Subject: Grounded Grid Preamp Breadboarded
Posted by GarMan on Fri, 07 Jan 2005 17:42:15 GMT
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Happy new year everyone. Over the holidays, I was busy with a couple of projects. The first was the completion a chassis for my K-502 amp. Details can be found at:http://audioroundtable.com/Craftsmen/messages/504.htmlMy second project was breadboarding a Grounded Grid preamp. This was the design found in Bruce Rozenblitz's book Audio Reality, and the amp itself can be purchased in kit form or assembled from Transendence Sound.I tried a different approach on contruction this time around. The individual sections of the amp were point-to-point soldered on its own board. The boards are then connected via terminal strips. Breaking up the amp in this manner made the build a lot easier and I didn't have to worry about how many solder terminals I need or their locations. Also, each section can be moved around independently.Parts are mid/hi grade. Nothing outlandish. Two Auricap coupling caps, Holco resistors, JAN Philips tubes. The only "mod" I made to the design was the use of poly bypass caps in the power supply. Other than that, the design came straight out of the book.One of the things I like about the design is the powersupply. Bi-polar +/- 200V from voltage doubler rectification. Even though two transformers were required, it still reduced cost and size by quite a bit, compared to the use of one large 300+V transformer. The PS uses two 120V 6VA transformers which are about $12 each. As you can see from the photos, they're also very compact.Other reasons why I choose this design is that it's simple and has very low gain (3X?). I find most preamps do not allow you to turn the volume pass 9 o'clock. This one, I'm listening at 12.The tubes are horizontal mount and its my intent to build this as an enclosed stackable unit, under two and half inch in height. Seeing tubes peak out of a top panel in a "traditional" tube chassis is cool, but you can only have so many of those in your system before you run out of space. The parts run cool enough so I don't foresee a heat issue.So, how does it sound with the Gainclone? Not much to report here. It sounds pretty much the same as when I connect my source directly into the Gainclone with only a pot in between. EXCEPT ... the sound is a lot more dynamic. With the "passive preamp" (ie. pot only) everything comes through. The only problem is that the music sounds "soft". Regardless of how loud the setting is, you're still not getting any "bite". The Grounded Grid improves on that by delivering the dynamics that's missing, while taking nothing away (at least nothing I can hear). Compared to my integrated, the Grounded Grid Gainclone combo is letting me "hear things that I've never heard before". Never thought I'd use that phrase but in this case, it's apt. I am getting a slight hum from the preamp, but I'm not too worried about it. It's only on an exposed breadboard afterall, with no shielding for the signal path.I highly recommend this project for someone looking for a preamp. Simple enough for someone with a couple of projects under their belt, but sophisticated enough to satisfy those who are serious about audio.The next step is to find an appropriate chassis, which I have not come across yet. Considering building my own from scratch.Gar.
Grounded Grid Breadboard

Subject: Re: Grounded Grid Preamp Breadboarded
Posted by Manualblock on Sat, 08 Jan 2005 02:56:36 GMT
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Say Garman; Very nice breadboard job; they sound good you say. I was wondering; what was it that decided you on the grounded grid circuit? Have you heard it before or heard of it? Yours is the first I've seen built.

Subject: Sweet!
Posted by Wayne Parham on Sat, 08 Jan 2005 09:29:23 GMT
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That's one great loooking amp you built there!Gar's K-502 amp photosYour grounded grid preamp looks interesting too. Maybe it would be good to mention this in the Group Build forum for another possible group build?Gar's grounded grid preamp photos

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Subject: Re: Grounded Grid Preamp Breadboarded
Posted by Russellc on Sat, 08 Jan 2005 10:02:38 GMT
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Very interesting. I have had my eye on that pre amp (and matching phono) for a while. The pre kit is around 500, and I have heard nothing but good reviews. I like rosenblitz's designs and have used his "60 watts of mcintosh power" power amp (6550/kt88) for years.Regards, Russellc

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Subject: Grounded Grid
Posted by Poindexter on Sun, 09 Jan 2005 18:26:39 GMT
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Hey, Gar,Is there somewhere I can go to see an exposition of this circuit? I would not have thought that the basic characteristics of a grounded-grid circuit (high voltage gain, low Zin, high Zout) would be optimum for a line amp, but I've heard a good deal about people building this particular line amp. The original design is Rosenblit, no?Poinz

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Subject: Re: Grounded Grid Preamp Breadboarded
Posted by GarMan on Mon, 10 Jan 2005 01:43:29 GMT
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John, there were a few reasons why I selected this design:It's different from most preamp designs out there. I've heard and/or built preamps in the common cathod, mu follower and SRPP topographies and was interested in hearing how this one would be different.It's simple with relatively few part counts. Three tubes in total and six resistors per channel in the amp stage. I think I've also mentioned the PS which uses low cost parts such as 120V transformers and low value filter caps.It's been reviewed very well. Bruce has a very loyal following on his own message board and most everyone who's build or heard it have very positive things to say about it.But the most important reason why I selected this preamp was its low gain of only 12dB (4x). Prior to building this amp, I was toying with the idea of building an unity gain buffer (12SN7 cathode follower)as a preamp. With most power amps having an input sensitivity of less than 500mV, it doesn't make sense to put a high gain stage between source and amp. The gain provided by this preamp lets me listen pass the 12 o'clock position, and even into the 3 or 4 o'clock with low sensitivity speakers.BTW, I'm still toying with the idea of the unity gain buffer.Gar.

Subject: Re: Grounded Grid Preamp Breadboarded
Posted by Manualblock on Mon, 10 Jan 2005 01:49:13 GMT
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Thanks Garman; hearing these points articulated is a big help with understanding what works with what and why. Good post and nice work!; J.R.

Subject: Re: Grounded Grid
Posted by GarMan on Mon, 10 Jan 2005 01:50:26 GMT
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Hi Poinz,Sorry, the schematic is not public property, so I can't share it with you. You are correct that a GG circuit has low Zin. In Bruce Rozenblit's design, he uses a cathode follower buffer in front of the grounded grid gain stage to reduce Zin. Not sure if most grounded-grid circuits have high Zout, but this design has a Zout of only 300ohm (have not verify, but going by the book's description). As for gain, this design has a natural gain of 19dB, but total gain is knocked down to 12dB due to the use 7dB of feedback.Gar.

Subject: Re: Grounded Grid
Posted by TubeCraft on Mon, 10 Jan 2005 20:12:45 GMT
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Rosenblit may have designed this particular preamp, but the circuit has been around for many years. You can read all about it in the circuit guide at the Tubecad website. John Broskie refers to

it as a "common cathode" circuit - if you look hard enough, there's a favorable evaluation of Rosenblit version there as well. It's two triodes with the cathodes tied together, hence the name "common cathode" - only the second triode is a real "grounded grid" - the first triode is really a cathode follower. The cathode follower drives the grounded grid.Not many home audio components could drive a grounded grid circuit directly - typical input impedance of 600R - or less.

Subject: Re:I should have said "like" a cathode follower
Posted by TubeCraft on Mon, 10 Jan 2005 20:36:37 GMT
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.. and that the signal at the cathode of the first triode drives the GG.

Subject: Holy Toledo!
Posted by Poindexter on Tue, 11 Jan 2005 03:25:10 GMT
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Now I dig yo jive. It is to laugh; this is a circuit that I have used and promoted for years! I learned to call it the singly-driven diff-amp; schem likee so:I'm a push-pull animal, and this is my fave phase splitter (I take output off both plates) since it has gain, and its balance may be adjusted by the values of the two plate resistors. It occurs to me that if output is to be taken from the grounded grid side only, perhaps the load (plate) resistor on the driven (by signal) side, or the actual common cathode (this is another name for the plate-loaded amp) side may be omitted.This is another use for this circuit that I had not perceived. I have used it as a preamp as shown here:This uses transformer output to reduce the gain and Zout, rather than negative feedback, which I have found to be a technically attractive but sonically dangerous tactic. The problem with this circuit is the output transformer, which is unobtanium.Okay, now I'm seeing what is happening here. Thank you for your very clear explanation of this circuit.Yer Obeediyunt Servunt,Poinz

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Subject: Re: Holy Toledo!
Posted by Wayne Parham on Tue, 11 Jan 2005 12:24:48 GMT
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Weren't interstage transformers popular in days gone by? Not IF coils, but audio interstage transformers like you've shown? Or am I thinking of something else?

Subject: Re: Holy Toledo!
Posted by TubeCraft on Tue, 11 Jan 2005 14:01:50 GMT
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Interstage transformers are very popular in my house. Especially since Hammond introduced the 124 series. I'm just finishing a PP 6B4G amp that uses a 124E driven by a 7044 in SE parafeed. Lots'a old paper in oil coupling caps. I know everyone says that good ITs have to be hideously expensive, not me. But hey, I'm just an experimenter, not an "audiophile." I do like music.The 6B4G SE amp currently in my system is 6n1p (both sections parallel) driving a 124B IT (parafeed). Talk about el cheapo, the output transformer on that beast is a Rat Shack 70v line transformer!TC

Subject: Re: Holy Toledo!
Posted by TubeCraft on Tue, 11 Jan 2005 14:11:32 GMT
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Yeah, that's it - except that as a single-ended line amp you would AC ground the plate of the "upper" tube (say a 10uf cap to ground) and just take the output from the plate of the "bottom" tube.Z out and gain is moderate (depending on the tube) but the circuit is really easy to drive and really wide-band. People rave about the Rosenblit version. (All 12AU7s, I think).

Subject: Re: Holy Toledo!
Posted by Wayne Parham on Tue, 11 Jan 2005 15:08:53 GMT
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I thought I remembered seeing interstage transformers, and some prefered this approach to capacitor coupling because it offers impedance matching and what-not.I like parafeed output circuits, they seem to swamp the loudspeaker resonance so they are much more tolerant of load. I guess there is probably some trick about setting the Q of the parafeed cap and transformer to keep it from getting tubby, but that's probably in the sizing of the components. I don't know, I just know I like what I've heard.I guess the Radio Shack 70V transformer work pretty well, and the price is right too. That's cool. Since you're using a common distribution transformer, can you get substitute parts from other companies too?

Subject: Yes.
Posted by Poindexter on Tue, 11 Jan 2005 15:25:32 GMT
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J.C. Morrison used it in his phono pre in Sound Practices, as well, and I've been using it as a phase splitter since about '90.Actually, to AC ground the 'on' side plate, all that's necessary is to remove the load resistance, since the next thing up that wire is a big old capacitor to ground - significantly larger than 10µF, usually.Thanks again,Poinz

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Subject: Interstage (or line output) transformers.
Posted by Poindexter on Tue, 11 Jan 2005 15:54:14 GMT
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Yes, they're out there, but there seem to be two flavors:Little peanut cheapos that sound like sh, ah, not so good.Great bloody whacking things the size and expense of output transformers.TC, my first try in the circuit above was the Hammond 124B. I really wanted to like it, but it sounds just like the 10K outputs I tried in the 6V6 amp; dry, opaque. I even tried Amveco power toroids (115+115 : 44), which Bench liked, but they were rolled off too much on both ends, and sort of wiry sounding. The Lundahls and Sowters and Tangos are all these ten watt monsters that cost $100-200 and won't even fit in the chassis. It seems impossible to get the quality without the huge capacity. Don't know why they feel that a component that's transforming a few milliwatts has to be rated at ten watts; maybe a traditional use for them is driving big transmitter tubes like 845's in A2.I'm still looking, and also talking to some OEM winders who may be willing to wind to spec, but so far no joy. I'm not giving up because I have a long affectionate history with the singly-driven diff-amp (thus my original Holy Toledo!). The high PSRR of diff amps makes them a natural for low level signal use; don't have to use huge music-sucking caps in the power supply final stage.Poinz

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Subject: Re: Holy Toledo!
Posted by TubeCraft on Tue, 11 Jan 2005 17:53:32 GMT
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"I guess there is probably some trick about setting the Q of the parafeed cap and transformer to keep it from getting tubby."There's a small chapter in the Radiotron Manual (3rd ed.) on parafeed and sizing the cap to avoid resonance with the L of the transformer primary. Basically, it's easy, 'cause bigger is better, say 1-5 uf, some use up to 10uf. I use 400-630v Solens or vintage paper in oils. The Radiotron manual also mentions that one may want to intentionally size the cap to resonate to "increase bass response"...There's also the Rp of the tube to consider and the quality of available caps!The Rat Shack line transformer works great as a parafeed output - I'm sure something from allied or edcor would work just as well. Plan on experimenting with the various taps. I want to try using a PP OPT in parafeed.BTW, I'm using the primary of the original Hammond 1627 opt as a plate choke.Anyone who reads my posts, remember, I'm no EE or anything - I barely have the math to do anything correctly. Just an experimenter.TC

Subject: Re: Interstage (or line output) transformers.
Posted by TubeCraft on Tue, 11 Jan 2005 18:15:11 GMT
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Nice breadboard! What tubes?

Subject: Re: Interstage (or line output) transformers.
Posted by Poindexter on Tue, 11 Jan 2005 19:31:39 GMT
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They're 6SN7's. Novisibursk, I think; branded Sovtek.I just started making breadboards last year. It's a revelation; I don't have to worry about drilling extra holes or beating them up. I've gotten more developmental prototyping in in the last year than the previous five.Poinz

Subject: Send in the Mud Hens...
Posted by PakProtector on Fri, 14 Jan 2005 20:48:17 GMT
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Hey-Hey!!!,The first circuit can be used with its load resistor to halve the circuit gain, should it be needed. It is an interesting proposition to adjust the value of the plate load of the so-called cathode follower in order to adjust the overall gain of the circuit...interesting stuff to consider for the tweaking department for sure.regards,Douglas

Subject: Other sources...
Posted by PakProtector on Sat, 15 Jan 2005 00:06:52 GMT
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Hey-Hey!!!,Ebay seems to have a selection of Altec/Peerless line-speaker TX's. 15xxx depending on power and likely tapping options and perhaps distribution from 600R and 70V lines as well. Hunt 'Peerless' in the consumer electronics section. I have a feeling that the 600R:Voice-Coil ones would be best(if they actually exist). More primary Z to improve te bass performance is usually a good thing.regards,Douglas

Subject: So-called cathode follower.

Posted by Poindexter on Sat, 15 Jan 2005 02:26:06 GMT
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Thank you, Doug. So-called grounded grid; what this circuit is, is a singly-driven diff-amp, and output may be taken off either plate (depending upon whether one requires inverted or non-inverted output), and circuit parameters adjusted to optimize the desired configuration. Your read of using the driven side plate resistor to adjust the gain (when output is taken off the non-driven side) is brilliant; I hadn't seen that. The Rosenblit/Transcendent circuit uses an active (SRPP) load on the output (GG/non-driven) side, but I don't have the voltage to spare. What I do have (in my project box) is a pair of Hummond 150H chokes, which I'm going to try this weekend. I now have the 6SN7 breadboard configured as a tranny coupled PP, so everything on the PS side is already there, the mod to the audio circuit will be simple.Stay tuned.PoinzP.S. I have some tranny news, if you like; Post me.

Subject: Re: So-called cathode follower.
Posted by PakProtector on Sat, 15 Jan 2005 04:19:59 GMT
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Hey Poinz,on this:Your read of using the driven side plate resistor to adjust the gain (when output is taken off the non-driven side) is brilliant; I hadn't seen that.I had not seen it either. Seems like all sorts of possibilities open to play with that one. Two completely different types. 12GN7 pentode on the input side and a triode strapped version getting its cathode driven for one extreme. Play with the pentode's plate load and pay particular attention to how it is loaded and I'll bet it could do some remarkable stuff.Two matched vlaves might be a better option. The plate load thing can be adjusted at both sides depending on the gain required. Low plate load onthe valve with its grid taking signal would offer an inverting low gain side. Or put the lower plate load on the grounded grid side. The output should be taken from the 'side' with its grid grounded for appearance's sake at least.Just look at all the math applied to describing the balance in a Schmitt inverter and use it to quantify the imbalance that is required. Small common cathode loads(*NOT* CCS-like) could also be applied to tuning the circuit performance.Going to have to play with this stuff sooner or later, no doubt about that...regards,Douglas