Subject: Bias supply
Posted by PakProtector on Sat, 21 Jan 2006 12:30:22 GMT
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Hey-Hey!!!,The amp's requirements are for a negative rail capable of supporting front end current, and supplying fixed bias. Even with 2A3's we can get away with less than 100V negative. Good thing, since it is a convenient line in the component ratings. 100 PIV for diodes, and 100V caps.For the CCS in the front end, it is good to have at least 20V to dictate operation where the capacitances have stopped changing due to delta-voltage. Too much voltage requires troublesome heatsinks. The supply uses a 30VAC input to a voltage doubler. Two CRC stages, one full voltage, and the other from the midpoint and also dropped through the decoupling resistor. One could also terminate the two supplies with chokes. From Mouser, a 6.8, or 10 millihenry high current choke (J.W. Miller 5800 series, PN 542-5800-682 and -103). They're $1.48 each. For the cap, a good film or film/foil unit. The ASC X387 of 7.5 or 10 uF from the bias pot wiper to ground will do nicely. The split-CT grid chokes need the two center ends AC coupled to ground anyway, and this cap is a very good choice there.More drawings to come...:)cheers,Douglas

Subject: the Schematic
Posted by PakProtector on Tue, 24 Jan 2006 15:55:47 GMT
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hey-Hey!!!,Here is the link to the schematic:http://www.audioroundtable.com/GroupBuild/Projects/Galahad_Bias_Doubler_Schematic.pdfThe unloaded AC voltage of the supply TX should be very close to 30. AC voltge * 2 * root2 needs to be always less than the PIV of the diodes used. There are Schottky of higher voltage, so uprating is fairly easy.cheers,Douglas

Subject: Re: the Schematic
Posted by Damir on Tue, 24 Jan 2006 21:21:22 GMT
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Good work! May I suggest a schematic for bias pots? Pots are 100k/lin, (50% on the scheme just means that program needs % of "opening" the pot...); in the middle position we have about -65V out.Resistors R2 & R3 (between the wiper and "input" leg of the pot) are not necessary, but it`s a precaution if wiper gets discontinued. The useful range is about -50...-80V.

Subject: Re: the Schematic
Posted by 2wo on Tue, 24 Jan 2006 22:36:11 GMT
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Won't c1,c2 short the signal to ground...John

Subject: Re: the Schematic
Posted by PakProtector on Tue, 24 Jan 2006 23:03:52 GMT
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Nope...remember, this low impedance stuff is at the other end of a high impedance device. The grid resistor, or grid choke. For most power tubes, 100k is good. It is a reasonable compromise between loading and isolating. For valves like the 1619/1624 or triodes like the 2A3, some makers suggested inductive coupling to ground. Either the secondary of an IT or a grid choke. For a pure resistive element would load the previous stage too much.Hence Galahad, with its 10k plate load. Even a 2A3(which seems to accept over-spec grid circuit resistance values), a 60 or 70k might be a better idea...:)cheers,Douglas

Subject: Re: Bias supply
Posted by Manualblock on Wed, 25 Jan 2006 16:01:21 GMT
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Say Douglas; man it would be great to follow this 2A3 thing but let me illustrate how this discussion is absolutely not for the fainthearted or uninitiated builder.What does the sentence negative rail supporting front end current mean?good to have at least 20V capacitances have stopped changeing due to delta-voltage?Why are the heatsinks troublesome?Thanks; if this kind of questioning is not productive let me know.The rest I understand.

Subject: Re: Bias supply
Posted by Damir on Wed, 25 Jan 2006 19:49:11 GMT
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Well, we have a CCS (sink), common for both tubes (diff. phase splitter/driver). DC voltage between the cathodes (connected together and "CCS-ed"), and the ground is only a few volts, and for good work CCS "needs" more, at least 20V. We must use a "negative rail", or -20V referred to ground. Heatsink must "deal" with P=U*I dissipation, and if we use large neg. voltage, then we apparently need large heatsink:-)

Subject: MOSFET D-S voltage
Posted by PakProtector on Wed, 25 Jan 2006 20:42:20 GMT
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Hey-Hey!!!,I think Damir answered all but the capacitanceone. Go to the Fairchild Semiconductor site, and download the data sheet for the IRF820. Scroll down to the chart with che capacitance. The caacitance is greatest at low drain-source voltages and levels off after about 10V or so. Hence the 20V recomendation.On heatsinks, anything is a bit ov a pain compared to bare TO-220's for me. But I am a bit on the lazy side. It shows everywhere: simple PP circuits, simple linestage circuits...nothing too complicated anywhere...:)cheers,Douglas

Subject: Re: Bias supply
Posted by Manualblock on Wed, 25 Jan 2006 22:11:00 GMT
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So where does that neg 20 v come from then?

Subject: Re: Bias supply
Posted by Damir on Thu, 26 Jan 2006 05:28:25 GMT
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The new schematic - 30V AC PT and voltage doubler rectifier with two outputs. Larger neg. voltage for the 2A3 bias, and lower for the CCS.
http://www.audioroundtable.com/GroupBuild/Projects/Galahad_Bias_Doubler_Schematic.pdf

Subject: Re: Bias supply
Posted by Manualblock on Thu, 26 Jan 2006 13:59:33 GMT
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Looks complicated.

Subject: Re: Bias supply
Posted by Damir on Thu, 26 Jan 2006 17:17:47 GMT
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Arrgh! Everything is complicated...even a simple schematic like this is complicated in the real world when you must mechanicaly fix those parts, drill a holes, solder a few wires...disgusting hobby...:-)http://db.audioasylum.com/cgi/m.mpl?forum=tubediy&n=59322&highlight=Building+Valve+Amplifiers&r=&session=

Subject: Re: Bias supply
Posted by Manualblock on Thu, 26 Jan 2006 18:40:10 GMT
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No the soldering hole drilling mechanical part isn't too bad.The shematic is growing and taking on a life of its own though.Hard to keep up.I had my heart set on a 2A3 PP amp. This may be beyond my abilities. I know it sounds good too.Without a scope and tech aids to track the circuit behaviour there doesn't seem to be a way to safely follow this. It's a big investment to take a chance on. So; let me ask truthfully; this really isn't a novice project is it?

Subject: Re: Bias supply
Posted by Damir on Thu, 26 Jan 2006 19:04:04 GMT
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"So; let me ask truthfully; this really isn't a novice project is it?"Well, it can be - but all the parts of the project must be worked out in detail, and good order. It can be simplified - without CCS, PP grid choke and fixed bias, but... If we use fixed bias we must have a negative bias supply and bias pots. Power supply is not present on the original schematic. If we have the PT with additional 50-60V "bias" winding, we can use it with Graetz bridge for the bias voltage, plus additional filter for the CCS. We need HV winding of about 350V-0-350V or little more, rectifier tube and choke input filter. Probably another LC filter for the front end. Ideally, four 2,5V/2,5A windings, too, 5V for the rectifier and another 6,3V for the driver...

Subject: Should you consider Anything involving high voltages novice work?
Posted by Old Brown Eyes on Thu, 26 Jan 2006 19:14:05 GMT
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It is amazing how far one can go basically doing a "paint by numbers" approach. But nobody should ever forget that they are messing around with stuff that can kill. Add to that fact that your family members might be using this stuff and we really need to go the extra mile and make sure we know what we are doing.Now that is not to say everybody needs to be able to design Doug's amp themselves to be qualified to build it but IMHO you should at least have a grasp of what each

part is doing and why it is in the circuit. Or to put it another way, how can you be sure what you built is safe if you don't know what half the parts are and what they are doing in the circuit? Doug is a nice guy and all but you owe it to yourself to be able to double check his work and see that it is safe (I am sure Doug would agree and not take offense at this comment).So no, tube audio isn't a "novice" thing. Guess that means you are not as much of a novice as you think you are huh?The Seth is "simpler" on paper. I got to hear one at my house last night but I can't comment until the other mono block is done and I get to hear it in stereo.Russ

---

Subject: Re: Should you consider Anything involving high voltages novice work?
Posted by Manualblock on Thu, 26 Jan 2006 21:02:51 GMT
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Thanks and I agree absolutely. So; what is the Seth?

Subject: Re: Bias supply
Posted by Manualblock on Thu, 26 Jan 2006 21:03:59 GMT
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Well; I guess you have answered that question !Thanks bud.

Subject: Re: Should you consider Anything involving high voltages novice work?
Posted by PakProtector on Fri, 27 Jan 2006 00:08:15 GMT
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Hey-Hey!!!,Hey Russ, I would like nothing more than a prospective builder questioning my work. The criticism is not something to be feared, it is a proper check of the design. Question everything, it's the answers you don't get answers to that ought to cause concern.Have your friend email me, I have a neat and useful improvement to the circuit. One of my mates up here has built a pair and reported favourably on the tweak. It is also free.For manualblock, the Seth is a simple PP 2A3 circuit. Peerless S-240-Q output, phase splitting choke, and a high gain triode driving one end of it. CCS or resistive parafeed drive to the choke which is attached to the 2A3's grids. One of Magnaquest's distributors dreamed it up. It became viable with the modification to Mike's EXO-173 he and I worked out. I published a frequency response table on the prototype(on AA's Tube DIY). Since I like doing the phase splitting with a tube(tubes actually), I was never happy with driving an interleaved CT choke with a balanced drive. Some experimentation I did indicated it was likely due to the added winding capacitance the interleave caused.For a 2A3 driving a less-than-flat speaker impedance, 6k6 is a better a-a load. If you want to stay in the Peerless 20-20 series, the OPTx in question goes by S-230-Q. This is the OPTx I am going to get wound

for my wife's 2A3 project, Galahad. The Peerless spec on idle current is 70 mA/leg which is well within the 2A3's 60-65 mA idle current.cheers,Douglas

---

Subject: patience...
Posted by PakProtector on Fri, 27 Jan 2006 00:18:19 GMT
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Hey-Hey!!!,This amp is not all that hard. A volt meter will be all that's required to build the first one. You'll need to be able to adjust bias and adjust the front end g2 voltage with a resistor swap if you don't guess well. A measurement of the neutralization caps would be nice, but I'll offer some TFE insulated coax I have some experience with to anybody who wants to build.I am going to lay it out, and drill most of the holes, but my wife is going to do the rest. There isn't too much that I or somebody else on the forum can't answer as far as detailed questions go. troubleshooting isn't going to be an issue for some complex NFB compensation issue because there isn't any in Galahad. It's all open loop. Which is why I specified 6k6 instead of 5k a-a load. Slightly better damping from the bigger a-a load.cheers,Douglas

---

Subject: Re: patience...
Posted by Manualblock on Fri, 27 Jan 2006 02:56:16 GMT
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Well; thanks Doug, that definately helps. I'll keep watching and listening.

Subject: Latest Seth schematic
Posted by Old Brown Eyes on Fri, 27 Jan 2006 11:55:51 GMT
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Doug, they changed the front end a bit. Would your mods still apply? My friend has already purchased the iron and built the amps (just finished the other mono block last night) so I doubt he would be willing to go to a different OPT. But he might consider some front end changes or something like that. Can you give me a hint about the mods?Russ

---

Subject: Galahad Amp
Posted by Wayne Parham on Fri, 27 Jan 2006 15:11:02 GMT

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I'm gonna build one of these, looks good.But I want to have a nice chassis built, make this one a show piece. So I guess I better wait 'til the details are ironed out.

Subject: Re: Latest Seth schematic
Posted by PakProtector on Fri, 27 Jan 2006 15:19:44 GMT
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Well, I don't really want to offer public support to that design due to its main parts source. I would offer it in private, and it is still valid with the new driver circuitry.cheers,Douglas

Subject: Re: Galahad Amp
Posted by Manualblock on Fri, 27 Jan 2006 15:22:06 GMT
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Good idea.

Subject: Re: Latest Seth schematic
Posted by Manualblock on Fri, 27 Jan 2006 15:22:45 GMT
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Does that amp use an autoformer?

Subject: Re: Galahad Amp
Posted by PakProtector on Fri, 27 Jan 2006 15:27:39 GMT
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Hey-Hey!!!,I have a bit of stuff distracting me right now. I plan to put the mono amps on a 10" x 18" plate. I need to make a drawing of the layout, and I'll publish that as soon as it's done. Going to leave room for grid chokes, but build the first with grid resistors for cost simiplicity reasons.The most critical thing left to set its value for is the dropping R for the front end g2, and the size of the capacitor for bypass to ground. Since it's a PP stage, the bypass cap size is a bit less critical.Got

some cool frame-grid, high-gm pentodes for $2 each at Radio Electric Supply...looking good from here.cheers,Douglas

---

Subject: Re: Galahad Amp
Posted by Wayne Parham on Fri, 27 Jan 2006 16:37:26 GMT
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Sounds good, I'm really looking forward to it.I have a matched pair of Electro-Harmonics 2A3 tubes, so I'll get another pair coming. Guess I better make time to do a shopping list. But the chassis fabrication is probably the thing that will take the longest. I'd like to have it built from steel plate, bent, welded and ground smooth, then sent to be chromed.

Subject: yes it does...
Posted by PakProtector on Fri, 27 Jan 2006 19:30:04 GMT
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The CT inductor the 2A3's grids are attached to is the divice in question. Ground its centre, and drive one end. The signal at the other end is 180-degrees out of phase. It is interleaved to make sure the two are of equal magnitude and phase-opposite. It does work well if driven by a low impedance source.If I didn't like a straight diff amp, as drawn for Galahad, it is an attractive option. The stage as drawn also has room for improvement(read that: well tweaked complication). It has to look possible for the lower skill/confidence levels too. ONe can either spend a lot of time with support, or a lot of time simplifying. I think the end result of the former results in better amps...:) The end result of the latter is greater profit, so that's a non-issue in this forum.cheers,Douglas

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Subject: Re: Bias supply
Posted by 2wo on Mon, 30 Jan 2006 00:22:49 GMT
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Don’t lose heart.A P-P 2a3 is a good thing and this circuit look like a winner.It may look complicated at first glance, with it’s pos and neg supply’s, grid choke and feedback. But there is no reason why it could not be built in stages. Start with the basic front end, hold off on the CCS for the moment. Leave out the grid choke and feed back for now and use cathode bias for the first cut. This way we don’t need a neg power supply to get music going. and we have something that looks like the attached. I did not try to redesign the input section for single supply operation. Dougles is the pentode expert. This may not be Douglas’s amp, but the bones are there.My apologies to Douglas for diddling with his design, he puts this stuff in for good

reasons but how good does an amp sound that doesn't get built? At the last NE Bottlehead meet, I got to listen to Zacster's 6b4 amp. Which is a cathode bias with a Curcio Front end, built on a ST70, no feedback.It sounded outstanding. Has me dragging my ST70 out of the dungeon, for yet another flogging.I think this is a good approach. Listen for a while, then add the feedback circuit or the grid chokes.Next we need to address the Neg supply, not a big deal by it's self. Just leave a bit of room under your chassie for a 3"x3" or so transformer. Now we can add the CSS (BTW Jim McShane Has a kit of CSS parts for the "bargain basement amp that they are working on over at the DEC forum. They lifted it form Guienevere).With the Neg supply in place you can try fixed bias for the outputs if you wish.I like cathode bias but if you have a neg supply it is easy enough to try it. This way you can try one thing at a time and see if it is your cup of tea, with no waste save for a few resistors.

Subject: Re: yes it does...
Posted by Jeff Lessard on Tue, 31 Jan 2006 18:53:05 GMT
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"The stage as drawn also has room for improvement(read that: well tweaked complication). It has to look possible for the lower skill/confidence levels too." The Seth is a simple platform that offers lots of room for eventual improvements. Everyone is most welcome to offer their ideas about how to improve it. "One can either spend a lot of time with support, or a lot of time simplifying. I think the end result of the former results in better amps...:) The end result of the latter is greater profit, so that's a non-issue in this forum."It appears that you obviously miss the original point of the Seth by a mile or two. The main goal was simply to offer a simple PP design, easy to build for the first timer in amp building from scratch. Nothing more. I'm a strong believer that you have to walk before you can run. In my case I think it's much better for a rookie to start simple than to start with something complicated. Feel totally free to think otherwise.

Subject: Re: yes it does...
Posted by PakProtector on Tue, 31 Jan 2006 22:47:03 GMT
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Hey-Hey!!!,Well Jeff, I'd say you missed my point by a mile or two. The Seth is simple, and fits that easy to build description quite well. The new front end is even simpler. It was not my intent to criticize its simplicity.Remember, I am not in the business of selling parts for a tyro to assemble into an amp. I am not in the business of selling parts so an experienced person can build an amp either. I'm just a another DIY-er who would share the methods discovered. cheers,Douglas

---

Subject: oooooohhhh! neat

Posted by PakProtector on Tue, 31 Jan 2006 23:13:23 GMT
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Hey-Hey!!!,That is about as simple as it is reasonable to do. Single filament TX is easy enough, and I have heard a few amps fairly quiet with that arrangement. The Miller neutralizing caps are quite optional, with no grid choke to contribute additional capacitive loading, the 10k output Z of the pentode stage should drive it well. With a 12.6-0-12.6 and two diodes full wave and 25V capacitors a small negative supply for the cathode CCS is very easy. Radio Shack has a 450 mA TX for ~$7 and the 25v caps are quite inexpensive. 470R, 1/2 Watt resistors and make a CDC Pi filter.It's easy to add the small caps later. Get it together, and listen...:) I will soon be unwinding a Peerless S-230-Q to clone for this project. The small 6k6 a-a output is probably the best budget Iron for such a project.cheers,Douglas

Subject: simple circuits
Posted by PakProtector on Wed, 01 Feb 2006 23:42:42 GMT
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hey-Hey!!!,There are a few things to consider with a Class A amp. first is the lower B+. Low B+ cuts into available driver headroom quickly. While a cirect coupled two stage front end can be quite simple, it isn't practical for a Class A amp with ~100V less B+.The Mullard 5-20(I think), with its input pentode direct coupled to the LTP arranged twin triode is nice, but with its ~100V loss to the cathode load, it isn't practical.Swap the cathode voltage allowance and resistor for a CCS and -10V negative supply opens up a lot more headroom. Swap pentodes(which do need a carefully matched g2 voltage and load choice), and there's headroom to spare for even low-mu tubes like the 2A3.The input stage being a pentode offers a lower capacitive load for the linestage. It is also a more static capacitance as Miller is not making an appearance due to the effects of the screen grid.It is ridiculous(IMO) to suggest that a *REALLY GOOD* amp can be done from a circuit compromised for simplicity. Some circuits are quite simple. I would invoke Einstein's rule, as simple as is required, but no simpler...or something like that. Anyway, it is not so difficult once the holes are drilled and the Iron is mounted.cheers,Douglas