle and explode.

to be absolutely belt-and-suspenders protected you'd need to use caps rated to the full 560vdc. on the other hand, if YOU know what the rules are and you don't break them you'd be fine with lower-rated caps. i don't know if i'd go all the way down to 350, which is cutting it close. keep plugging in values to PSUD2 and see if the supply's voltage rises immediately after turn on, and to what level it rises to. for the longest cap life make sure their max vdc is not exceeded. also keep in mind that your value of capacitance can be very much smaller than typical and still provide excellent ripple performance, as you can see from psud2.

ken

|                                  |   |                          |                      |
|----------------------------------|---|--------------------------|----------------------|
| <a href="#">START NEW THREAD</a> | <a href="#">REPLY</a>   | <a href="#">PREVIOUS</a> | <a href="#">LIST</a> |
| Read 22 times                    |   |                          |                      |
| <b>From:</b>                     | <b>JWK</b> ( <a href="mailto:jkilmer@usadatanet.net">jkilmer@usadatanet.net</a> ) |                          |                      |
| <b>Date:</b>                     | 1/3/2002 9:55 PM  |                          |                      |
| <b>Subject:</b>                  | <b>BONUS!!! and a coupla more things...</b>                                       |                          |                      |

I just got a call from a customer service person (thanks, Darlene) at Hammond. The choke that came out of the Traynor chassis is rated at 7H and 150mA!!! I don't have to buy one and better filtering, less minimum current required.

I see what you mean about the ripple filtering. I was amazed to see what a 100uF cap will do after the choke. I'm gonna just go with 450v Sprague Atomes. If I do any testing without tubes (hey, there's only \*two\* of them!) I'll put in the bleeder resistor. Anyway, I plugged in 47uF for the plates and screen and got a +/- ripple difference of 1.3 volts for the plates. 100uF gave me .84 volts. I don't know if that's enough to make a difference. Pierre uses two 220uF before the plates and PSU2 says he gets about 4 volts difference and he considers it nothing objectionable. Well, there's going to be some fun tweaking involved.

Time to go shopping for parts. Thanks for all the help.

John

---