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From: momitch (firejoke@aol.com)

Date: 3/11/2001 5:43 PM

Subject: The EL84 Amp Design Challenge

OK guys, here's what you have to work with in order to come up with the best sounding EL84 design you can (for whatever style of music you prefer):

You have 2 9-pin slots for the preamp tubes of your choice. You have 2 9-pin slots for 2 EL84's. You have an octal slot for the rectifier tube of your choice (or for a plug-in SS rectifier). You may set the B+ at whatever level you like. You have ultralinear taps on the OT if you would like to use them.

Here's the main questions:

1. Describe the preamp and PI you would use. Explain your choices if you would. Remember, you only have 2 9-pin slots for the preamp and PI.
2. Describe how you would run the EL84's. Feedback? Ultralinear? Plate voltage? Choke or no choke? Fixed bias or cathode bias?

EL84's are my favorite output tubes. I can't wait to hear everyone's ideas. Here is my current 2xEL84 project:

EF86 front end: 220k plate, 1M screen, 2.2 cathode resistor bypassed with a 22uF cap, 300V B+

5751 PI: Long-tailed pair 100k plates, 1.2k bias, 47k tail, 1M grid reference, .0047uF input cap, .047uF grid-to-ground cap on non input side, 300V B+

Just a 500k volume pot between the EF86 and the PI. I'm thinking of adding a "tone-cut" control ala Vox and Matchless at the PI.

PT is custom made. 320V on the EL84 plates. SS rectifier. Hammond choke. 47x47uF Elna Cerafine cap for the OT and screens. 16uF Atoms for the PI and Preamp. 1k5W resistors on the EL84 screens. Cathode biased with no negative feedback.

The amp is a little midrange heavy, which doesn't sound perfect to me when I'm playing alone, but sits perfectly in the mix when playing with other musicians. I do wish the low end was just a bit tighter. I'm staying away from UL for the EL84's because it came out so dark and sterile in a 2x6V6 amp I tried it in. Maybe a tiny bit of feedback would sound nice in this amp.

I'm looking forward to hearing what you guys might come up with. Be as detailed as possible please. Thanks in advance!

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From: Bruce (MissionAmp@aol.com)
Date: 3/11/2001 5:47 PM
Subject: Re: The EL84 Amp Design Challenge

Uhhmm... why? 😊

Bruce

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From: momitch (firejoke@aol.com)
Date: 3/11/2001 5:56 PM
Subject: Re: The EL84 Amp Design Challenge

Because it's fun! On another thread I suggested that something like this might be fun and others agreed, so I am starting the thread for us. Don't you think that finding out why some people use a choke or not is interesting. Some people like EL84's at 400V and some at 250V; I'd like to hear why each of those people likes the voltage they use. WHY NOT!!!

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From: Bruce (MissionAmp@aol.com)
Date: 3/11/2001 6:25 PM
Subject: Re: The EL84 Amp Design Challenge

Don't you think that finding out why some people use a choke or not is interesting.

Nah! EL84s are edgy, harsh when overdriven and never smooth and creamy like 6V6GTs and well, getting boring.

We need more 30 watt 6V6GT amps!!



I'm playing with Jason.

Bruce

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From: Jason (jlclal@aol.com)
Date: 3/11/2001 8:13 PM
Subject: Re: The EL84 Amp Design Challenge

Bruce,

Too much Fun!

I really love 6V6's too. You know, my tastes change depending on my mood. I think that 6V6's probably have the most "tubey" tone going for them in a 5E3 Deluxe circuit. I can even get into the BF Deluxe Reverbs. The one I had in recently was a primo amp('65). I voiced it to my liking. The owner loved what I did with it. He said that it sounds as good as it ever has, and that he plans on using it with his band live and in the studio. I took that as a great compliment, after all, he did buy the amp new in the "box" in the 60's. I don't own any "pure" 6V6 designs, but I want to. I really think the merits of these tubes are being appreciated by me, lately. Though I still think a happy little amp with some stinging EL-84's can smoke most other designs, IMO. They really compliment my Strat for clean, bright, edgy tone. For a PRS(my bucker axe of choice), they are a bit midrange heavy compared to a 6V6. I like the snarl. Reminiscent of Led Zeppelin BBC Sessions "The Girl I Love...". Too cool!

Jason C. Arthur

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From: Tube Dude 22
Date: 3/12/2001 5:43 PM
Subject: I'll stick with 6V6'S, thank you...

Discussing EL84's VS 6V6's is like comparing apples and oranges or Chevy's & Fords. We all have our favorite.

Given the choice of a 6V6 or 6BQ5 powered amp, I'd choose the 6V6 every time. It's predictable & reliable. I've burned out more 6BQ5's than any other output tube. Perhaps it is the high dissipation, high filament current & small envelope combination.

However, I prefer pentodes over beam power tubes, as a rule. I favor EL34's, 6F6's and 6K6's over the tone of the 6BQ5/EL84.

My next homebrew amp will be PP 6DL5's.

TD22

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From: Jason (jlclal@aol.com)

Date: 3/11/2001 6:13 PM

Subject: Re: The EL84 Amp Design Challenge

momitch,

You are the Man!

Jason C. Arthur

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From: Jason (jlclal@aol.com)

Date: 3/11/2001 6:43 PM

Subject: Re: The EL84 Amp Design Challenge

momitch,

Power Supply: GZ-34(Mullard)

27uF SCR/630V-EL-84 Plates

18uF " "-Screens

18uF " "-PI

18uF " "-Preamp(both sections of 12AX7)

1K resistor instead of choke(I always use a resistor)

10K to PI

2.7K to preamp

Power Section: Sovtek Standard Grade EL-84's from the mid 90's

330VDC on Plates

Cathode Bias(150 Ohm-250uF @ 50V Atom)

1K screen resistors

8K primary

4,8,16 Ohm taps(feedback from 16R)

Phase Inverter: RCA 12AX7

2.7 K grid stoppers(El-84's)

.022uF Mallory 150 input from preamp
100K and 82K plates
.022uF Mallory 150s to '84 Grids
820R bias resistor
22K long tail resistor
1 Meg grid loads
.1uF Mallory 150 presence
5K lin presence

Preamp: 12AX7 EH(Blackface Style Preamp)

Single Input/Channel-no padding 1 Meg grid load to first stage
100 K plate resistors
1.5 K cathode
4.7uF/50V CDE metallized polyester
2X .022uF Mallory 150's tone stack
220pf Silver Mica tone stack
250K treble
1 meg bass
10 K mid
1 meg volume

Parts:

Teflon 22 ga wire
Audio Note Ceramic Sockets
Carling Switches
Switchcraft jacks(isolated)
Modified Star Ground
1 Watt carbon films
5 Watt Vishay/Dale wirewounds for power supply
Terminal Strips
Fender style pilot lamp(amber)
Blackface Chassis(local machine shop clone)
Deluxe Reverb Cabinet Blonde Tolex+Oxblood Grille w/ 2X Celestion Vintage 10's
Stainless Steel Faceplate(high polish)
Cream Chicken Head Knobs
Fused Mains, PT CT and OT CT
ground switch
Hammond PT
Lafayette Paper OT(scrounged from old tube amp)

This amp was put together one day while bored. All parts were from previous projects laying around. A happy accident.

Jason C. Arthur

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From: John Kelley Brown (ledboots@home.com)
Date: 3/11/2001 7:59 PM
Subject: Re: The EL84 Amp Design Challenge

Jason,

I've never used a resistor instead of a choke, how does it effect the tone or does it, why do you prefer it?

Using a 22K long tail resistor instead of a 10K, I'd imagine you would have to use a 820 ohm instead of a 470 as well. How does the tone differ with the 22K compared to the 10K? I've also seen some amps that use 470K instead of the 1 megs.

Kelley

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From: Jason (jlc1a1@aol.com)
Date: 3/11/2001 8:26 PM
Subject: Re: The EL84 Amp Design Challenge

John,

The 22K tends to help the Drive signals from the PI balance a bit easier. I use an 820R bias resistor. I tried the "Vox" Style PI, and I think this design lends to a brighter, rounder tone than the Vox. It also drive the tubes harder. I never tried anything other than 1 Meg grid loads in the PI. They work great for me. Oh yeah, I really don't like chokes. I find that in my bad luck, they introduce some noise. I can live without the benefits of a smoothing choke. I like the sound of a resistor. Seems to "sing" more under higher current demands. I like the Dale Aluminum housed wirewounds(25 Watt) that you can screw into the chassis. This acts as a heatsink. They also make great cathode bias resistors, too.

Jason C. Arthur

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From: anonymous
Date: 3/12/2001 4:43 PM
Subject: Re: The EL84 Amp Design Challenge

What was your slope resistor value? -Jim

Single Input/Channel-no padding 1 Meg grid load to first stage
100 K plate resistors
1.5 K cathode
4.7uF/50V CDE metallized polyester
2X .022uF Mallory 150's tone stack
220pf Silver Mica tone stack
250K treble
1 meg bass
10 K mid
1 meg volume

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From: Jason (jlclal@aol.com)
Date: 3/12/2001 4:53 PM
Subject: Re: The EL84 Amp Design Challenge

PM,

Slope is 56K.

Jason C. Arthur

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From: momitch (firejoke@aol.com)
Date: 3/13/2001 4:49 AM
Subject: Jason's Stuff

Your design sounds like a winner! Can you really tell a difference using those poly caps in the PS for filtering? Does the blackface-style preamp stay pretty clean as the volume goes up? I bet your betting alot of PI and EL84 distortion with this amp. I also bet it cleans up beautifully with a roll back of your guitar's volume knob. Could you describe its sound for us? How did you couple the second gain stage 12AX7 to the PI?

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From: Jason (jlc1a1@aol.com)

Date: 3/13/2001 9:53 PM

Subject: Re: Jason's Stuff

momitch,

I appreciate the entheusiasm! Feel free to build it. It's worth it! I wish I had soundsample capabilities(any suggestions here are welcome-I am new to the Internet). I would love to post some, to support my tonal claims!

The Amp: 10.5 Watts RMS @ Clipping.

Tone controls are extremely dramatic and effective. Moreso than most, that I have played. It is extremely easy to dial in many tones with this amp. It seems to be the perfect middle ground between a BF Deluxe Reverb(with no reverb!), and an AC-30. It is also about as loud(er) as a BFDR. You get a really good clean from this amp with a tighter than Vox feel factor. A bit of squish, but not as dramatic as an AC-30. The clean can be described by me to be like a BFDR with overtones of Vox due to the Celestions and EL-84's. The best description is with a Strat, SRV "Wall of Denial" tone is pretty close. Under(Strong) Distortion with a Strat, it gets great Jeff Beck "Wired" rhythm tones. Not hot enough for his lead tones, though, even with humbuckers. You'll need a pedal, which by the way, work great with this amp. Even my lowly Boss Distortion pedal sounds pretty good here.

With a PRS, It takes on the midrange heavy tone of these guitars. It cleans up extremely well with the parallel/outside coils or even while rolling back the amp's volume using the neck only pickup. BTW, this tone reminds me of a brighter B.B. King tone on this guitar using the neck PU. The outsides remind me of Dicky Betts. With the bridge only pickup, this amp does the BBC Live Zeppelin Tones very well, namely "The Girl I Love...", "Thank You", "Since I've Been Loving You", "Black Dog". Absolutely killer lead/rhythm tones for faking Pagey! You get a squishier attack and less headroom with buckers. Not as pretty clean as with the Strat, but a VERY good tone. The preamp does clip when hit with the larger signal. This adds to the bright harmonics and crunch. Almost reminiscent of a cathode follower. Nice indeedie!

All in all, this was quite a happy accident. The Solens were A/B'd with 20uF Sprague Atoms(500V)all around. The Spragues lost. I use a .022 input to the phase inverter. A 5Y3 works very well in this amp as well for a very fat tone with a looser feel and less power. BTW, obviously, as mentioned, this amp begs to be tweaked. These tones described above were obtained after tweaking! She is capable of many great tones, but does require some knob twisting.

Have Fun,

Jason C. Arthur

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From: momitch (firejoke@aol.com)

Date: 3/13/2001 11:19 PM

Subject: Re: Jason's Stuff

Your design sounds killer. You know, I've never liked the Fender Blackface sound so I've always strayed away from the blackface-style tonestack, but maybe I'll try it with the EL84's. When I say I don't like the blackface tonestack, I'm sure part of what I don't like is the placement of the stack right after the first gain stage. I just love the Marshall/Vox sound, with the tone stack later in the amp. I've gotten to where I like to hear ALOT of midrange from my amps, and ditching tone stacks completely has been working for me lately. Just a volume pot and a "tone cut" control after the PI and I've been happy. Thanks for your great posts!

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From: Bruce (MissionAmp@aol.com)

Date: 3/13/2001 11:42 PM

Subject: Re: Jason's Stuff

The Amp: 10.5 Watts RMS @ Clipping

And thank you for being honest!

I can never get more then about 15-16 watts out of pair EL84s clean, and that's guitar frequency clean too, not RMS clean 0 distortion!!

I can sure make 'em go to over 24 watts Wicked and NASTY though!

Bruce

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From: Jason (jlclal@aol.com)

Date: 3/14/2001 1:06 AM

Subject: Re: Jason's Stuff

Bruce,

I thank you for the compliment. If we all used the RMS system of measuring output power, there would be no questions about the validity of our output power claims. 10.5 Watts may not

sound as impressive as a larger number, but we will let the tones and actual ear bleeding volume be the convincing factor instead! Besides, I am rebuilding this circuit into a quartet output. They would think that Paul Bunyan and Babe, The Blue Ox entered their ear canals and started chopping!

Jason C. Arthur

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From: John Kelley Brown (ledboots@home.com)
Date: 3/11/2001 7:41 PM
Subject: Re: The EL84 Amp Design Challenge

This is just too much fun. This is the maing reason I always come back to Ampage. Ok, because I'm still not creative enough with amp building to build a really fresh idea from scratch, just a cut and paste guy, and because you've taken from me one entirely necessary triode, I'll submit my second favorite all time preamp, the Bassman 6G6-A or 6G6-B, normal channel only, into a long tail pair PI, standard pushpull AB power section with EL84's, fixed bias, 56K negitave feedback resistor off the 8 ohm only OT which would be either a Hammond 1650F or 1608, 193C choke just to make the amp heavier 😊. then I'd start playing around with it to taste. Instead of a Bassman, I could call it a Bassbaby or something. I've never built a EF86 preamp, have nothing against using them, it just that I've never liked the tone of amps I've played through that used them, but it sounds like it would be a fun project.

Kelley

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From: Jason (jlc1a1@aol.com)
Date: 3/11/2001 8:35 PM
Subject: Re: The EL84 Amp Design Challenge

John,

I take it you need a cathode follower? They are wonderful sounding. I love them with EL-34's or 6L6's. Not much that can beat them. Due to the gain offered by '84's, I tend to drive the EL-84's harder with the PI to get the crunch needed. Less preamp distortion, and Mo Betta '84 Distortion.

Jason C. Arthur

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From: John Kelley Brown (ledboots@home.com)
Date: 3/11/2001 9:11 PM
Subject: Re: The EL84 Amp Design Challenge

Jason,

I've never worked with EL84s before so I'm lost with them, that's why I'm building that testbed project I mentioned back in the "say no to feedback" thread. My concern is that if EL84's need a special treatment like that, and it turns out they work best with cathode bias and so on, that I'll end up with the typical EL84 tone that I don't like. By the end of the day I wan't to end up with a 20 to 30 watt amp that sounds like a EL34 plexi Marshall. Is that even possible with an EL84's or do all the design parameters have to be just so with EL84's they always end up sounding that way? I can see doing a blonde or blackface Bassman circuit and going for that sound which is also a tone I like, but how do you get the Marshall thing to happen without the tonestack being driven by the cathode follower?

Kelley

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From: SpeedRacer (Joe@ObsoleteElectronics.com)
Date: 3/11/2001 7:53 PM
Subject: Re: The EL84 Amp Design Challenge

That's an easy one. 😊 I've built so many with EL84's..

EZ81 rect (octal is overkill! 😊 5Y3 if I have to.
Long tailed PI (47k tail, etc. as per Vox)
BF Style pre-amp with the 2nd pre-amp tube.
Run the EL84's at 340V at the plate, cathode biased
(130 Ohms)
No -fb
OT of my own design. 😊 8k primary though.
Choke between the screens and plates.

fwiw I think EL84's are one of the best sounding tubes ever made and I don't understand folks who don't dig them. C'mon! a mini EL34.. what could be cooler than that? 😊 15W of fury..

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From: John Kelley Brown (ledboots@home.com)
Date: 3/11/2001 8:06 PM
Subject: Re: The EL84 Amp Design Challenge

Joe,

I've never used the nine pin rectifiers. Is there one that has the least sag? What would perform like a GZ34 or tighter if possible? I prefer SS rectifiers but want to play around with tube but want something close to SS.

You get those Delft trannys in yet?

Kelley

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From: SpeedRacer (Joe@ObsoleteElectronics.com)
Date: 3/12/2001 1:44 AM
Subject: Re: The EL84 Amp Design Challenge

The EZ81 is what you find in lots of old 15W HiFi stuff with EL84's. It's plenty tough for a pair of the bad boys. You can go bigger of course, but IMHO "why". 5AR4 is as close to SS as you're going to get in this app. Idle current is so close to peak that you don't need as much filtering or as much rect (I mean if it can handle idle, you're there you know? 😊)

You get those Delft trannys in yet?

Got covers on order for those.. They're all wound up but the cover supplier in NZ can't supply anymore so I'm shipping some down from the US.

Islands, you know? 😊

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From: John Kelley Brown (kelbrown@cisco.com)
Date: 3/12/2001 1:58 AM
Subject: Re: The EL84 Amp Design Challenge

"Got covers on order for those.. They're all wound up but the cover supplier in NZ can't supply anymore so I'm shipping some down from the US.

Islands, you know? 😊"

Joe, you wouldn't want the covers to get lost in the mail. Just to be safe, you should fly to New Zealand. To save air fair, take the cheaper flights that only carry enough fuel where you have to keep stopping at islands like Hawaii, Tahiti, Bora Bora, the Cook Islands, Fiji. I know this sounds like a lot of trouble but you would be damn sure the transformer covers got to him.



I'll look into the EZ81's I like the name, "easy eightyones". How much do they drop the voltage?

Kelley

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From: SpeedRacer			
Date: 3/12/2001 7:23 PM			
Subject: Re: The EL84 Amp Design Challenge			

Just to be safe, you should fly to New Zealand.

ok funnyman.. 😊 Actually I'd love to go. NZ is gorgeous.. where else can you ski and surf the same day? 😊 Flew to OZ back in '86(?) man that was a HAUL. 30-something hours. JFK-LAX-Hawaii-Sidney. If you're not claustrophobic now, you WILL be.. Hawaii-Sidney leg was >12 hours.. went to sleep over the pacific, slept 8 hours.. woke up still flying over the pacific. that's just messed up... loved being down under though. I'd go back in a heartbeat. Drinking Castleman's XXX and waterskiing.. yeah baby!

To save air fair, take the cheaper flights that only carry enough fuel where you have to keep stopping at islands like Hawaii, Tahiti, Bora Bora, the Cook Islands, Fiji.

sounds like the voice of experience? 😊 That would be the way to go...

re: EZ81 - I'll measure mine up for ya and post.

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From: Rick Erickson (ampdog@wolfenet.com)			
Date: 3/12/2001 9:47 PM			
Subject: Re: The EL84 Amp Design Challenge			

where else can you ski and surf the same day?

I hate to say this on a public forum but: Washington State! Although the surf isn't nearly as good as Hawaii or CA., don't know much about NZ.

RE

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From: steveR			
Date: 3/12/2001 9:48 PM			
Subject: Re: The EL84 Amp Design Challenge			

where else can you ski and surf the same day?

Well if you drive real fast you can make it from Lake Tahoe to Santa Cruz in 4 to 5 hours. You could ski the morning while the snow's still good, and make it to the waves to surf while the sun sets.

I think they can ski year round on Mauna Kea. Watch for lava though!

steveR

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From: John Kelley Brown (kelbrown@cisco.com)			
Date: 3/12/2001 10:57 PM			
Subject: Re: The EL84 Amp Design Challenge			

I love it there. I was in Tahiti, Bora Bora and the Cook Islands in '95, NZ and Australia in '71. Bora Bora is very easy on the eyes in more ways than one.

Kelley

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From: Jason (jlclal@aol.com)			
Date: 3/11/2001 8:16 PM			
Subject: Re: The EL84 Amp Design Challenge			

SpeedRacer,

Right On!

Jason C. Arthur

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From: momitch (firejoke@aol.com)			
Date: 3/11/2001 9:20 PM			
Subject: Re: The EL84 Amp Design Challenge			

Sounds Killer!

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From: Trace (voodooamps@aol.com)			
Date: 3/14/2001 1:41 AM			
Subject: Re: The EL84 Amp Design Challenge			

fwiw I think EL84's are one of the best sounding tubes ever made and I don't understand folks who don't dig them. C'mon! a mini EL34.. what could be cooler than that? 15W of fury..

15 watts or fury indeed, I love that statement! (ha, ha) I think most people who have heard (and dislike EL84's) are either clean-tone lovers or they OT sucks in the amps they have tried. I've heard GREAT OT's and really bad OT's hen it comes to EL84's.

All this will change when you introduce your new EL84 OT (hint, hint)

Trace

<http://www.voodooamps.com>

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From: BWilliamson (underdog@discover-net.net)			
Date: 3/12/2001 12:36 AM			
Subject: EL84 Amp Filtering			

Remembering back, DR.Z posted here once and he claimed that the best sounding EL84 amps

were the ones just underfiltered. So that a little ghost noting was happening.

something that came to mind, haven't done much with 84's myself. Keep meaning to.

bw

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From: John Kelley Brown (kelbrown@cisco.com)			
Date: 3/12/2001 1:45 AM			
Subject: Re: EL84 Amp Filtering			

I've heard him say that before too, it would be worth a try. I'd think "ghost noting" may or may not be a good thing depending on what you are after, whenever I've heard "ghost noting" the ghost note wasn't a pleasant one. Maybe the kind of ghost noting with underfiltered EL84 amps is different.

Kelley

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From: Steve A. (steve_ahola@yahoo.com)			
Date: 3/12/2001 2:38 AM			
Subject: Re: EL84 Amp Filtering			

bw:

DR.Z posted here once and he claimed that the best sounding EL84 amps were the ones just underfiltered.

Seems like another famous tube guru has been known to overfilter his EL84 amps... something like 160uF going to the plates (with a SS rectifier, of course).

"Diff'rent strokes for diff'rent folks" and all that... Viva la Difference!

--Thanks!

Steve Ahola

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From: Jim Jones (boowho@mts.net)
Date: 3/12/2001 4:12 PM
Subject: Re: EL84 Amp Filtering

I just rebuilt my November 2 x EL84 plexi knockoff and doubled up on the first stage filtering. Now there's 80uF right after the recto and 40uF everywhere else. Bear with me, I've only built a couple amps and haven't really done a lot of experimenting, but I was amazed at how this extra filtering made single notes and double-stops really leap out. Chords are very defined and the bottom end is incredibly tight. This should be obvious to everyone I guess, but I had to try and see for myself.

I think heavy filtering sounds awesome in a "hard rock" amp, but I wouldn't do it if you're looking for something "bluesy."

I may decrease the filtering in the preamp, maybe 20uF or so. I've heard that a lot of folks like the filtering heavy in the back end and lighter in the pre. What sort of response/tone difference should I expect by thinning out the preamp filtering?

Jim

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From: Bruce (MissionAmp@aol.com)
Date: 3/12/2001 4:02 PM
Subject: Re: EL84 Amp Filtering

I've worked on a few EL84 Dr Z amps and they are most certainly NOT purposely underfiltered or even remotely underfiltered.

Where did that rumor come from?

Bruce

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From: BWilliamson (underdog@discover-net.net)
Date: 3/12/2001 6:39 PM
Subject: Re: EL84 Amp Filtering

Where did that rumor come from?

I SWEAR that DR.Z posted that here, on this board himself. Think we were talking about the

Carmen Ghia and somebody was going off on ghosting problems with that amp. OF course, the archives keep kicking me out so I can't dig it up.

But I agree, the couple I've seen wouldn't fall under this. Suppose it depends on the tone he was shooting for.

bw

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From:	Bruce (MissionAmp@aol.com)
Date:	3/13/2001 5:06 PM
Subject:	Re: EL84 Amp Filtering

Hmm... well he reads AMPAGE once in a while so maybe he'll clarify that someday. Also, I'm not so sure ghost noting is so much a power supply underfiltering problem as it is an overdrive issue.

Bruce

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From:	Steve A. (steve_ahola@yahoo.com)
Date:	3/12/2001 2:55 AM
Subject:	Re: The EL84 Amp Design Challenge

momitch:

Park made a 20 watt amp that meets your specifications. It looks a lot like the Blues Express amp I've been screwing around with, but with no mid control and plenty of NFB (way too much NFB IMHO YMMV ISO CAB FWIW ROTFL)

<http://www.blueguitar.org/park20.zip>

Steve Ahola

P.S. Since your amp sounds a lot like the right channel of a DC30 (but with only 2 EL84's) have you thought about using its rotary tone switch, which selects between different values for the EF86 coupling cap? I'm not sure if I'd like the choice of caps used in the DC30, but you could figure out the values you like and go from there. I think that the cut control on the Matchless is more for fine-tuning the tone in the power amp section than for setting the overall tone (as is usually done in the preamp).

FWIW the Fender Pro Jr uses a 270 ohm resistor in series with a 2200pF/1kv cap (ceramic?) between the plates of the two EL84's. Seems like there was an article on Dr Z that mentioned this and a thread here discussing that awhile back but I didn't save it... anybody save that one to disk? I just picked up some 2200pF caps so I can experiment around with that idea.

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From: Dave B. (the3burns@earthlink.net)
Date: 3/12/2001 5:49 PM
Subject: Re: The EL84 Amp Design Challenge

I believe the Tonequest report had an article with Dr. Z talking about "conjunctive" filters. Also kg posted an article with a 6V6 poweramp that used a 15k/.01uf conjunctive filter. Z uses the hammond reverb amp circuit which is a 10k/.002uf. I've tried them in a 6V6 cathode bias amp and didn't care for the way it muted the tone. Maybe they work better in a EL84 amp.

DB

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From: Steve A. (steve_ahola@yahoo.com)
Date: 3/13/2001 2:14 AM
Subject: Conjunctive filters for EL84's

DB:

Here is a quote from that thread:

From: JaySG

Date: 1/12/2001 12:22 AM

Subject: Tonequest Dr. Z Interview -- Conjunctive Filters

This seems like something to discuss. I'm including some RCA text after the Dr. Z snippet. Please bear with and keep on reading.

Q: What other specific features are unique to your amps?

A: I probably have a couple of original designs that are unique to my amps, and they were all

evolved from a circuit that's called a conjunctive filter. It's a filter that goes across the primary side of the output transformer. The Carmen Ghia has a very traditional conjunctive filter, or corrective filter, as it's described in the RCA Receiver's Handbook. It affects the primary impedance of the transformer and allows frequencies to be very flat, or balanced. From say, 100Hz to 3K, the amplitude is the same. So from the high E to low E strings if your pick attack is the same, you'll get the same volume from the notes. The volume of individual notes isn't frequency dependent. So going back to what we were saying earlier about the touch dynamic of our amps, all that is related to the conjunctive filters that we use, and you're really in control because of them.

Q: And this is unique to the Z's?

A: No one else uses it. It's something I found in an old RCA book of my dad's, and again, it's referred to as a corrective filter. It was just a little side note on how to make an amplifier more linear within a certain band of frequencies. When you strum a chord, each note makes it's own contribution to the sound without one note overpowering the other. Jazz players love it when they're playing those big, 6-string chords—it really puts a twinkle their eye when they hear it.

The Prescription is another one in which I went with a different approach with the conjunctive filter. I have Todd Sharp to thank for that. We were in the tuning room for a Rod Stewart show and I'd sent Todd some parts for a Dr. Z Prescription he was using. We started playing around, and before you know it, we had evolved it into a really cool sound with different values of resistors and caps that we used. It's funny how working with artists, you develop things.

From a RCA Receiving Tube Manual:

A corrective filter can be used to improve the frequency characteristic of an output stage using a beam power tube or a pentode when inverse feedback is not applicable. The filter consists of a resistor and a capacitor connection in series across the primary of the output transformer. Connected in this way, the filter is in parallel with the plate load impedance reflected from the voice-coil by the output transformer. The magnitude of this reflected impedance increases with increasing frequency in the middle and upper audio range. The impedance of the filter, however, decreases with increasing frequency. It follows that by use of the proper values for the resistance and the capacitance in the filter, the effective load impedance on the output tubes can be made practically constant for all frequencies in the middle and upper audio range. The result is an improvement in the frequency characteristic of the output stage.

The resistance to be used in the filter for a push-pull stage is 1.3 times the recommended plate-to-plate load resistance; or, for a single-tube stage, is 1.3 times the recommended plate load resistance. The capacitance in the filter should have a value such that the voltage gain of the output stage at a frequency of 1000 cycles or higher is equal to the voltage gain at 400 cycles.

A method of determining the proper value of capacitance for the filter is to make two measurements of the output voltage across the primary of the output transformer: first, when a 400-cycle signal is applied to the input, and second, when a 1000-cycle signal of the same voltage as the 400-cycle signal is applied to the input. The correct value of capacitance is the one which gives equal output voltages for the two signal inputs. In practice, this values is usually found to be in the order of 0.05 microfarad.

--submitted by Steve Ahola (thanks to bw for emailing it to me!)

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From: JWK (tcompton@citlink.net)
Date: 3/13/2001 4:05 AM
Subject: Re: Conjunctive filters for EL84's

Thank you for posting that, Steve. I remember reading that post when it appeared and always regretted not printing it.

- 1.) So this is only for non-negative feedback amps?
- 2.) "Across the primary" - Is this then wired from plate to plate on the tube sockets?
- 3.) I have a mystery circuit on my old Eico I've been meaning to ask about. It's a 330pF, 800V cap wired from the plate of one 6L6 socket to the center tap of the primary. Anyone know what the hell that's for?

Sorry for ending with a preposition.

John

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From: Bruce (MissionAmp@aol.com)
Date: 3/13/2001 5:12 PM
Subject: Re: Conjunctive filters for EL84's

Q: And this is unique to the Z's?

A: No one else uses it. It's something I found in an old RCA book of my dad's, and again, it's referred to as a corrective filter.

I'm sure he means currently but, I've been working on a lot of old Orange amps the last few months and have found a couple with factory installed 1500v .01uF caps with a 2 watt resistor (in series) from each OT plate wire right back to the center tap.

Bruce

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From: JWK (jkilmer@usadatanet.net)			
Date: 3/13/2001 5:42 PM			
Subject: Re: Conjunctive filters for EL84's			

I guess that answers my question on how the filter is hooked up. Now that I see it, I feel incredibly stupid. Tell me Bruce, do those old Orange amps have a NFB loop or not? Thanks.

John

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From: Bruce (MissionAmp@aol.com)			
Date: 3/13/2001 5:47 PM			
Subject: Re: Conjunctive filters for EL84's			

Yes they do run a NFB loop John.

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From: nuke (larrysb@aol.com)			
Date: 3/14/2001 1:21 AM			
Subject: Re: Conjunctive filters for EL84's			

The Fender Pro Junior also employs a "conjunctive filter" aka, "corrective filter" or "conjugate load".

It's not a Z exclusive, even today. 😊

The idea is as old as the hills and has been used from time to time in everything from hifi to PA to car radios to guitar amps.

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From: Daver (bluefire@voyager.net)

Date: 3/14/2001 2:01 AM

Subject: Re: Conjunctive filters for EL84's

From what I've read in the RCA book and RDH, they suggest using the filter with no -FB. The Pro Junior (and others) does have negative feedback. Sooo..... what's the real story with conjunctive filters? -FB or no -FB? Or does it just work differently in each case? Getting weak....confused....

Daver

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From: Steve A. (steve_ahola@yahoo.com)

Date: 3/14/2001 6:09 AM

Subject: Re: Conjunctive filters for EL84's

Bruce:

I've been working on a lot of old Orange amps the last few months and have found a couple with factory installed 1500v .01uF caps with a 2 watt resistor (in series) from each OT plate wire right back to the center tap.

With the cap and resistor connected from the plate to the OT CT (which is essentially at ground as far as the AC signal is concerned- right?) would that not work differently than having it between the two phases? Going from each phase to the CT it seems like it would bleed off some of the highs indiscriminately, while wired across the phases it would depend on the accuracy between the two phases- right? Sort of like your version of the cross-line MV with the series cap to keep the low settings from getting too "buzzy" ...

So wouldn't Dr Z's conjunctive filter have some similarities in its effect to a 50pF to 150pF snubber cap across the PI plates? Only using a larger valued cap in series with a resistor to lessen its effect...

I don't think that this conjunctive filter is the "end-all be-all" but it seems like still another way to shave off some excessive highs from an EL84 amp... a welcome addition to our bag of tricks. But I don't see it making the string-to-string balance perfectly even... 😊

--Thanks!

Steve Ahola

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From: Charlie Turner (chjtr@gte.net)

Date: 3/14/2001 2:31 AM

Subject: Re: Conjunctive filters for EL84's

Hi! I knew that I'd seen this somewhere before and I've finally found it in "The Audio Cyclopedia", question 12.169. They show an alternative network for push-pull applications using: resistor, capacitor, capacitor, resistor in series from plate to plate with the network grounded between the 2 capacitors. It is stated that "Resistors R1 and R2 are about 1.3 times the recommended plate to plate impedance"; I'm not sure if that means each resistor should be $1.3 \times p-p$ impedance, or both together should be $1.3 \times z(p-p)$. As far as the caps are concerned, it is stated in the singular: "The capacitor is selected for a value that will result in the same voltage gain at 3000Hz as that at 400Hz. Generally, a capacitor of 0.03 to 0.06 uf will suffice for the average amplifier. Worded that way, it sounds like each cap should be 0.03 to 0.06 uf, and by extension, each resistor should then be $1.3 \times z(p-p)$. It also states "As a rule, the foregoing networks are not used in amplifiers employing negative feedback, although they have been used to some extent in the past.", so I guess the "rule" is: use this as needed or desired. Hope this might be helpful in some way. Charlie

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From: Tim Gagan (timgagan@newmexico.com)

Date: 3/12/2001 3:18 AM

Subject: Re: The EL84 Amp Design Challenge

Ok, this is fun and right up my alley. There's a project I want to get started on soon here, which is basically a 6G3 (Brown) Deluxe with EL84's rather than 6V6's, only one channel and no tremelo. I had a Brown Deluxe for awhile and it was one of the best amps I've ever heard. I think those things are way underappreciated; I much prefer them to the Tweed Deluxes (Fenders and clones) that I've heard. I want to do this because I believe I prefer EL84's to 6V6's so I think it'll sound even better with EL84's. Once I build this amp I can put my taste to the test: I'll be able to do a straight-out comparison between EL84's and 6V6's because I already built a 6V6 version of this thing.

The project is this:

Deluxe 6G3 preamp and PI, one channel only, no tremelo. It will be built into an old Knight stereo, using the Knight PT and one of the Knight OT's. The OT is ultralinear, and it'll have a switch to take it in and out of ultralinear operation. I like right around 340-350 volts for the EL84's, so I'll play with rectifiers (the Knight used a 5AR4 so it has the octal socket) and/or zener diodes to get me in that ballpark. Cathode bias, no choke, negative feedback subject to

experimentation.

A question for Speedracer: you refer to EL84's as mini EL34's; I've heard that before but it puzzles me because aren't EL34's true pentodes and EL84's beam power pentodes?

Thanks!

Tim

<http://www.gaganbros.com>

The World's Only Double Doubleneck Lefthand Band

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From: Jason (jlclal@aol.com)
Date: 3/12/2001 4:52 PM
Subject: Re: The EL84 Amp Design Challenge

Tim,

EL-84's are true Pentodes: plate ,screen grid, suppressor grid, control grid, cathode.

- Pin#1: NC
- Pin#2: Control Grid
- Pin#3: Cathode(Suppressor Grid internal connection)
- Pin#4: Filament
- Pin#5: Filament
- Pin#6: NC
- Pin#7: Plate
- Pin#8: NC
- Pin#9: Screen Grid

The EL-84 looks like a Beam Tetrode, but it does not have Beam Forming Plates/Grids to the best of my knowledge. It does have the internally connected Suppressor Grid, though. In an EL-34, for instance, you have the choice of whether or not to connect the suppressor grid externally(Pin #1). In the EL-84, it is permanently connected. The EL-84 was designed with Pentode Operation heavily in mind, hence the permanent internal connection.

Jason C. Arthur

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From: Tim Gagan (tingagan@newmexico.com)
Date: 3/12/2001 6:51 PM
Subject: Re: The EL84 Amp Design Challenge

Hi Jason,

Thanks for the info. My question was based on GE's Essential Characteristics describing a 6BQ5 as a "Beam Power Amplifier". Misprint?

Tim

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From: Jason (jlclal@aol.com)
Date: 3/12/2001 7:03 PM
Subject: Re: The EL84 Amp Design Challenge

Tim,

Interesting. I would like to read that. I have always understood that EL-84's are true Pentodes, though they "look" like Tetrodes on paper. Where can I get a copy?

Jason C. Arthur

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From: MBSetzer (QualityAna@aol.com)
Date: 3/12/2001 9:31 PM
Subject: Re: The EL84 Amp Design Challenge

The GE they are talking about is definitely a regular ordinary pentode.

So is the RCA, and any other faithful 6BQ5 or EL84.

The GE book *Essential Characteristics* may be still available from Antique Electronic Supply, I use mine quite a bit, but there really is not much there about each tube, it just has all their receiving tubes listed.

Many times in this book the pentode/tetrode/beam power tube terminology is virtually interchangeable, and therefore incorrect. Other references are better for this detail, best approach is to simply examine your tubes firsthand, you will know for sure.

Also, with currently made EL84's a lot of them don't follow the original design pinout, some are

a cross between 6BQ5, 7189, & 7189A.

Mike

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From: Chris B (teleman28056@cs.com)
Date: 3/12/2001 3:49 AM
Subject: Re: The EL84 Amp Design Challenge

Copy the 5E3 circuit. Use a 120k for the plate resistors on the preamp tube. Try about 340V for the plates of the EL-84's, 300V for grid #2, 275V or so for the preamp and PI. I love that circuit! The one I built sounded great, except the volume wasn't loud enough because I used an under-rated PT.

Chris B

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From: anonymous
Date: 3/12/2001 1:17 PM
Subject: Re: The EL84 Amp Design Challenge

Simple:

I don't care for EL84's when overdriven, unless they are combined with a conjugate load and/or careful tailoring of the grid-stopper resistors. Conjugate loads are real nice on EL84's.

I'd go with EF86/12AX7, plenty o' gain, I'd probably use something similar to the Z setup in the Z28, but not quite so dark.

GZ34 recitifer, no more than 40Uf filtering. I'd also go with a somewhat beefier than required OPT core, I like iron. Pentode mode, fixed bias, some feedback but not too much.

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From: John Kelley Brown (ledboots@home.com)
Date: 3/12/2001 3:58 PM
Subject: Re: The EL84 Amp Design Challenge

What are conjugate loads and how do you implement them?

Kelley

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From: Bruce (MissionAmp@aol.com)
Date: 3/12/2001 4:06 PM
Subject: Re: The EL84 Amp Design Challenge

Go back to Steve A's message.

Bruce

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From: John Kelley Brown (kelbrown@cisco.com)
Date: 3/12/2001 6:12 PM
Subject: Conjugate loads?

I looked and didn't see any of Steve's posts discussing conjugate loads. Could someone 'splane me on what a conjugate load is and how to implement it?

Kelley

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From: Dave B. (the3burns@earthlink.net)
Date: 3/12/2001 7:05 PM
Subject: Re: Conjugate loads?

I think you're talking about a conjunctive filter which is a series resistor cap combination placed across the primary of the OT. It supposed to even out the frequency response. try 10K/.002.

DB

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From: Jason (j1c1a1@aol.com)
Date: 3/12/2001 4:55 PM
Subject: Re: The EL84 Amp Design Challenge

Anonymous,

Who was that masked man!

Jason C. Arthur

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From: MBSetzer (QualityAna@aol.com)
Date: 3/12/2001 5:29 PM
Subject: Re: The EL84 Amp Design Challenge

here was my EL84 Push Pull amp from last year . . .

<http://members.aol.com/setzeramp/setz106.gif>

oops, forgot the PI, oh well it works anyway, I think I'll just plug in and turn it up to 11 . . .

heh heh,
Mike

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From: Jason (jlc1a1@aol.com)
Date: 3/12/2001 7:14 PM
Subject: Re: The EL84 Amp Design Challenge

MB Setzer,

A Brilliant Design! You obtain the out of phase drive signal for VB from the RC network(100K/.1)attached to the VA Screen Voltage Swing. Nice. How does she sound, Nigel Tufnel? Does she fit you like a flesh tuxedo?

Jason C. Arthur

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From: Rebel420 (giorfida@drifteramps.com)
Date: 3/12/2001 7:45 PM
Subject: Re: The EL84 Amp Design Challenge

heh, I've gutted a couple of these Davis's let me tell ya, they have the best sounding OT I've

ever heard in an e184 amp!

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From: MBSetzer (QualityAna@aol.com)			
Date: 3/12/2001 9:52 PM			
Subject: Re: The EL84 Amp Design Challenge			

I figured Gino had a more conventional use for the old Davis PA OPT by now 😊

Really not my brilliant idea, the amp came that way, and I decided to keep it pretty similar to original as I changed it to guitar use, excellent for vocals too, never would have thought since it was just an office PA . . .

The original is here:

<http://members.aol.com/mbsetzer/davis106.gif>

you can tell I did some minor changes, including the so-called conjunctive filter, IIRC the cap/resistor across the OPT is similar to what they use in power conversion to damp ringing where the transformer is driven by a square wave. Might even be called a Zoebel network?

Anyway, this amp does a good job of producing square waves, works fine at all volumes but actually stays clean til about halfway up, then breaks up fast as you get to 11. With the PI-less outputs, it does change the way it breaks up differently at different volume levels compared to regular amps.

Mike

START NEW THREAD	REPLY	PREVIOUS	LIST
From: Rebel420 (giorfida@drifteramps.com)			
Date: 3/12/2001 10:03 PM			
Subject: Davis PA Amp OT goodies.			

I figured Gino had a more conventional use for the old Davis PA OPT by now 😊
with a set of NOS e184/7189's running betwene 350v-400v, and a plexi style preamp, you really can't hear much difference between this and a 50w plexi... this OT IMHO, has the same response/basic tone as the OEI 50plexi ot.... I have one of these OT's on loan at the moment, but when I get it back, I also plan on trying it in a voxy type circuit as well...

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From: John Kelley Brown (kelbrown@cisco.com)
Date: 3/12/2001 11:03 PM
Subject: Re: Davis PA Amp OT goodies.

Rebel,

"...with a set of NOS e184/7189's running betwene 350v-400v, and a plexi style preamp, you really can't hear much difference between this and a 50w plexi... this OT IMHO, has the same response/basic tone as the OEI 50plexi ot...."

Now you are talking about what I want to hear! How do you get one of these trannys? What else comes close?

Kelley

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From: hogy (hogy@home.com)
Date: 3/13/2001 3:19 AM
Subject: Re: Davis PA Amp OT goodies.

Would y'all please shut up about those Davis OTs? Fer cryin' out loud...

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From: John Kelley Brown (kelbrown@cisco.com)
Date: 3/13/2001 3:40 AM
Subject: Re: Davis PA Amp OT goodies.

Hogy,

Ok, ok, I'll stop blabbing on and on Davis output transformers. I know nobody wants to hear me say another word about Davis output transformers so I'll stop my insessant dribbling about Davis output transformers. 😊 What are they anyway? I've never heard of them until this thread that's now discussing Davis output transformers.

Kelley

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From: hogy (hogy@home.com)
Date: 3/13/2001 4:00 AM
Subject: Re: Davis PA Amp OT goodies.

They're just crappy little transformers that nobody should want. To get one, you'll have to gut a perfectly fine little Davis amp, what a shame. If you want a real good sounding, cheap and readily available OT for 2 EL84s, get the Schumacher made Deluxe Reverb OT from New Sensor. Seriously, a fine unit. Hogy

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From: Rebel420 (giorfida@drifteramps.com)
Date: 3/13/2001 6:16 AM
Subject: Re: Davis PA Amp OT goodies.

They're just crappy little transformers that nobody should want

I apologise... they aren't all that.. they are in the same category as those damnded Traynor amps... NOBODY should ever want one of those 😊

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From: John Kelley Brown (ledboots@home.com)
Date: 3/13/2001 8:59 AM
Subject: Re: Davis PA Amp OT goodies.

Hogy,
I'll look into using the Deluxe OT. I have a coupla Hammonds I'm trying as well. Thanks for the tip.
Kelley

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From: Steve A. (steve_ahola@yahoo.com)
Date: 3/14/2001 6:25 AM
Subject: Schumacher DR OT

Hogy:

If you want a real good sounding, cheap and readily available OT for 2 EL84s, get the

Schumacher made Deluxe Reverb OT from New Sensor.

Thanks for the tip!

Steve Ahola

P.S. Would that be stock # NSC041318 on the following page?

<http://www.turnstyle.com/nsc/catalog.asp?raster=B219.0xA2ACCBF8F96BB50F.C74F.0.FFB2>

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From: Rebel420 (giorfida@drifteramps.com)			
Date: 3/13/2001 6:20 AM			
Subject: Re: Davis PA Amp OT goodies.			

Now you are talking about what I want to hear! How do you get one of these trannys? What else comes close?

nothing comes close... at least YET ... *evil grin*...

you can get the Davis amps thru EBAY occasionally, estate sales, pawn shops, church/school rec. halls, small town community centers etc... ya know the typical haunts for old tube PA equip



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From: Stephen Conner (steve@esru.strath.ac.uk)			
Date: 3/12/2001 5:44 PM			
Subject: Lemme see...			

OK, here's what I'd do.

EF-86 in first stage of preamp, with 100K plate resistor etc. 1M Volume control (with 4.7n coupling cap) after this stage feeding...

12AT7 in second slot- first section as gain stage with 4.7nF input coupling cap, 100K plate resistor, 1.5k cathode resistor, no cathode bypass cap, second section as cathodyne PI. Master volume (with 4.7n coupling cap) in between the two sections.

EL-84s in ultralinear mode with fixed bias and no feedback. Grids driven by MOSFET source followers.

275V B+ for everything. Heavily filtered with either choke (all supplies taken after choke) or my trademark solid-state regulator.

Steve C.

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From: John Kelley Brown (kelbrown@cisco.com)			
Date: 3/12/2001 6:02 PM			
Subject: Re: Lemme see...			

Ok, I bite, what's your "trademark solid-state regulator"?
Kelley

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From: Stephen Conner (steve@esru.strath.ac.uk)			
Date: 3/13/2001 12:40 PM			
Subject: Re: Lemme see...			

what's your "trademark solid-state regulator"?

It's a do-hickey I designed for my Toaster 50-watt amp. I was going to build it with no feedback so I wanted every trace of hum removed from the B+. Also, with the PT I had the B+ was too high (550V) so I had some volts to play with. In the end, I used quite a lot of feedback (I didn't like the tone with none) but the regulator stayed.

Here is the schematic

<http://homepages.strath.ac.uk/~cnp111/psu.html>

When I get round to it, I'm going to design a new version with a wider range of adjustment and a tracking bias supply, so I can try some KO'C style power scaling. I'm going to try putting an adjustable sag control in too.

steve C.

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From: Ray Ivers (RAGEray@aol.com)
Date: 3/12/2001 5:50 PM
Subject: Re: The EL84 Amp Design Challenge

12AX7 long-tail - 12AX7 diff amp - 1/2 (2) 6GW8 triode CF drivers - 1/2 (2) 6GW8 pentode/UL output stage.

I know you said using EL84 outputs, but I just wanted to throw it in FWIW (didn't want to sacrifice any gain to use a CF driver stage!). Antique's got the 6GW8's, which apparently sub to an ECL86.

This design will not have mega-gain, but it should also lack the slightest trace of harshness, with very low noise levels and a smooth overdrive character. It could easily be built using EL84's, but not within the 'Design Challenge' parameters; another 9-pin dual triode would be needed.

Ray Ivers

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From: Ted Pimm (tpimm@golden.net)
Date: 3/12/2001 9:47 PM
Subject: Re: The EL84 Amp Design Challenge

Im just building the 1xEF86 and 2x6GW8 amp.

For the EF86 I have

220k plate load
1500 ohm cathode
switchable cathode bypass caps - none, 2uf, 33uf.

Switchable 0.005uf and 0.047uf coupling cap to a 500k volume pot and 1M tone cut with an 0.02uf to ground - this switchable cap doesnt seem to make too much difference.

PI are the two triodes of the 6GW8s set up as in the Matchless Spitfire - 100k plate loads, shared 1200ohm cathode resistor to the 1M, 1M, 47K, 0.01uf cathode circuit.

Output section - 294V on plates, 275V on screens into a 10k load OT (125E). 160 ohm cathode resistor, and 63uf cathode bypass. No neg feedback. Dissipating about 6.5W per tube at idle.

Its been a lot of work to tweak this design, but its finally sounding nice.

Ted.

Ive ordered some more 6GW8s to try. The ones I have are Tungstram.

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From: Ray Ivers (RAGEray@aol.com)

Date: 3/12/2001 10:47 PM

Subject: Re: The EL84 Amp Design Challenge

Ted,

That's a nice, simple circuit, and IMO the less number of gain stages that will get you the desired amount of overdrive, the better.

Audio Gadgets tells me that the .005 uF cap will have about a 45 Hz rolloff in this circuit, and the .047 uF will go down to 4.7 Hz; you might want to try an .001 instead of the .047 and see what happens. 😊

Ray
