

VALVE

the magazine of astounding sound



**Groove Thang -
Doc's phono
preamp**

**O-Glow,
converting the
Baby Ongaku to
Active Loaded
Direct Coupled
operation**

**Brainiac on the
British ultrafi
scene and more
Heavy Metal**

**direct coupled
differential PP
EL84 amp**

**why can't Johnny
read
schematics?**

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B-Glow

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from Electronic Tonalities

active loaded 5965 driver

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VALVE

*the magazine of
astounding sound*

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Many ideas published in this magazine are untried, and involve the use of potentially dangerous parts and tools. In attempting any idea or project published herein, you assume total responsibility for your actions and any harm caused to yourself or others. Please, be careful!

This publication is produced as a service to the audio community and is wholly owned and published by Electronic Tonalities.

The intent of this publication is to offer ideas to inspire and educate audiophiles in an effort to increase their understanding of the audio equipment they use and cherish. Blatant copying of the circuits published in this magazine for use in commercial products shows a complete lack of original thought.



editor's thing

Did we do the right thing?

We expected some bruhaha about our changing over from hardcopy to what seems to have affectionately been dubbed CYBERVALVE by our readers, but in fact, the positive response has been almost overwhelming.

Naturally we had a few folks come to us with technical problems, but we seemed to have sorted most of them out as being due to the use of outdated versions of Acrobat Reader.

The folks who didn't have computers were urged to check out CYBERVALVE at the local library or cybercafe, and those who did seemed pleasantly surprised.

A few folks complained about the download time. Ever hear the saying "anything worth having is worth waiting for?" I don't plan on cutting the quality of this publication just to improve the download time, so that's just the way it is. A 20 minute download is a lot shorter than three days in the mail, homes.

The bottom line is this -

VALVE in hardcopy peaked at a total of 650 subscribers.

The first issue of CYBERVALVE, a bigger, better issue than ever before, was accessed over 7500 times in four weeks, from an average of 1063 unique addresses per week.

Did we do the right thing?

Can you say "no brainer?"

and another thing

We welcome new advertisers to this new version of VALVE. Don't let the fact that this mag is coming from bottlehead.com keep you from talking to us about advertising a competitive product. United we stand and all that, we want to see everyone do well in this biz. You may note that one of our biggest competitors (and a very good friend at that) advertises in VALVE.

If you'd like to advertise in a magazine that gets 7500 accesses a month, by folks who are looking for kits, parts, and any tube audio related stuff, get in touch with us. We offer rates that are much lower than the hardcopy mags - \$100 per issue for a full page (7.5"x10") color ad, and can deliver a new ad to the public in a much shorter time frame than the printed media.

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Our goal is to get a new issue out every six weeks, so advertise early and advertise often!

Don't let the blue smoke out,

Doc B.

on the cover

This is the prototype of our new B-Glow 300B SE amp kit. The conventional airgapped, RC coupled, fixed bias circuit has really turned out to be a pleasant surprise - great bottom end, absolutely killer midrange, sweet clear highs. The prototype was finished with gloss black powder coat

on the chassis plate, a clear polymer coating on the poplar base, and metallic faux granite on the inductors. Brass hardware replaced the stock plated steel.

The wire is a combination of Jena Labs 18 ga. hookup and our new house brand 20.5 ga. solid wire.



Groove Thang

a phono stage

by Doc B.

“If your CD sounds better than your vinyl, there’s something seriously wrong with your vinyl setup, B.”

Geez, was I getting tired of hearing that one.

a little history

I’ve been futzing around with a few different pieces of phono gear over the years, but never really reaching anything like satisfaction with the setups I’d use.

Been through the TD-124/SME3009/Denon DL-103 route, actually that was my second 124 (hell, man, I had a TD-124 when I was 18, with a big clunky Rek O Kut arm and an original ADC-1 cartridge, what took the rest of you so long to figure out they’re a good Ttable?)

For now I’ve settled on a big ol’ Denon DP-6000 I got as a commission on a fairly hefty antique radio sale I did a few years ago. It has a Denon DA-305 tonarm on it, nothing to write home about, save for the fact that it is fairly massy. The table also has a second arm mounting board, which has been through a Grace 747 and now sports a Linn Basik that’s been sleeved with heatshrink and the counterweight has been replaced with one of Andy Bartha’s littlest Whatchamacallits with a hole poked in it to add a little mass and damping. The search for a decent tonearm continues, and there’s a certain long skinny piece of ebony that sits in my woodpile that subliminally beckons me to try to DIY one whenever I walk by.

The concern for mass stems from the fact that I love low output moving coil cartridges, and them moving coils want to hang off a beefy stick. They also want some step up, and for this I have used a Denon step up transformer, for lack of anything

else. I did have a Levison JC-1 for a while, but somehow talked myself into the whole “gotta have transformers” bit at one point and sold it. To it’s credit the trans is very versatile, it has switched inputs for two cartridges and 40 ohm and 3 ohm taps. But unfortunately I’ve heard Koetsu and Sun MC step trannies, so I’m well aware that this ain’t the best there is, although a replacement of the stock output cable with our new trick wire helped open things up a wee bit.

Mikey keeps talking about these incredible step up trannies he wants to wind someday, but he knows I’m too much of a rag picker to be able to afford all that fancy ass triple mu metal shielding, so we won’t hear a MagneQuest MC stepup until someone with deeper pockets than Doc B. steps up to the plate and custom orders a few sets.

OK, I skipped over the cartridge, I know that. Been through my fair share, over the years, from that ADC-1, through Sonus Blues, cheapo Empires and ATs, Grados of various persuasions, cheapo to middling good Shures, an Audioquest AQ-404 that I bought in a fit of self pity when my first wife dumped me, a DL-103 I scored for \$50 right before everyone started saying how great they were, etc., etc.

No doubt in my mind that the low output MCs always worked best for me. I note that in the 50’s MC cartridges were called dynamic cartridges. I’ll drink to that. So now I have a Koestu Black I picked up used from Victor Meurisse, and a Fidelity Research FR-1 that my bud Stan Webb found at Goodwill, in the box, with the papers, for something like 50 cents. The man has an eye for the good deal, and I felt like I got a great deal even when I offered him a 10000% profit for it

So now I have two carts with piddling output, about 0.3mV, and distinctly different characters. The K is like honey on top, so sweet you think it might be rolled off, until you hear a cymbal. It’s clean and clear, but laid back. Bass? Holy shit! Put on some 70’s fonk with that really heavy analog synth, and tear the roof off the mutha sucka. The K is quite happy at 40 ohms, I found it quicker but a bit dry into 47K. The FR-1 is the other end of the spectrum,

more like what we’ve come to accept as the “MC” sound, I guess. Very clean and beautifully open, very present, to the point of accentuating surface noise a bit too much. Maybe not so hot on the bottom, demanding 3 ohms to sound with any weight at all. Fooling with the VTA helps this somewhat, but my hunch is that this is in part due to the Basik it’s mounted on, and I hope at some point to try the FR-64 tonearm the cart was designed to mount in, which I understand is the Hulk Hogan of tonearms, with a bigass armtube and a 2 lb. weight hanging from it’s base, under the turntable plinth.

a starting point

So enough with the preamble, you thought this article was gonna give you a cookbook phono preamp and Doc is just reminiscing, right? Well, this ain’t that.

I was fortunate enough to have been given one of George Wright’s first phono stage prototypes (OK, I admit it, George has been so kind as to send me three preamps over the years, two of which have wandered off to other guy’s systems, never to be heard from again). How good are they? Suffice it to say that it’s the one I recommend when anyone calls asking, and everyone who buys one loves it.

But hey, I’m Doc B., no matter how good this thing is I just gotta build my own and convince myself it’s better, ya know?

George based his design on the now classic RCA phono stage, a two stage preamp with passive RIAA eq, which can be found in the RC-30 tube manual. He modified the design extensively, incorporating very high gain 6ER5 tubes. He designed his preamp to work with MM cartridges, and to drive any kind of preamp you might want to plug it into, including a cathode follower output for the purpose.

Check out May 95 VALVE for the scoop.

I wanted to do a couple of thing differently, so I kinda cobbled up one of the early protos George had given me. The earliest experiment was to upgrade coupling caps and wire, the usual “know nothing” type of upgrades. Nice subtle changes, but this was not what I was about, so the first thing to happen was the cathode resistors on the 6ER5s went in the dumper and I shoe-

horned in four Ni-Cd AA batteries instead, into a box even smaller than the production preamp come in.

George's preamp is setup for MM cartridges, like I said, and George has worked hard to get a very extended top end (some say a bit bright). This is a superb complement to Grados and Shures, but some of the MCs I was using got pretty lean sounding through the preamp.

The AAs did a nice job of kicking up the bass, not necessarily with a great deal of control, but with ample quantity. I should point out that in the process of adding the batteries, the operating points remained the same, with the 6ER5 grids biased to -1.2 giving a low, like around 1 mA current draw. This low current operation keeps the 6ER5s, with their rather high gain, very quiet. One thing I wanted to mess with was trying a higher current draw to see if I could richen the sound up a bit without adding too much noise.

I planned on running this preamp into a Soul Sister line stage with 100K input impedance, through a short cable, so I didn't feel the need for the cathode follower output stage George designs into his preamp. Output now comes directly off the coupling cap that follows the second 6ER5 stage.

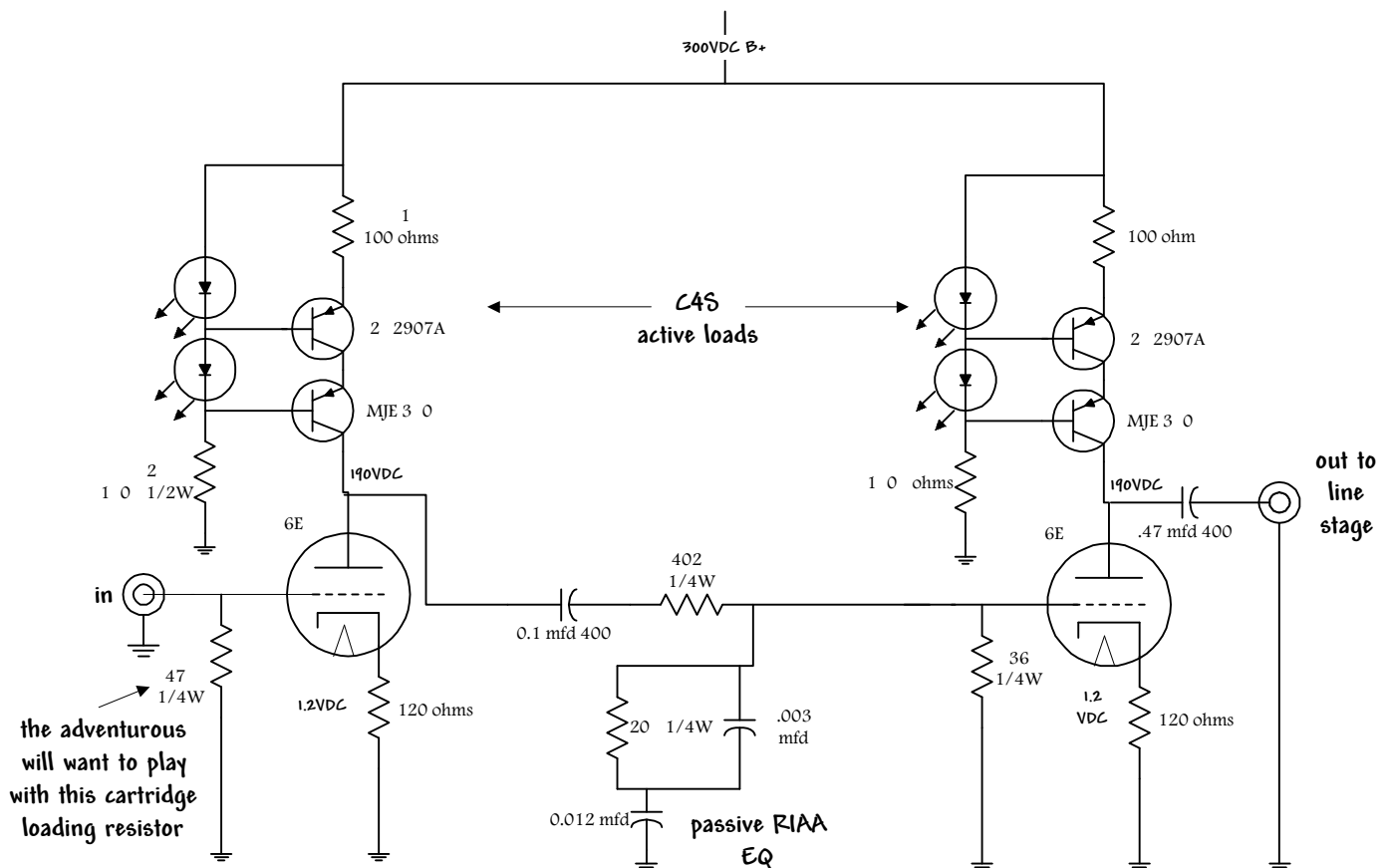
And of course I had to try to build the preamp with C4S loads. These could turn out to be the perfect load for a phono preamp gain stage, they give two advantages we seek - high gain (the full mu of the tube) and low noise, doing a superb job of isolating power supply noise, and replacing the typical noisy plate load resistor. Since I wanted to hear the 6ER5s with higher current running through them, I set the C4S atop each 6ER5 to run at 10 mA and went back to resistors on the cathodes. A word to the wise here, this preamp is still in the cut and try stages. Fiddle with the cathode bias resistor to get the plate voltages you want.

So the basic two stage with passive RIAA circuit came out as shown below.

I had been very pleasantly surprised at the effect of using gaseous shunt regulators with the Soul Sister line stage (really opens up the top end), so I employed the same ideas with the phono preamp, using the original Wright prototype series regulated power supply chassis as the starting point. The series reg and tube rectifier came out and the VR tubes went into the existing holes. It would be much better to put the shunt regulator as close to the C4S boards as possible, and I will probably move these tubes to the holes where the cathode followers lived on the phono preamp chassis in the future.

Ultrafast recovery soft start diodes replaced the existing rectifiers in the high voltage supply and heater supplies, and I reworked the existing caps and resistors into a CLCR filter ahead of the shunt regulator.

Groove Thang Phono Stage - one channel



The whole PS is shown below:

And now a confession. I was hoping to get low enough noise to be able to plug the cartridges directly into the input of this preamp, and get rid of the step up device. I installed a 47 ohm input resistor and cranked the volume pots on the Soul Sister waaay up. The sound was marvelous, faster with more depth and detail, but just a little too noisy and a bit shy gainwise. Maybe some future improvements in layout will help, but right now the limiting factor to direct input from low output cartridges seems to be finding 6ER5s with a low enough noise level. I suspect it would be interesting to try this preamp with nuvistors, too. I don't have a clue whether they would be any better, they have a rep for lots of microphony, so maybe not, but it would be fun to try.

So back went a 47K resistor across the input, and in went the step up trans. Hmmm,

not bad. The new circuit seems to have alleviated some of the vagaries I felt the step up trans was producing.

So you need a description of the sonics now, huh. Well, I finally like my vinyl set up better than my CD. It's a little fatter than the CD setup, but the dynamics are like, *there*, yowza!

Bass is really something with the Koetsu, it gets way down there, and with good control.

Living Stereos that seemed too soft and lush now have impact and better, if not perfect, presence. Vocals are tighter with less euphony. Mo' natchul.

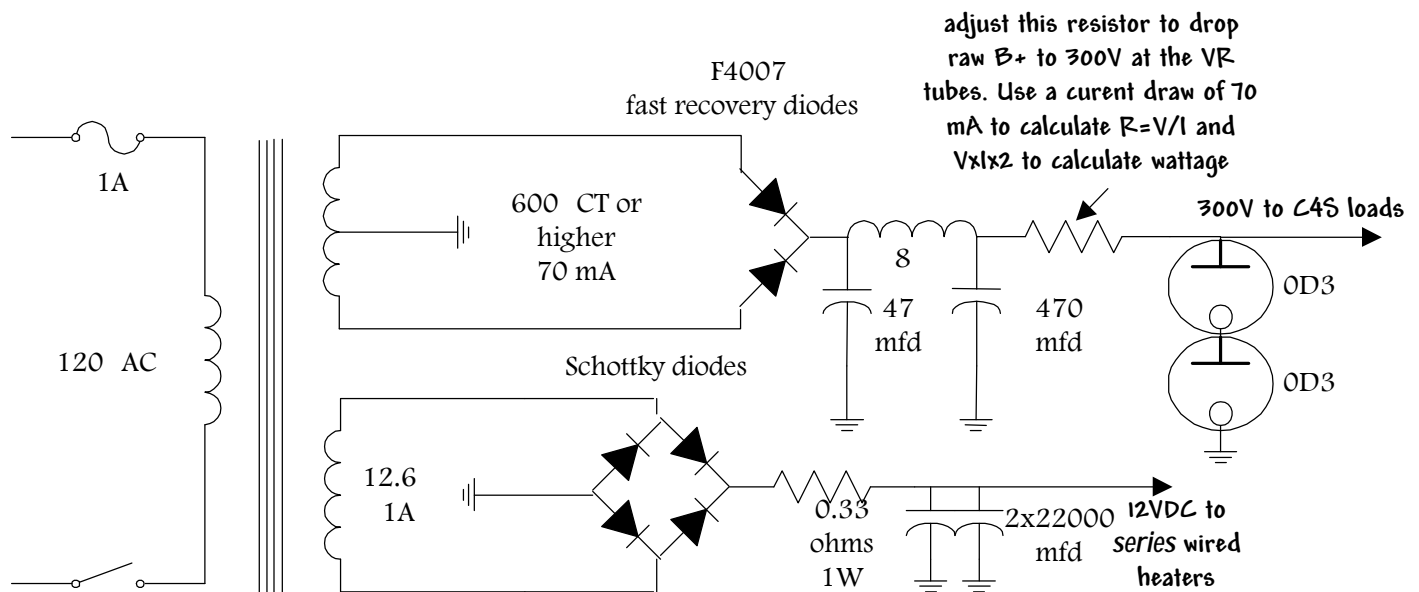
I should mention my other recent tweaks. Along with using our new long crystal copper cables I covered the Denon plinth with big Whatchamacallits (well, one in each corner really) and set the base on three

medium Whatchamacallits. A few small Whatchamacallits went around the armboard. All of this extra mass seems to tighten things up and offer a bit better isolation.

But the biggest improvement was when I pulled off the old rubber mat and put six evenly spaced small Whatchamacallits on the aluminum platter. The records now "float" on these pucks. I had to add a piece of 1/4" aluminum tubing to extend the spindle to keep the center hole of the record from slipping around and creating wow, and of course I had to raise the tonearm height. Once this was done the improvement was, as we say, not subtle. The reduction of background noise was quite significant.

Give Andy Bartha a call at 954-583-7866 ET and get some of these ugly little pucks, they are really fun to play with.

Groove Thang Q&D power supply (derived from Wright phono preamp supply)



For best performance put the power supply in a chassis separate from the phono preamp. The VR tubes should be on the preamp chassis very near the C4S boards for best regulation

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you asked for it

O-Glow

*a conversion of the “Baby Ongaku”
into a big brother version of Afterglow*

By Doc B.

We’ve received several calls lately from folks who’ve built Gordon Rankin’s great “Baby Ongaku” design, so named in an article by Frank Reps in Issue 9 of *Sound Practices*. The design was originally drawn up by Gordon for Mike Lafevre to use as a giveaway application for MagneQuest customers who purchased DS-025 output transformers and 5504 power transformers. A lot of folks have called us asking if it would be feasible to convert the circuitry of the Baby-O, as it is affectionately called, to roughly the same direct coupled, active loaded topology as the Afterglow.

Sure. The basic parts are there, and the quality of the iron should yield up a sort of “superglow”. NOTE that I don’t have a Baby-O on hand as I write this, so it may take a bit of tweaking to get the voltages of this direct coupled conversion just the way you want them. Such are the trials of the hardcore direct coupler.

To take the design as close as possible to the Afterglow in terms of sonics the 5V4 should be replaced with a pair of ultrafast recovery soft start rectifier diodes. This will lower the power supply impedance which can help dynamics. It will also help to get the voltages up where we want them to be, as the voltage drop across the solid state

rectifiers is less than the tube rectifier.

The .68 mfd cap at the input of the power supply filter must be increased, maybe to 40-100 mfd to get the B+ up to what we will need for direct coupling of the circuit, a critical contributor of the Afterglow sound. With the power transformer secondary voltage of 720VCT we should get into the ballpark of voltage we get from the PGP 8.1 trans used in the Afterglow. In a pinch that 10 mfd cap connected to the 12AT7 SRPP could be used to replace the .68 cap if it has a high enough voltage rating, otherwise use a 600V or higher rated capacitor and go ahead and up the value to 100 mfd.

While you’re at the output of the PS filter, disconnect the 390K and 100K voltage divider resistors and the 22uf bypass cap that connect to the CT of the 6.3V filament winding, you won’t need ‘em for the new driver stage. The center tap can be left floating, or you can tie it to ground. Choose the way that is quietest.

The plate of our 2A3 will be sitting at roughly 400-440 VDC, and we will want the 2A3 filament to float at about 145VDC. The 2A3 will run at 60 mA, so we will need bias of -45 volts between the filament and the grid. This puts our direct coupled 2A3 grid and 5965 plate both at 100VDC. To set the filament at 145VDC at 60 mA, we will need to change our 1Kohm 2A3 cathode resistor to 3000 ohms (yes this is the right value, you’ll see why when we explain the connection of our 5965 active load) and it will need to be a 10 watt wirewound resistor.

NOTE once again, beware that these voltages may be off a bit from what you actually get. The point here is to get 45V difference between the 2A3 filament and the grid. If the plate voltage is a little lower or higher, don’t sweat it. If it’s a lot different (hey we don’t have a Baby-O here to test), let us know and we can clarify the values needed.

A 200 mfd capacitor rated for at least 200V should be used as the cathode bypass cap, replacing the 30 mfd cap spec’d in the original design. If the original 30 mfd cap is rated for 200V or better, the 20 mfd @ 250V cap removed with the voltage divider

may be paralleled to it to achieve the 50 mfd value, although you may be sacrificing a bit of bass performance compared to the stock Afterglow.

We will use 1/2 of a 5965 for our active loaded driver, because a 12AT7 will become so sensitive with the C4S as to make the amp’s volume a bit hair trigger to adjust. Using 1/2 of the 5965 is kind of cool, if one triode wears out, we can always wire up the other half!

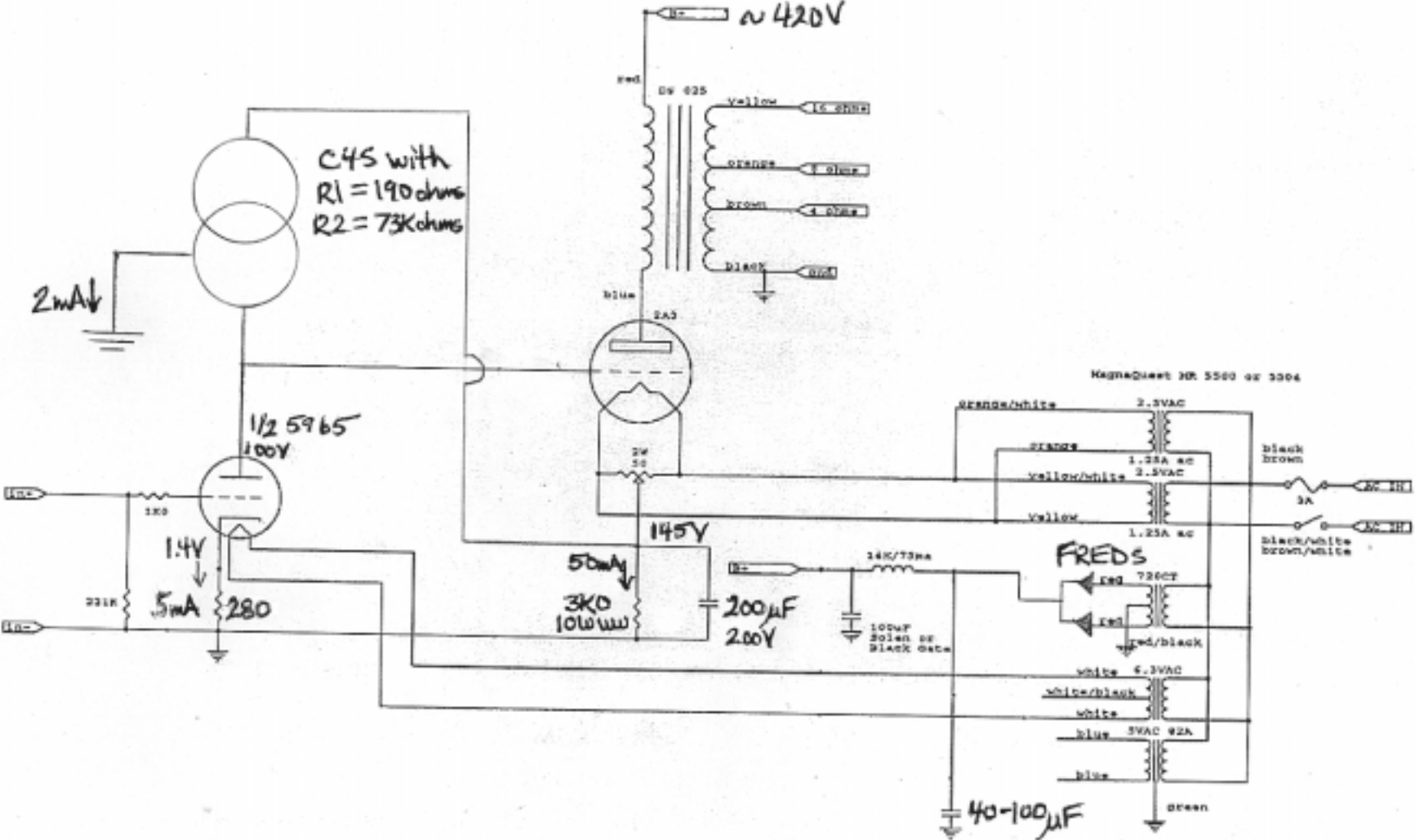
The SRPP is replaced by a C4S active load on top of the 5965. In the process of removing the SRPP the 7.5K ohm dropping resistor, the 10 uF bypass cap, and the 333 ohm bias resistor associated with the top half of the SRPP are removed. We want to run our 5965 at 100V and 5 mA, so R1 on the C4S board should be about 190 ohms, to set our 5965’s current draw to 5 mA. R2 needs to be about 73Kohms. See the C4S manual for details on setting this up. The cathode bias resistor of the 5965 needs to be about 280 ohms. No cathode bypass cap is needed.

The input grid resistor of the 5965 can stay at 221Kohms. Obviously the 221K grid resistor on the 2A3 grid, and the .47 mfd coupling cap are removed for this direct coupled amp and the plate of the 5965 is coupled directly to the 2A3’s grid.

Another unusual feature borrowed from the Afterglow design is the connection of the C4S board’s input, the R1 current set resistor to the top of the 2A3’s cathode resistor. This seems an odd way to supply the driver tube, but in practice works extremely well, the most notable improvement being a reduction of the noise floor when compared with the more conventional approach of feeding the load thru a dropping resistor directly from the output of the power supply. This connection also explains why the 2A3’s cathode resistor is 3000 ohms. Only 50 mA passes thru the cathode resistor, while another 7 mA passes thru the C4S, for a total of 57 mA total current draw through the 2A3.

So there you have it, now you can try out another nice 2A3 circuit on that Baby-O you built. And if you are looking to build a super 2A3 amp on your own chassis, the design would certainly be a worthwhile contender for a scratchbuilt project.

o-glow



a little journey to the home of Kevin Scott

By Paul Joppa

When I was in England in 1997, I tried to visit Simon Shilton, the transformer maker. That didn't work out, but he recommended that I try to see Kevin Scott and hear his speakers. I'd never heard of him, his company, Living Voice (#2 Carlyle Road, West Bridgeford, Nottingham NG2 7NQ United Kingdom), or the Air Partner and Air Scout speakers. But it seemed like a worthwhile thing to try, as long as we were going to Nottingham anyhow.

We stayed at a nice pub that must have been built about the time trains were invented. It was close to the train station anyhow, and a short walk to the castle. There are several pubs near the castle, built into the old tunnels under the castle, that all claim to be the oldest pubs in England. Everything seemed easily accessible, and West Bridgeford was also pretty close - but Kevin suggested strongly that a cab would be the best way to find his place. He was right. I had a map, and was diligently following the cab's route - for about the first half mile! After that, it was hopelessly confusing for an outsider like me. Eventually however, we pulled up in front of his house on a pleasant residential street and I knocked on his door. I walked into his fairly small living room, and was stunned by these huge monoliths, in piano black and beautifully finished birds-eye maple. They stood nearly 4 ft high with a nearly 2 ft square footprint. Then I noticed the bass horn between them, maybe 30 in high but at least 5 ft wide and 2-3 feet deep. The speakers completely filled the narrow end of the room. OK, I'm thinking, the satellites are 16 cubic feet each ... this guy must be pretty serious!

He immediately put some music on, before I can say more than "Hello, I'm Paul..." - a real believer in the VALVE philosophy, Shut Up and Listen! The sound is simply stunning - see the comments later. The system that we listened to included a Wadia 860 CD, Simon Shilton's lovely preamp (basic "anode follower", choke-input power supply - see his web page for details), and an Art Audio amplifier with VV30B outputs driving Sowter output transformers for 13 watts.

In between the cuts, we talked about various issues. Kevin has lots of opinions, and wasn't shy about sharing them. Most seem to be based on his own experiences, and he often deplored the incestuous repeating of other's opinions which characterizes much of the high end dialog today.

He runs the business as much from his home as from his (by-appointment-only) shop. He seems to spend his time listening to music and talking about music systems with other enthusiasts, with occasional breaks for beer and mountain biking. What a great life!

On amplifiers, he thinks most single-ended amps have inadequate power supplies. There's a guy named Gary Dews who makes amps and power supplies under the Border Patrol name (Simon Shilton also mentioned him) who has experimented extensively, and in fact sells upgrade power supplies for many SE amps. Kevin claims these power supplies make major improvements in sound, even on cheap amps. He also thinks there's no point in bothering with 211s, 845s, etc - they just never have the full-range resolution of the smaller audio tubes. In general, he has found that high-frequency extension is surprisingly important - hence for example interstage transformers are to be avoided unless you can afford a really good one.

Kevin is very enthusiastic about component quality. I gathered he had spend considerable effort investigating components for every detail of these speakers. He likes Hovland capacitors, finding most others dull (and even the best electrolytics dark sounding). He uses big, air-core inductors - and at the 90Hz subwoofer crossover, they must be pretty darn big!

The bass he feels is far more important than you would think - any shortcomings here will muck up the midrange. It's surprising, he says, how often a change in the bass results in a perceived change at much higher frequencies. It's also the biggest challenge; it's very difficult to obtain clean high-level bass. I must say, his system certainly supported this, showing the best combination of extension, resolution, and impact that I've ever heard from a speaker system.

Perhaps I'd better describe the speakers we were listening to. These are his smaller systems; there is also a larger model without the subwoofer. All his systems are made as much as possible by other craftsmen; he noted it took a long time to find a good enough cabinet maker but it was worth the effort. He's right, the cabinets are real works of art. The drivers are all from Vitavox, except the tweeter (JBL), but most are modified in various ways to his specs. The systems are way out of my league at some \$30,000 a pair plus another \$12,500 for the woofer - I felt lucky to have been able to spend so much time listening to them.

Starting at the bottom, the sub has two 12" Vitavox woofers (a custom design for this speaker) in a classic folded horn like the original Shearer theater design. It covers 40-90Hz. I did not find out anything about the crossover, except that it was passive, everything running off the Art Audio amp.

The woofer of the "satellites" is another 12" Vitavox, the same one as the subs - Kevin feels this helps the integration. The suspension is quite stiff, and I assume the cone is quite light to obtain the claimed 105dB sensitivity. The surround is the tried-and-true doped folded paper; the cone itself is undoped paper. The magnet is quite large, and ceramic - he actually prefers the sound of these drivers with ceramic magnets to that with Alnico, after trying both. It is front-radiating and back-loaded with a large horn, exiting with a mouth about 18" square at floor level. Visible internal curves are smooth. The horn is said to go down to 50 or 60 Hz in-room without the sub; with the sub it covers 90 to probably around 200, then direct radiation takes over up to the crossover at

500 Hz - much like a classic Lowther horn in the bass, but with dimensions twice as big, and a shorter horn due to the higher cutoff.

The midrange crossover is basically a classic second-order type, with one trick that he was a little cagey about except to say it was quite cheap but makes a significant difference. For the most part, effort was spent on component selection rather than crossover topology elaboration.

The midrange is a Vitavox horn and driver with a 2.75 in custom diaphragm - very similar to the classic large Altec units. The diaphragm surround is a polymer with radial corrugations. The horn is interesting - it looks a lot like a large Altec (it's a full 2 ft wide, and I suppose 10" high), but the dividers go almost all the way back to the throat - and the side walls are curved in the half closest to the throat, so that it's more exponential than radial in the first half of the horn. It becomes radial for better directivity control in the mouth half. Specified directivity is 120 by 90 degrees.

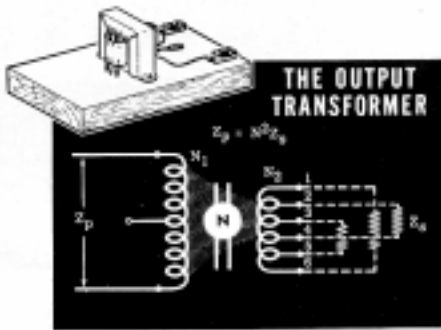
The dividers ring a bit when tapped, but the horn walls are very well damped.

The mids run to 10 kHz with a natural rolloff; the last octave is handled by a JBL slot tweeter which he prefers by a wide margin over the much-touted Audax. Unusually, it's rotated so the slot is 45 degrees from the vertical.

This is not a review, just some impressions based on a few hours listening in Kevin's room, to his music in his system - but this puppy sounds darn good. The system was being played at levels considerably higher than I would use myself, and I was impressed with the effortless ease with which these levels were handled. I have never heard bass before with such convincing solidity. Not even the big Wilsons can do what a really good bass horn can do. The sound was wonderfully well integrated. I have admired John Tucker's Exemplars in this respect ever since I first heard them, as being far and away better than any other horn system I've heard - but this was if anything better. And the treble nasties,

which I hear in every horn system I've ever run across to some extent, seem to be entirely missing. (The treble itself was certainly not missing - cymbals for example were especially crisp and lifelike). I spent some 3 hours with Kevin, probably 2/3 of it listening to this system at levels I would not normally tolerate, and I was still not tired of it at the end. I don't know what it is, but there's some real magic here. Only twice did I hear any hint of coloration (and we went through a wide variety of music) - a bit of "shout" on male voice, and some low violin once. I suspect these were horn resonances, but in any case they are rare exceptions to the generally uncolored sound. There was no chestiness, no boom, no tizz, no high-level treble crunch (even with massed strings at 10 dB above concert-hall levels). Percussive transients were especially well-handled. Unusually in my experience, these systems were very listenable fairly close in - even 5 ft from the speakers the sound was still well integrated, and backing up as far as I could, some 15-20 feet away made it worse rather than better.

Brainiac's



Heavy Metal

...an occasional review of some nifty chunk of iron (usually cheap!)

by Paul Joppa

Today's Topic:
the "Champ" output transformer

The "Champ amp" is a small (5-watt) guitar amplifier, usually with a 6V6 output tube and an 8-inch speaker of 4 or 8 ohms. This transformer is sold as a replacement for burned-out units in these amps. I got mine from Angela Instruments for \$25; they claim it is a little heavier duty than the usual replacement unit. It weighs 15 oz on my kitchen scale; the lamination stack is 2.25" tall x 1.875" wide x 0.75" thick. It appears to be air-gapped, secondary outside, primary inside. On my test bench I measured the following values:

Turns ratio: 26.5
 Primary: 235 ohm DC
 Secondary: 0.36 ohm
 Leakage ca. 0.07 H
 Capacitance: ca 34 pF
 DC current: Inductance with 12v/
 60Hz excitation is 10.5H at 10 mA, falling to 5.25H at 90 mA. I would rate it at 45 mA, where inductance is 8.7H.

This unit is unusual in that there is one lamination on each side that is interleaved, giving an unrealistic 15H at zero current. The capacitance is surprisingly small, so that high-frequencies are limited only by the leakage inductance giving a gentle

slope. With tweeters that have an inductive impedance rise, the treble should be even better.

The primary impedance with an 8 ohm load is 6100 ohms, and losses are small at 0.4 dB. Figuring power bandwidth as the frequency where the inductive impedance equals the load resistance, I rate this unit for 6 watts at 110 Hz. Small signal frequency response with a 1.5 to 2k plate resistance is within 3dB from 25 Hz to 17 kHz.

With a 4 ohm load, impedance is 3300 ohms and losses are 0.7dB. It should give 3.3 watts at 60 Hz. Small signal frequency response with a 1.5 to 2k plate resistance is within 3dB from 21 Hz to 10 kHz.

Overall, while this is not the greatest transformer available, it is good enough to hear the music. I've used it in my original "spud" amplifier with 417A/5842s; it's also suitable for many TV vertical output triodes like the 6DN7, 6CK4, or 6EM7. A 45 would be perfect, though at today's prices they are beyond the budget area this transformer represents. And of course it was designed for 6V6 or 6BQ5 service.

Out with the Old

We are closing out the KR Enterprise VV Valves to make room for the new generation of KR tubes. All sale tubes below have the KR 1 year warranty from date of purchase. Visit our website for KR pictures, specs and curves. <http://www.welbornelabs.com/krhome.htm>

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VV32B...these VV32Bs are all electrically the same tube except for glass color and shape.

VV32B	regular transparent glass	all sold
VV32BL	regular blue glass	\$250 per pair
VV32BC	blue cylinder	\$250 per pair

VV52B...these VV52Bs are all electrically the same tube except for glass color.

VV52B	regular transparent glass	\$250 per pair	<i>Hurry, almost gone</i>
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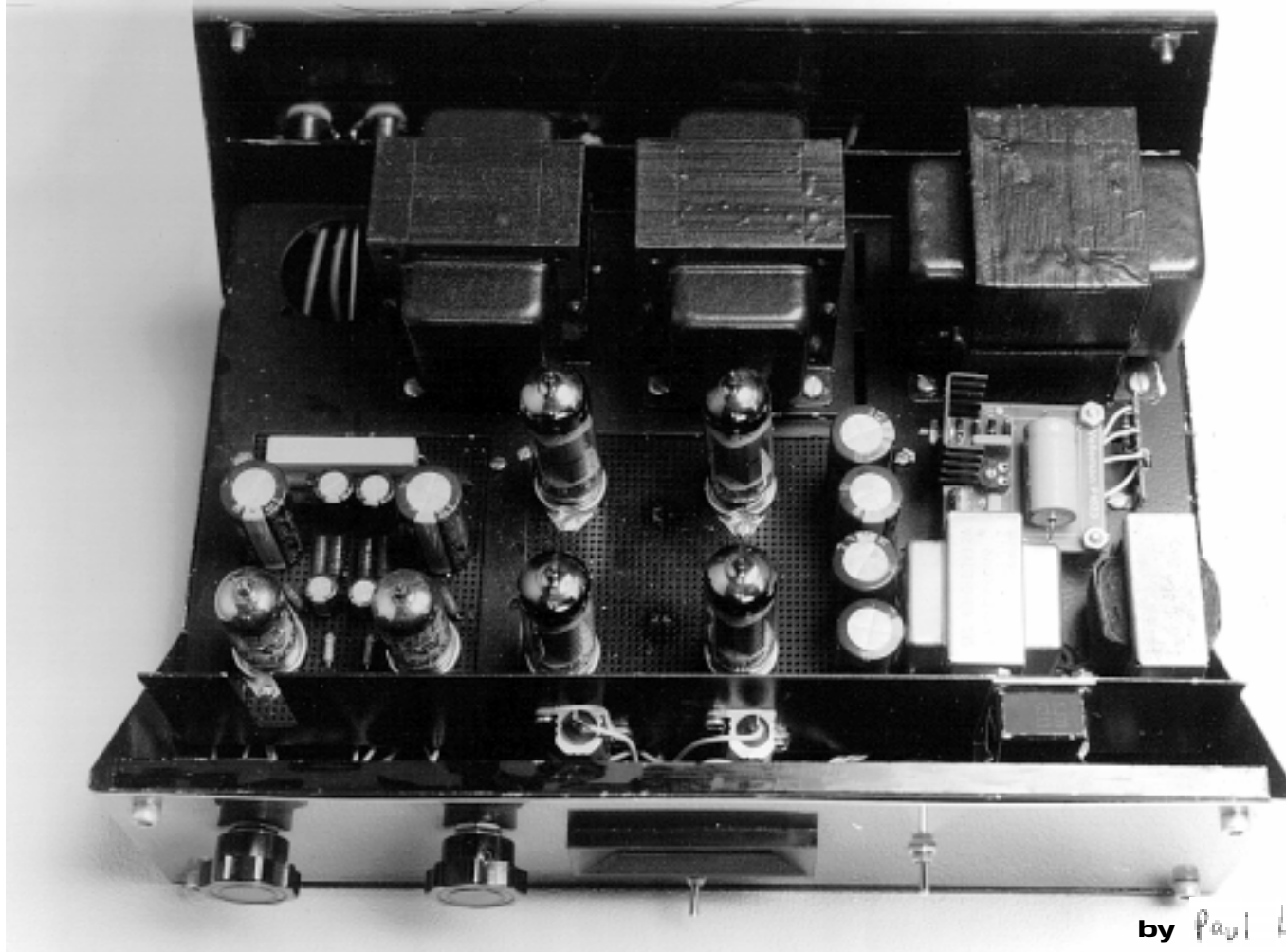
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direct coupled differential driven EL 84 amp



by Paul Hewlett

Feeling burnt out on single ended amps? Try this on for size - how about direct coupled differential driven EL 84 amp. That does not cost a million dollars to make. The amp featured in this article is one that I built for Mike Lafevre, using a design that Mr. Komoro developed. I was given permission to build this amp with his schematic, also to write a future article.

I would not recommend this amp to beginners as it is not an easy amp to construct. Most single ended amps are a lot easier to construct than this amplifier. How would I rate the difficulty? Intermediate, at least a couple of amps under your belt or a couple of belts under your amp? For resonance dampening of course!

To DHT or to not DHT that is the question? This amp was designed not to compete with the harmonically rich DHT PP

amps that are more expensive to build. These amps are built to a price point. The greatest cost incurred is the cost of the Dynaco SCA 35.

Down and out need an audio fix, cannot find one of these amps to strip? Mikey to the rescue, Magnequest is reproducing the Dynaco Z 565 transformer that is used in both the SCA 35 and ST35 amplifiers. The transformers are of better quality or equal, of course people will whine that they are not original. But they will not whine when they sound better.

As for the power tranny good luck, Hammonds suck. Be sure to dig deep if you go to Leeds Electronics, they might have a surplus transformer that will work. Electroprint will build custom power trannies to order.

How does it sound? One could say that

this EL 84 amp is like Sauvignon Blanc, slightly sweet with a clean finish. "I said sound, you clown". Sorry, writing an article will drive you to drink. The amp has a very powerful, sweet and transparent sound - can you say holographic? I knew you could.

Where's the beef? Solid state rectification, it's true. I swear. Ask Herb, he will tell you. How about the ultimate version? Tube rectified, carbon resistors, monoblocks, separate cathode bias resistor and Blackgate caps - these things are as smooth silk. Do not forget, too smooth, too boring! It's a tonal balancing act, every part is a natural tone control. Every part has a different resonance. The trick is to get every thing to resonate in natural harmony how will you know its right? You will feel it in your heart.

Lets talk techno, geek! The cathodes of

the 6DJ8 are feed a negative voltage, the voltage and current are set by the cathode resistor. Why? This enables the tubes to operate with equal bias on each section. Here lies the kicker, this amp is direct coupled any changes in the driver tube will effect the output tube, so the filaments of the 6DJ8's are regulated. This ensures that the thermal emission of the heaters, are kept constant. I used a Velleman kit regulator board that is cheap enough to offset the cost of my labor that would be required to hard wire one. Powering the regulator I used a Radio Shack 12 volt transformer.

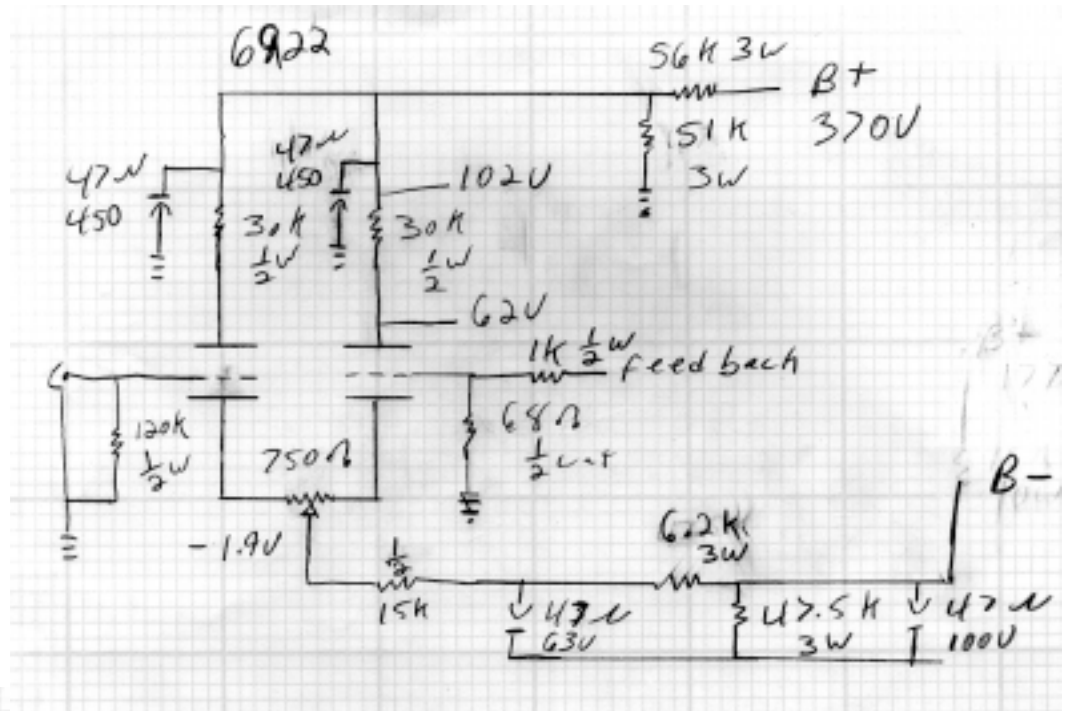
Regulating the B+ would have taken up more real-estate then I had available. Also the sound that B+ regulation inflicts upon the signal is not my sound.

A balance pot is used for each input tube to adjust the balance between each section. In order to monitor the balance of sections of the input tubes I connected a battery powered LCD meter. I

would then adjust the pot until 0.00 was displayed on the meter. A drift up to 1.00 is acceptable, this much imbalance will not harm the tubes. The output tubes are biased with a cathode resistor on each channel. These resistors are mounted on the chassis for better thermal transfer.

This amp is one of my favorite amps that I have built. We shall see how it fairs against the highly touted Acro 20/20 that I am restoring.

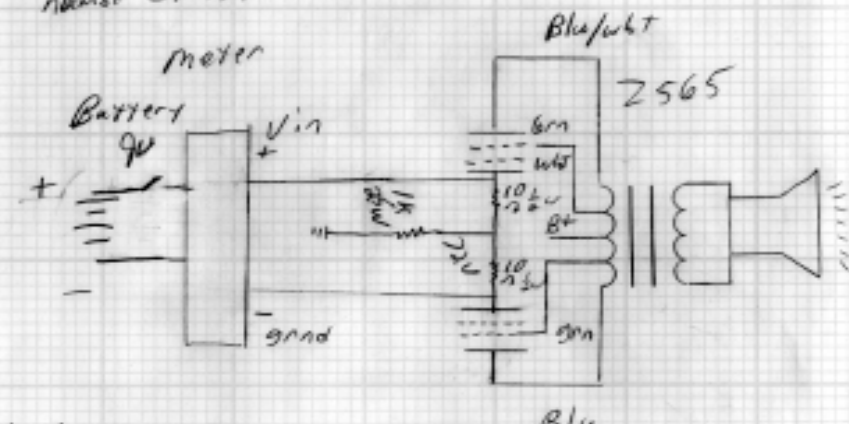
The EL 84 tube is one that should be taken seriously.



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meter — LCH
 — — PPDT
 — — switches
 — — used to switches
 — — between channels
 — — RCH

da' basics

Schematics look like Greek to you?


by Doc B.

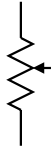
A lot of new folks have been joining our ranks lately, which is awesome. While a few come from an electronics background, the majority of new bottleheads are die hard audio nuts who know what they like, but haven't had the opportunity to get up to speed on the design end of the DIY game.

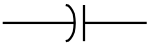
While we go to great pains to make our kits buildable without any working knowledge of circuitry, anyone who is serious about this stuff and wants to continue to improve their system will eventually need to know how to read a schematic drawing of a circuit.

To this end I will start to present here some basic symbols seen in typical tube audio circuits. Please don't bust my chops if you think I forgot something, there will be more of this in the future, and count on the fact that we'll cover what each component symbolized here really does in a circuit over the next few months.


Here we go:

 Resistor - The squiggle implies that the electrons flowing through the resistor are forced to burn off a little energy as they fight their way through.


 Potentiometer - Now our squiggly line has an arrow pointing to it. The arrow represents the wiper that runs over the resistive track in the pot when you crank it up to scare the neighbors. Can also indicate any other form of adjustable resistor


 Capacitor - The two perpendicular lines with the gap between them represent the two charged surfaces (usually foil or a metallized coating) in the capacitor. The insulator, polypropylene, oil or whatever, would be in the gap. You will see here that one of the two perpendicular lines is curved.

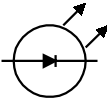
Sometimes both lines are straight. This curved line sits to the side with the lowest potential of a DC rated capacitor, the "minus" terminal.

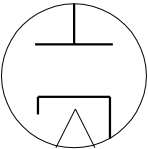
 Inductor - The curly line represents the inductor coil and the straight lines represent the core material. One curly line makes a choke, two curly lines, one on each side of the straight lines, makes a transformer.

Taps are signified by straight lines attached to the curly lines.

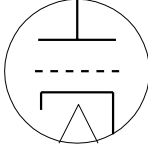
 Ground - a ground connection is represented in a lot of different ways, but the most common is either the three lines shown here or a triangle pointing down (to the ground, get it?)

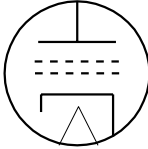
 Diode (Solid State) - The triangular arrowhead dealy bob represents the direction of current flow through the rectifier, and the line represents the cathode end, through which current is kept from flowing back in the reverse direction.

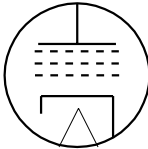
 Light Emitting Diode (LED) - These are similar to the solid state diode, with the addition of little arrows to represent the light emission.


 Diode (Vacuum) - Here's a little more c o m p l e x heiroglyphic. The circle defines the entire tube. The upside down T at the top is the plate of the diode. If there is one of these in a tube designated as a rectifier (which turns AC power into DC power) it is a half wave rectifier. If there are two of these in the circle, the tube is a full wave rectifier. The upside down V at the bottom is called the filament in a directly

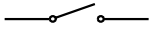
heated rectifier A directly heated tube is a tube in which the electrons boil directly off the filament. The V can also be called the heater in an indirectly heated tube. An indirectly heated tube has an additional element called the cathode which is heated by the heater to the point where it boils off electrons. The indirectly heated cathode is the sort of upside down L shaped thingy right above the heater (the filament in a DHT is often called the cathode too).


 Triode - Like the vacuum diode, the circle defines the entire tube, so a dual triode is often diagrammed with only half the circle enclosing the internals. The new element added to our basic vacuum diode is dashed line in the middle which represents the grid.


 Tetrode - This is like the triode, but now there is an additional dotted line above the grid. This is the screen.

 Pentode - This is like the tetrode but yet another dotted line is added, which represents the suppressor.

 Voltage Regulator Tube - the gaseous shunt regulator tube is designated with the familiar upside down T for the plate, and a circle for the cold cathode.

 Switch - gotta turn the thing off (unless you just unplug stuff like Doc). The angled line represents the moving switch contact.

 Fuse - the curvy line represents the part inside the glass that goes poof.

 Jack - the outer ring represents the part of the jack that usually goes to common or ground, the inner circle the signal carrier. Now they can't say you don't know jack.

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more VSAC 98 pics



Now that we can give you color photos, I dug back through all the nice photos we received from VSAC 98 attendees.

Tom Vetromile sent us the nice pic above, of the awesome Tube Research Labs amps and phono preamp built for Winston Ma. These babies greeted everyone in the show office as they signed in.

Dick Olsher supplied the photo of a happy Ed Billeci and his Sato horn. Ed came away with a nice sampler of Audience caps as an award for his horn and the 250TL amp shown in 5/98 VALVE



Dorothy Harwood of Acoustical Magic and Betty Kalmus of Antique Sound USA proved that audio is no longer just a man's game.
Photo by Tom V.

Ron Welborne introduced the new VV52BX powered Apollo amp kit, replete with beautiful chassis work, teflon sockets and a cool Japanese meter

Photo By LynnO



You have no idea what Doc goes through to get you a good price on MagneQuest iron
Photo by LynnO



Dan Meinwald and Alan Kafton set up a radical looking system in the EAR USA/Samahdi/Sahuaro room. Yes, those are speaker cables behind the Ichiban speakers and V-20 amp
Photo by Tom V.

So what are Eduardo de Lima, Lynn Olson, Gary Dahl, and the rest of the gang looking at?



Gary's Ariels in the Craftsman Room, of course.
Photos by Hank Murrow

These pics just barely scratch the surface of what went on at VSAC 98. Check out Lynn Olson's Ariel website, Dick and Leslie Olsher's Black Dahlia website, and David Robinson's coverage of VSAC 98 in Positive Feedback, Volume 7 Number 6 for some other perspectives.

So when's the next one? The superb quality of the exhibits and the major enthusiasm of the attendees has inspired us to make VSAC even bigger and better in the future. To give us a enough time to do it right, we've decided the next VSAC will be VSAC2000.

We'll put up info about where and when at bottlehead.com as soon as we have a venue and a date.

By the way, in case you didn't guess, putting on a show of this type is a gigantic undertaking. If you would like to volunteer to help put on VSAC2000, give us a call. We'd love the assistance, and you'd get to spend even more time involved in things tube audio.



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