

High Efficiency Speaker Asylum

Need speakers that can rock with just one watt? You found da place.

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RESIST-'ORS' NO MORE!!!

174.97.206.112

Posted on February 8, 2016 at 09:52:41

[Synthsayer](#)
Audiophile

Posts: 113
Location: Lexington, KY
Joined: December 20, 2009

After hooking up the Crites Speakers' 3636 Autotransformers I can't believe the improvement in mid and high frequencies. The difference is like night and day. I have used resistors or variable LPads to attenuate driver for many, many years and my speakers have sounded like crap for that long. I would try different tweeters or different caps or coils. I tried different crossover slopes and frequencies. And on, and on, and on... Several years ago I heard about using Crites autotransformers but discounted positive posts like this one. I thought that surely resistors could never be negatively affecting the sound of my speakers that much. WRONG!!! I won't ramble on much further, but I will say that I believe a big improvement in sound quality can be made to almost any speaker that uses resistors or rheostats for HF driver attenuation by modifying them with autotransformers like the ones from Crites Speakers. It took me a long time to finally get the sound of my system right. And, to think it could have been done long ago and with such a simple solution. Now I can listen to my speakers without having to figure out what is wrong with them and how will I fix it. :-)
"Ad Astra Per Alia Porci", - To the stars on the wings of a pig: John Steinbeck

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- [RE: RESIST-'ORS' NO MORE!!! - genungo 09:01:01 02/09/16 \(8\)](#)
- [RE: RESIST-'ORS' NO MORE!!! - BofService 13:15:59 02/09/16 \(7\)](#)
- [RE: RESIST-'ORS' NO MORE!!! - genungo 22:04:40 02/09/16 \(6\)](#)

...

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RE: RESIST-'ORS' NO MORE!!!, posted on February 9, 2016 at 09:01:01

[genungo](#)

Don't these tend to make speakers slightly more difficult-to-drive?

post reply

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RE: RESIST-'ORS' NO MORE!!!, posted on February 9, 2016 at 13:15:59

[BofService](#)
Audiophile

Posts: 740
Location: Atlanta
Joined: February 28, 2003

The autotransformer acts as an impedance multiplier. Guess we need to know what you mean by "more difficult".

post reply

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RE: RESIST-'ORS' NO MORE!!!, posted on February 9, 2016 at 22:04:40

[genungo](#)

Long ago, I remember reading a review of Klipsch Forte speakers. The reviewer stated that, because of the auto-formers used in the crossover, the speakers required an amp with good current delivery - despite the high sensitivity rating of the speaker.

 post reply

Alert

RE: RESIST-'ORS' NO MORE!!!, posted on February 13, 2016 at 00:20:26

[drlowmu](#)
Manufacturer

Posts: 9706
Location: East of Kansas City
Joined: January 10, 2005

I think there is low hanging fruit that will improve ANY Klipsch or ALTEC speaker, and that is really GOOD internal (and external) speaker wiring, from the amp. One can greatly improve transfer efficiency by doing a superb job on wiring.

On my ALTEC 515Bs, from the crossover to the driver, I run two runs of Mil Spec 12 AWG (copper stranded, silver plated, teflon jacket) to EACH terminal, so it is two runs to the woofer positive terminal, and two runs to the woofer negative terminal, effectively 9 AWG, and the music's presentation becomes " a whole new ball game ! "

I would be concerned over the wiring WAY before the difference of an autoformer versus a resistive pad. Get the wire optimized as the priority, and also, I find speaker wire terminations must be VERY TIGHT to transfer energy properly.

Have fun, enjoy.

Jeff Medwin

 post reply

Alert

RE: RESIST-'ORS' NO MORE!!!, posted on February 14, 2016 at 10:21:32

[Synthsayer](#)
Audiophile

Posts: 113
Location: Lexington, KY
Joined: December 20, 2009

Thank you, Jeff!

I think you may know my old buddy John in Lexington, KY from other forums.

He was telling me about your Fulton Loudspeaker knowledge, I think? I had a pair of them years ago.

re your post:

I removed the pretty banana plugs on some fat 10 ga. AR wire and used bare wire for connecting to amp and speakers.

There is a very noticeable improvement in stereo balance, imaging, and detail.

The amp sounds way better to me, overall.

Thanks again!

"Ad Astra Per Alia Porci", - To the stars on the wings of a pig: John Steinbeck

 post reply

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RE: RESIST-'ORS' NO MORE!!!, posted on February 13, 2016 at 07:37:56

[kyle](#)
Audiophile

Posts: 1461
Location: London Ontario
Joined: September 29, 1999

Hi Jeff.

How do you connect that much wire to the small connector opening on the 515B?

It would be even more difficult on newer Altec drivers with the pushbutton spring connectors.

 post reply

Alert

RE: RESIST-'ORS' NO MORE!!!, posted on February 13, 2016 at 08:19:59

[drlowmu](#)
Manufacturer

Posts: 9706
Location: East of Kansas City
Joined: January 10, 2005

Hello Kyle,

Right now, I have a Thomas and Betts (copper, plated with nickle or something looking like that) 10-12 AWG SPADE lugs, at the speaker terminal end. I can fit ONE of the two spade prongs into the stock 515B terminal's hole, and I tighten it down with final tightening done CAREFULLY tight with a pair of serrated jaw pliers. ONE spade prong fits into the stock terminal !!

There is a HUGE difference on control of the loudspeaker, by my 1.5 Watt Type 45 amp, depending upon how TIGHT I torque my triple 12 AWG speaker cables, to the 515B , at BOTH the crossover side and the amp sides' terminal block (aircraft terminal strip) being used.

The nuts " back - off after 30 minutes !! So....

I double-nutted each terminal connection, and yet, the nuts STILL back off and the speaker loses definition and control and the ULTIMATE dynamic contrasting possible, versus me having the nuts SUPER TIGHT with by using a 3/8ths inch ratchet drive.

I have been A-B ing this for three weeks now. Don't have a solution yet. My speaker spade lugs are the N.L.A. XLO brand 1/4 inch spades, very dynamic sounding spade lug !!

At the 515B speaker side, I am THINKING of soldering the double 12 AWG runs to each terminal, DIRECTLY onto the stock metal tab (on the other end of the terminal connection - inside the basket) while using hemostats, etc as heat sinks - so as not to melt the voice coil wire. This way, I can eliminate the terminal screw-on interface, and have it all soldered. Would tie wrap the double 12s to the basket for strain relief !!

This approach of eliminating the speaker terminal connection / interface works great on the ALTEC 802 high frequency driver I have been told by Dennis Fraker. In all cases, I use Wonder Solder.

Jeff Medwin

 post reply

 Alert

RE: RESIST-'ORS' NO MORE!!!, posted on February 14, 2016 at 19:31:10

[kyle](#)
Audiophile

Posts: 1461
Location: London Ontario
Joined: September 29, 1999

I have no idea about the effect of multi heavy guage wire but I have experimented with soldering connections and I found that every mechanical connection I replaced with continuous direct wiring and soldered connections improved the detail and sound staging - subjectively. I don't have anything that would measure that kind of difference but it worked and aside from the inconvenience made a big improvement for me.

 post reply

 Alert

Thank YOU !!!, posted on February 15, 2016 at 08:41:52

[drlowmu](#)
Manufacturer

Posts: 9706
Location: East of Kansas City
Joined: January 10, 2005

Just what I needed to hear Kyle. Appreciated.

Jeff

 post reply

 Alert

Fostex r100t, posted on February 9, 2016 at 06:11:03

[Kloss](#)

Wonderful things been using in projects for about 15 years. Easy 1db adjustment.

- <https://www.madisoundspeakerstore.com/l-pads-attenuators/fos>

 post reply

 Alert

RE: Fostex r100t, posted on February 9, 2016 at 08:48:52

[Inmate51](#)
Audiophile

Posts: 12478
Location: Dallas Area
Joined: July 6, 2005

Editing one last time (hopefully), due to forum design shortcomings.

Original message:

I suppose that's a good suggestion. The only issue is that we can hear differences as small as 1/10th of a dB. So, 1 dB st application.

Just wanted to point that out.

P.S.: I'll post this as soon as the pop-up ad at the bottom of the screen goes away so that I can see the "post" button. Grr

P.P.S. : I have no idea what will show up for this post, but, I'll know shortly. :(

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Fostex r100t - Kloss - High Ef... x +

www.audioasylum.com/forums/hug/messages/17/175005.html#postfp

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Subject: RE: Fostex r100t

Message: (Posts are subject to [Content Rules](#))

I suppose that's a good suggestion. The only issue is that we can hear differences as small as 1/10th of a dB. So, 1 dB steps may be too coarse for the user's application.

Just wanted to point that out.

P.S.: I'll post this as soon as the pop-up ad at the bottom of the screen goes away so that I can see the "post" button. Grrrr.

:)

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:)

RE: Fostex r100t, posted on February 9, 2016 at 13:14:11

[BofService](#)
Audiophile

Posts: 740
Location: Atlanta
Joined: February 28, 2003

I think if you use the right ad blocker you won't see those annoying things. It might even be malware (try downloading and running MalwareBytes).

G

RE: Fostex r100t, posted on February 9, 2016 at 13:12:59

[djk](#)
Manufacturer

Posts: 6135
Joined: June 17, 2000

I find the levels must match within $\pm 0.25\text{dB}$ to sound anywhere coherent, but I can hear a difference at $\pm 0.1\text{dB}$.

RE: Fostex r100t, posted on February 10, 2016 at 08:13:31

[Kloss](#)

lol

RE: Fostex r100t, posted on February 10, 2016 at 13:36:39

[djk](#)
Manufacturer

Posts: 6135
Joined: June 17, 2000

Yes, my friends were laughing too, until I demonstrated it (and they had borrowed my 1/2" B&K for their measurements).

What levels can you resolve?

(the steeper the crossover, the closer the level match need be)

 post reply

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RE: Fostex r100t, posted on February 10, 2016 at 13:55:10

[Kloss](#)

I can speak to the animals they ignore me but they know.

 post reply

Alert

RE: Fostex r100t, posted on February 10, 2016 at 19:43:28

[djk](#)
Manufacturer

Posts: 6135
Joined: June 17, 2000

Are you trying to be offensive?

 post reply

Alert

Are you suggesting that he's not able to achieve his goals?, posted on February 10, 2016 at 19:48:50

[kyle](#)
Audiophile

Posts: 1461
Location: London Ontario
Joined: September 29, 1999

nt

 post reply

Alert

How shall these babies be connected (schematic please), posted on February 8, 2016 at 23:43:29

[pix](#)
Audiophile

Posts: 398
Location: sweden
Joined: March 18, 2006

Any information (schematic) how these autoformers shall be connected?

I am currently using the Bi-amp route, but would like to pad down my mid/hi about 11dB (112dB/101dB) (based on the driver sensitivity) for a single amp system.

 post reply

Alert

Follow up on my previous post..., posted on February 9, 2016 at 00:08:13

[pix](#)
Audiophile

Posts: 398
Location: sweden
Joined: March 18, 2006

What properties does these autoformers have, besides the winding ratio?

Inductance?
Frequency range?
Power handling?
etc..

 post reply

Alert

RE: Follow up on my previous post..., posted on February 9, 2016 at 13:12:49

[BofService](#)
Audiophile

Posts: 740
Location: Atlanta
Joined: February 28, 2003

I think you are right pix, surely all those things apply. I think Bob represents them as "Better than what Klipsch supplied", but I don't know the specs of the Klipsch units either. Here is a doc showing how to wire the 3636 for different levels of attenuation: <http://www.critesspeakers.com/3636atz.pdf>

I have a pair on order too.

G

- <http://www.critesspeakers.com/3636atz.pdf>

 post reply

Alert

RE: Follow up on my previous post..., posted on February 9, 2016 at 13:16:18

[djk](#)
Manufacturer

Posts: 6135
Joined: June 17, 2000

The stock T2A I measured was about 35mH from top to bottom (spec is 40mH), the universal replacement is similar.

(I own a pair of the Crites units)

 post reply

 Alert

Can I wind an optimized x-former for my needs?, posted on February 9, 2016 at 23:55:55

[pix](#)
Audiophile

Posts: 398
Location: sweden
Joined: March 18, 2006

I assume the autoformer shall be connected after the x-over, hence it could be optimized depending on the x-over frequency.

I need to lower my mid/hi horn from 112dB to 101dB = 11dB which calls for a winding-ratio of 3,5 : 1 (step down)

My x-over point is 350Hz where an 4mH choke would load the amplifier with 8,8 Ohms (driver load not included yet)

The Windingratio of 3,5 : 1 call for a impedansratio of 12,25 : 1, which would mirror the 8 Ohm driver as a 98 Ohm load

But since the 8 Ohm load is 1/3,5 down the total load seen from the amplifier is 6,6 + 2,2 (parallell to) 98 = 8,56 Ohm

Result:
A 4mH winding with an 1 : 3,5 tap

Right or wrong?

 post reply

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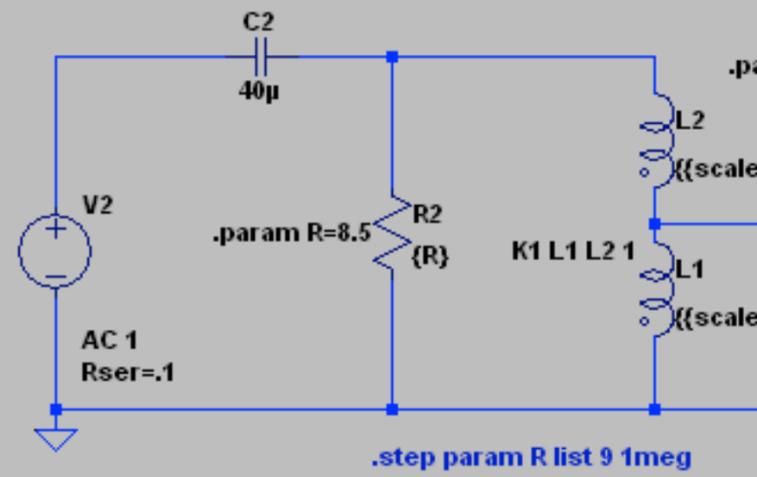
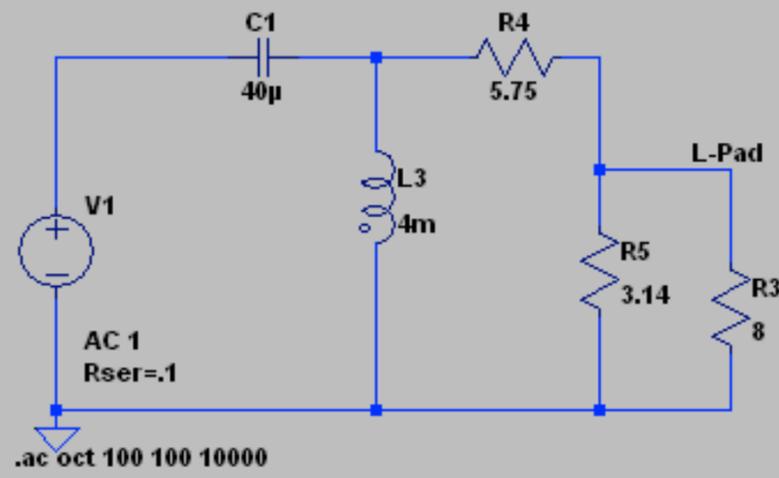
RE: Can I wind an optimized x-former for my needs?, posted on February 10, 2016 at 08:20:26

[dave slagle](#)
Manufacturer

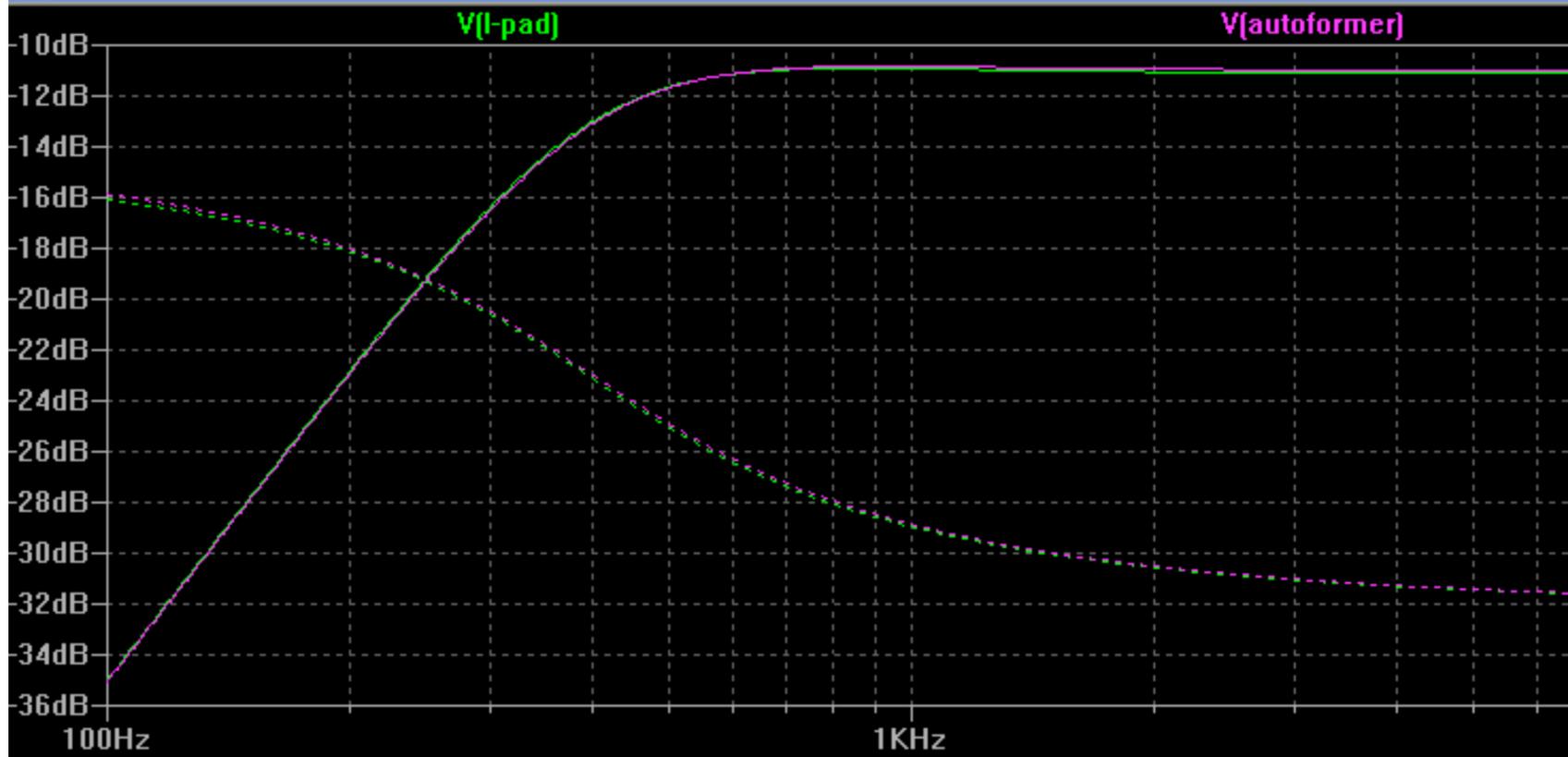
Posts: 5046
Location: NYC
Joined: April 27, 2001

Hey,

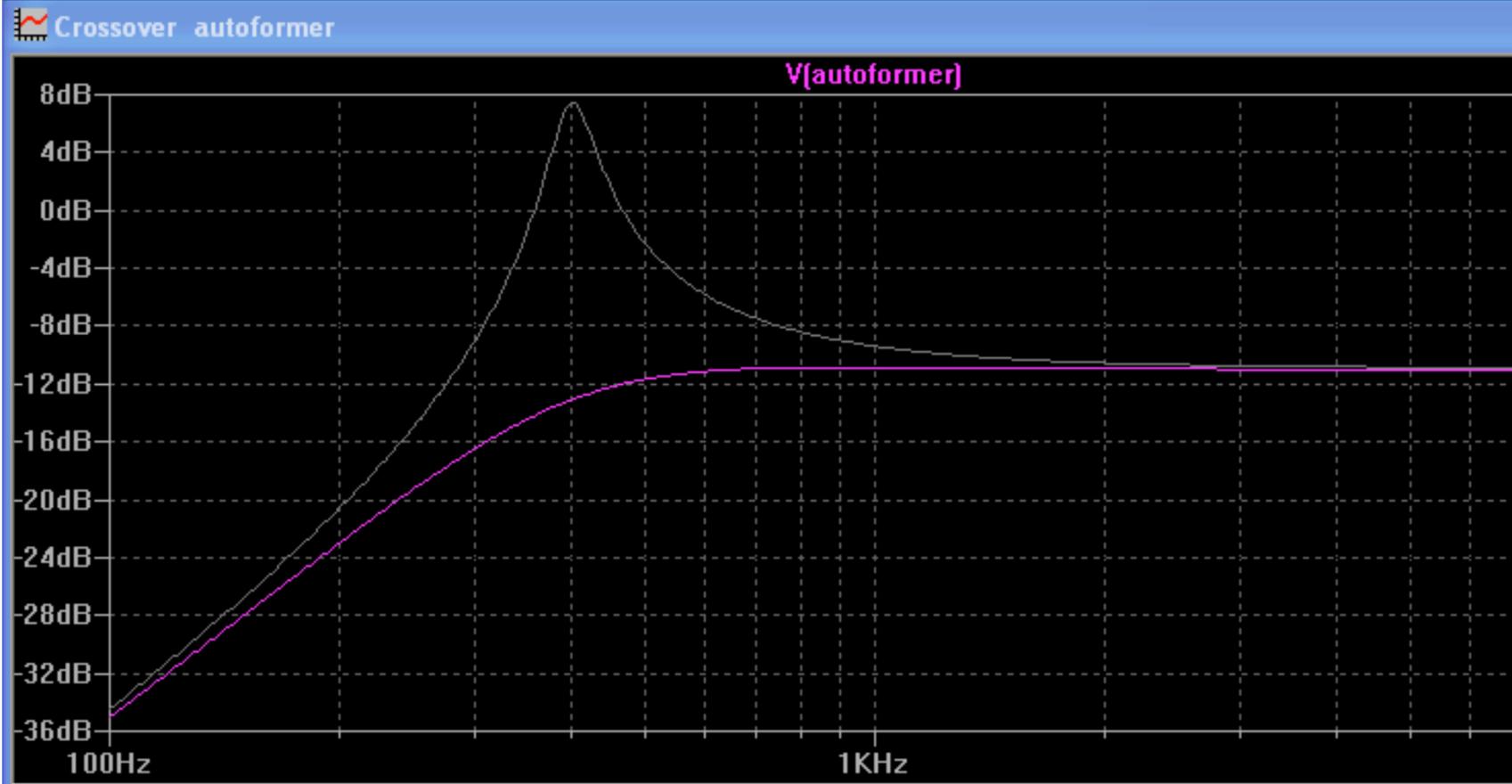
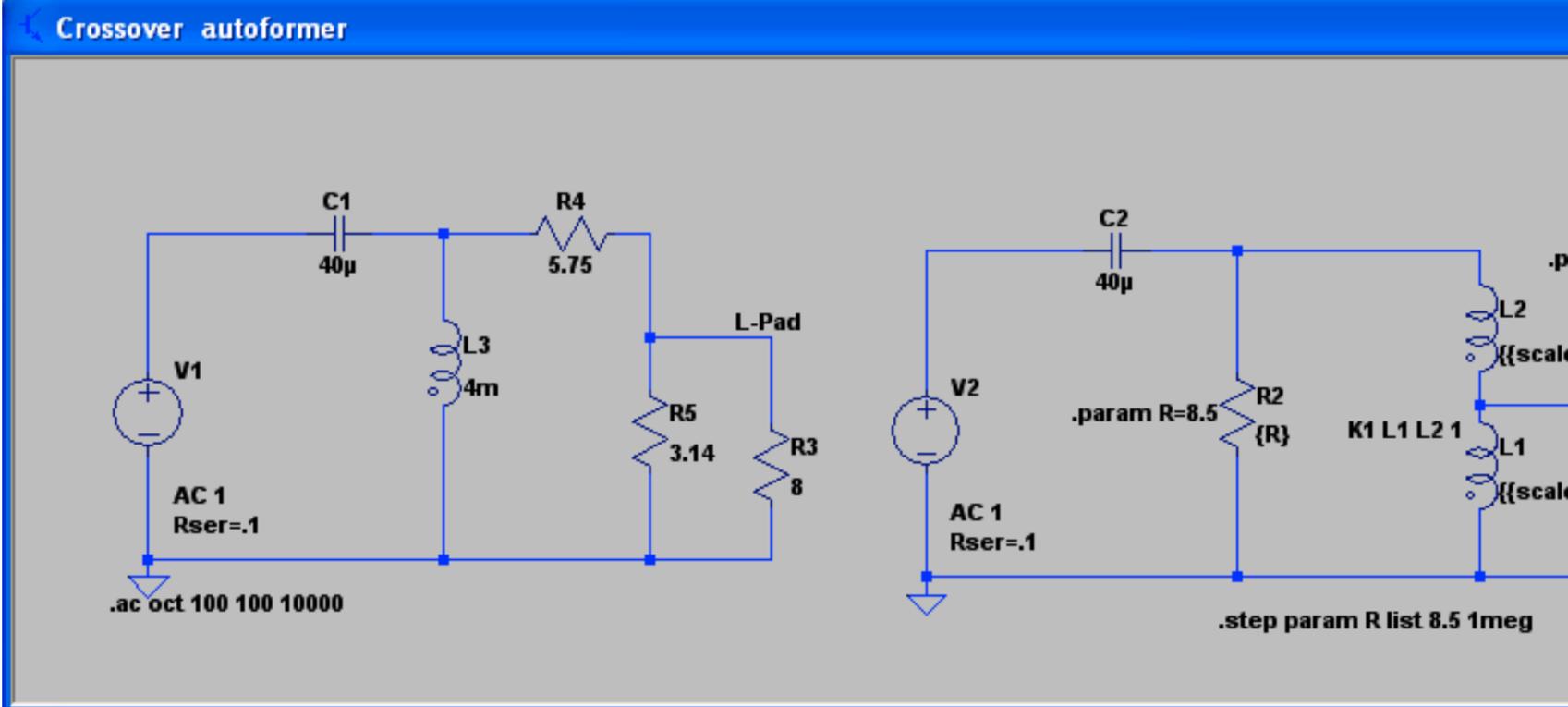
The short answer is Yes... However there is a 600 pound gorilla in the corner is begging for some attention. Here is showing that the behavior with an autoformer can be made to behave the same as an L-pad.



Crossover autoformer

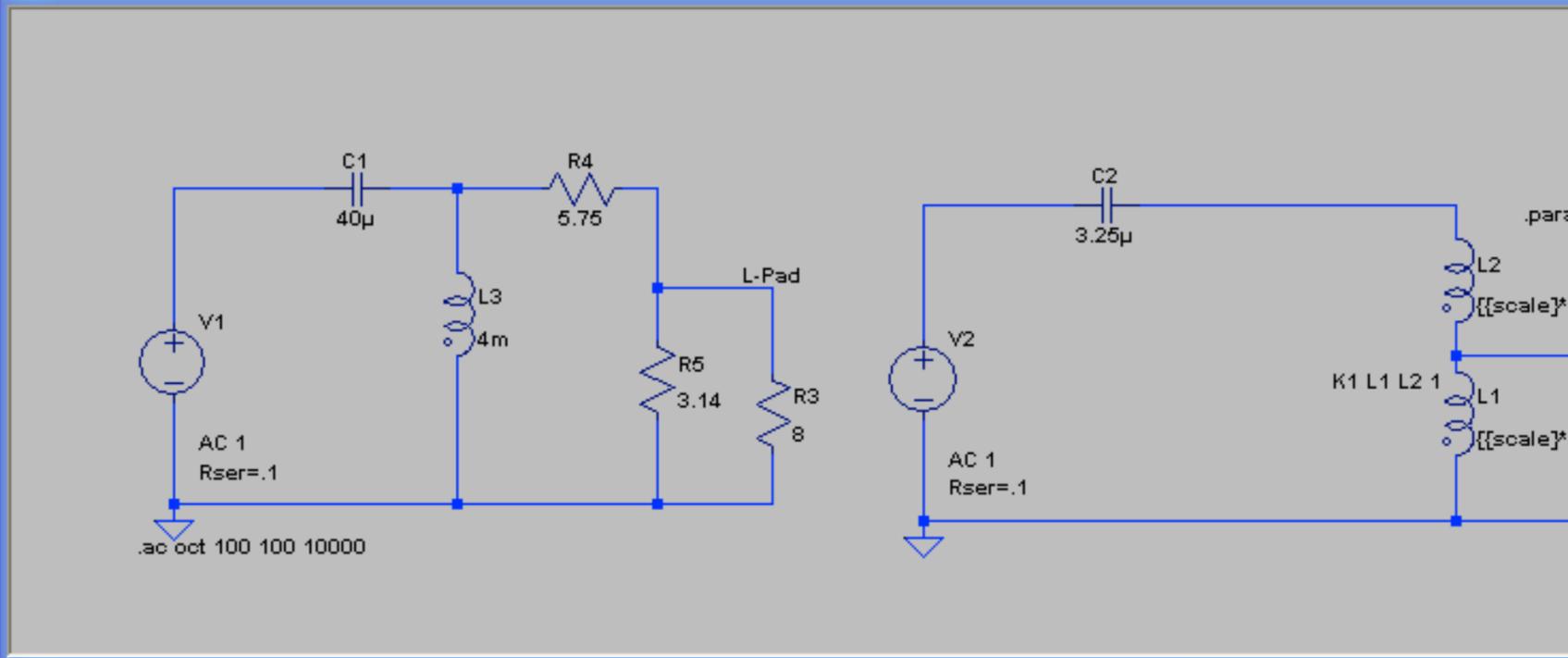


While being rather small the thing that everyone (except fostex) overlooks is the 8.5 ohm R2 in the autoformer exam does two important things and gives some unexpected results if left out. First it sets the crossover impedance and second it sets the CL resonance that all crossovers have. Here is the same simulation run with a value of 8.5 ohms and 1 meg for that meg essentially takes it out of circuit)

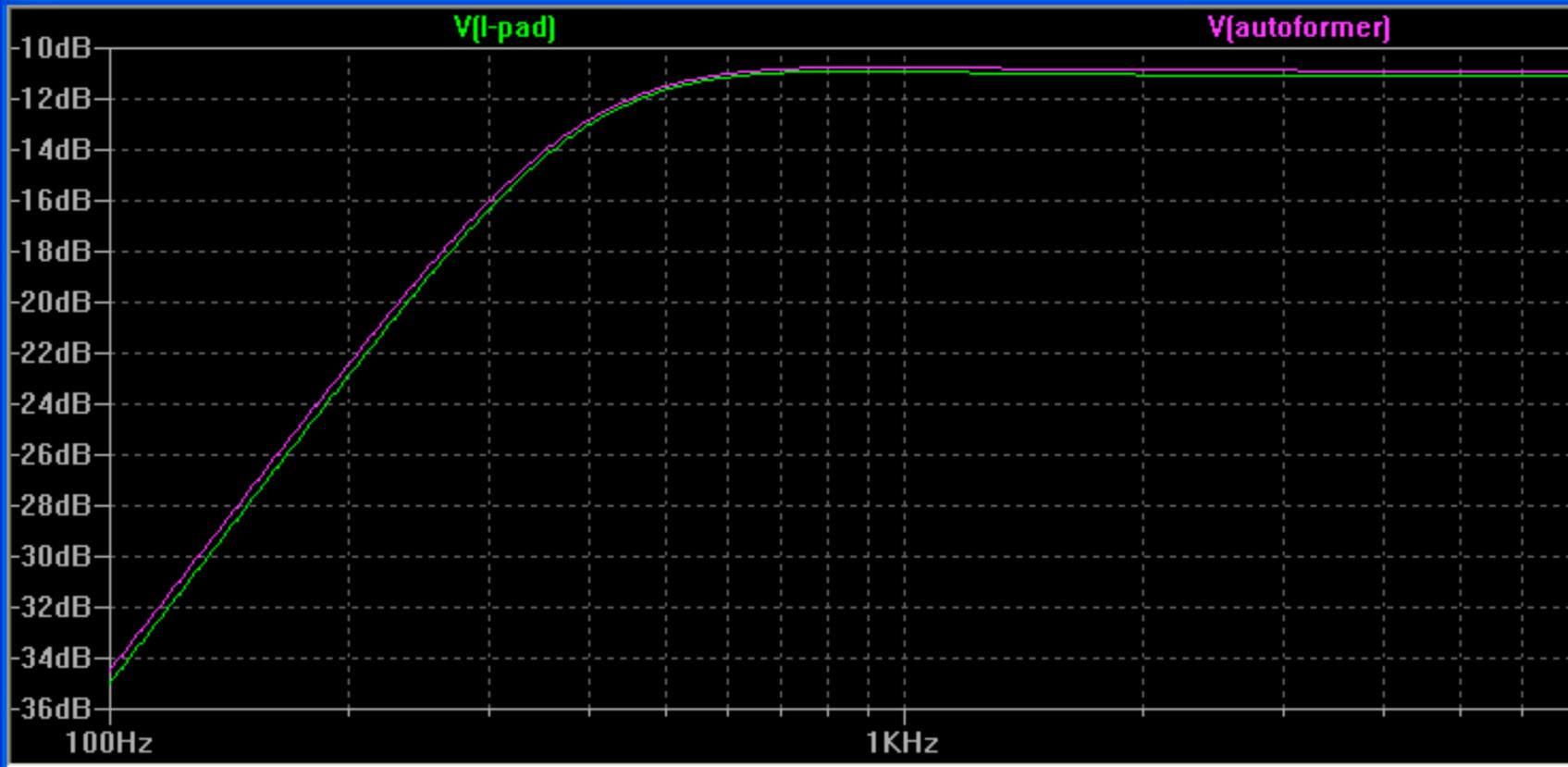


Well the first thought is YIKES... but then you realize that the autoformer is reflecting back a higher impedance than the driver presents so of course the crossover needs to change. So Lets change the crossover values for the 100ish ohm impedance and see what happens.

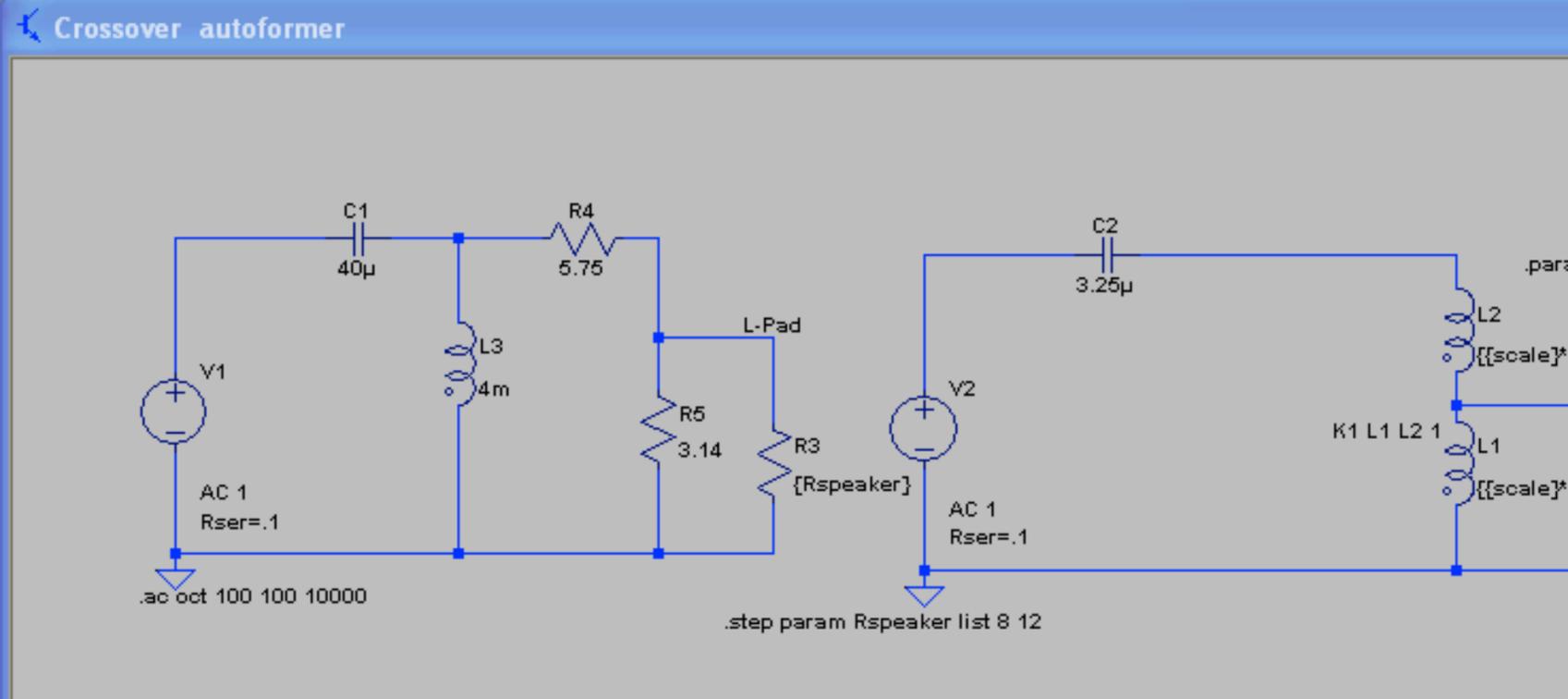
Crossover autoformer



Crossover autoformer



OK now we are back in business except for one small problem and that is the non-linear impedance curve of a driver. An 8 ohm drive starts to increase in impedance as frequency goes down and is actually 12 ohms in the crossover. The L-pad handles this nicely but the autoformer "magnifies" the impedance change and that nasty LC resonance starts to appear.



This was just a simple "first cut" at some of the things autoformers do that typically get ignored and the moral of this is to remember to use a damping resistor across the primary to avoid the gremlins that are sure to pop up.

(The people at Fostex knew all of this and if you look inside the T100 you will see a couple of 8 ohm resistors across the primary.)

dave

[post reply](#)

RE: Can I wind an optimized x-former for my needs?, posted on February 10, 2016 at 11:40:55

Synthsayer
Audiophile

Posts: 113
Location: Lexington, KY
Joined: December 20, 2009

Thank you, Dave!
Wow!

I never expected such great responses to my posting.
Your expertise far exceeds my own here, Dave.
Can you simplify things a little bit?

Do I need to add R2 = 8 ohms, and then change my crossover values for the high pass section going through the autotransformer?

I am crossed over at 800Hz 3rd Order into 8ohms.

Could you suggest some values?

If I am reading your posting right, C1 changes from 40uf when using the autotransformer? Plus, I add R2?

Thank you.

"Ad Astra Per Alia Porci", - To the stars on the wings of a pig: John Steinbeck

 post reply

Alert

RE: Can I wind an optimized x-former for my needs?, posted on February 10, 2016 at 12:09:14

[dave slagle](#)
Manufacturer

Posts: 5046
Location: NYC
Joined: April 27, 2001

Do I need to add $R2 = 8\text{ ohms}$, and then change my crossover values for the high pass section going through the autotransformer?

Some value of R2 is needed and the crossover values will remain the same. Typically the value for R2 will be about 10% above the nominal crossover value and all of this should be verified by measurement.

I am crossed over at 800Hz 3rd Order into 8ohms.

how much attenuation and what is your speaker impedance. LTspice is free and easy to learn and a good starting point.

dave

 post reply

Alert

RE: Can I wind an optimized x-former for my needs?, posted on February 10, 2016 at 12:37:44

[Synthsayer](#)
Audiophile

Posts: 113
Location: Lexington, KY
Joined: December 20, 2009

Current HP filter values:

C1 = 15uf

C2 = 56uf

L1 = 1.2mH

4db attenuation w 3636 autotransformer

"Ad Astra Per Alia Porci", - To the stars on the wings of a pig: John Steinbeck

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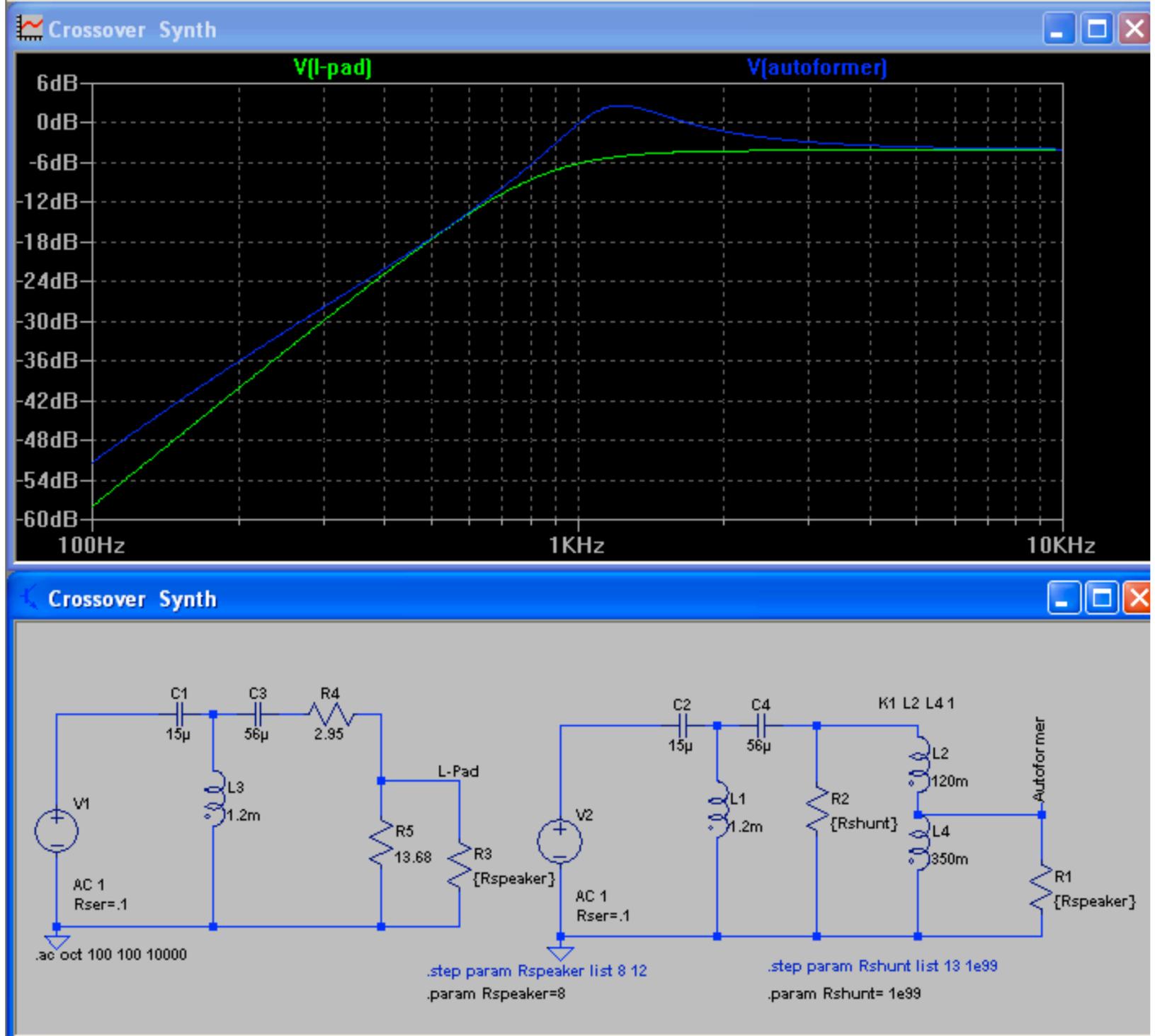
Alert

RE: Can I wind an optimized x-former for my needs?, posted on February 10, 2016 at 13:31:20

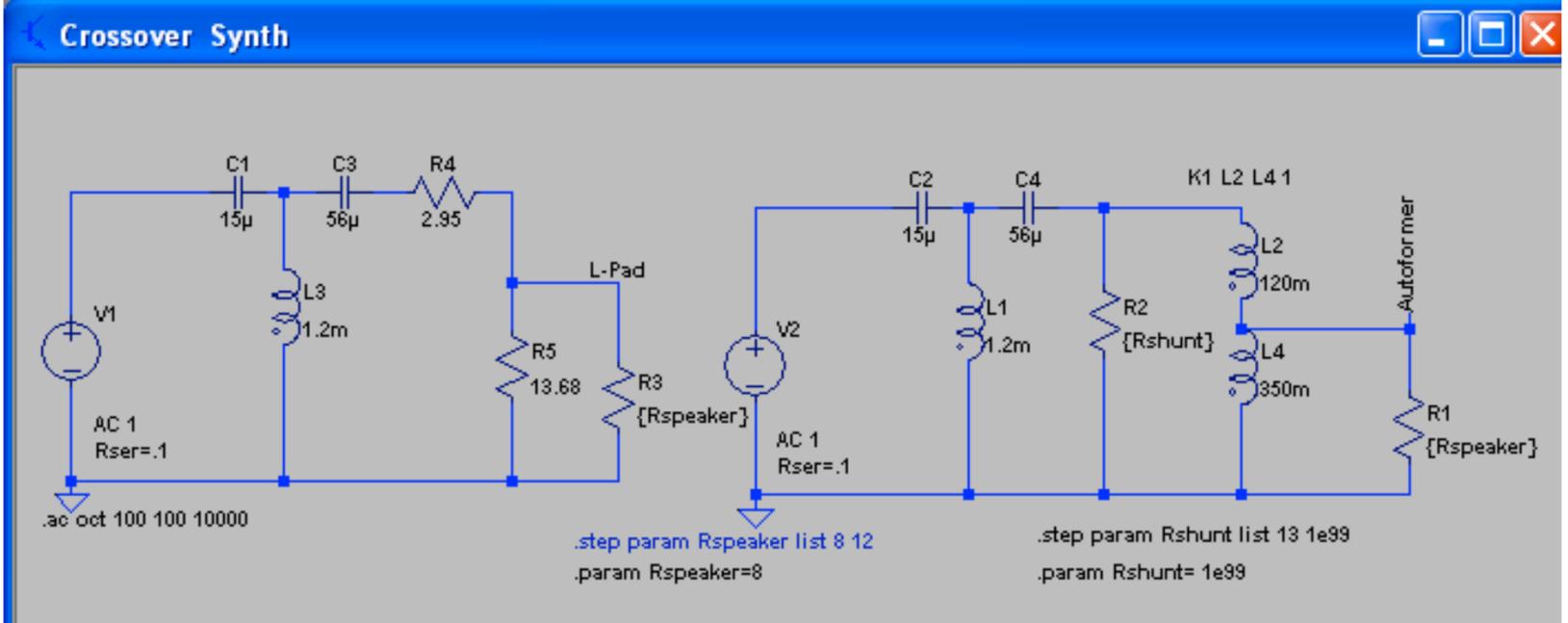
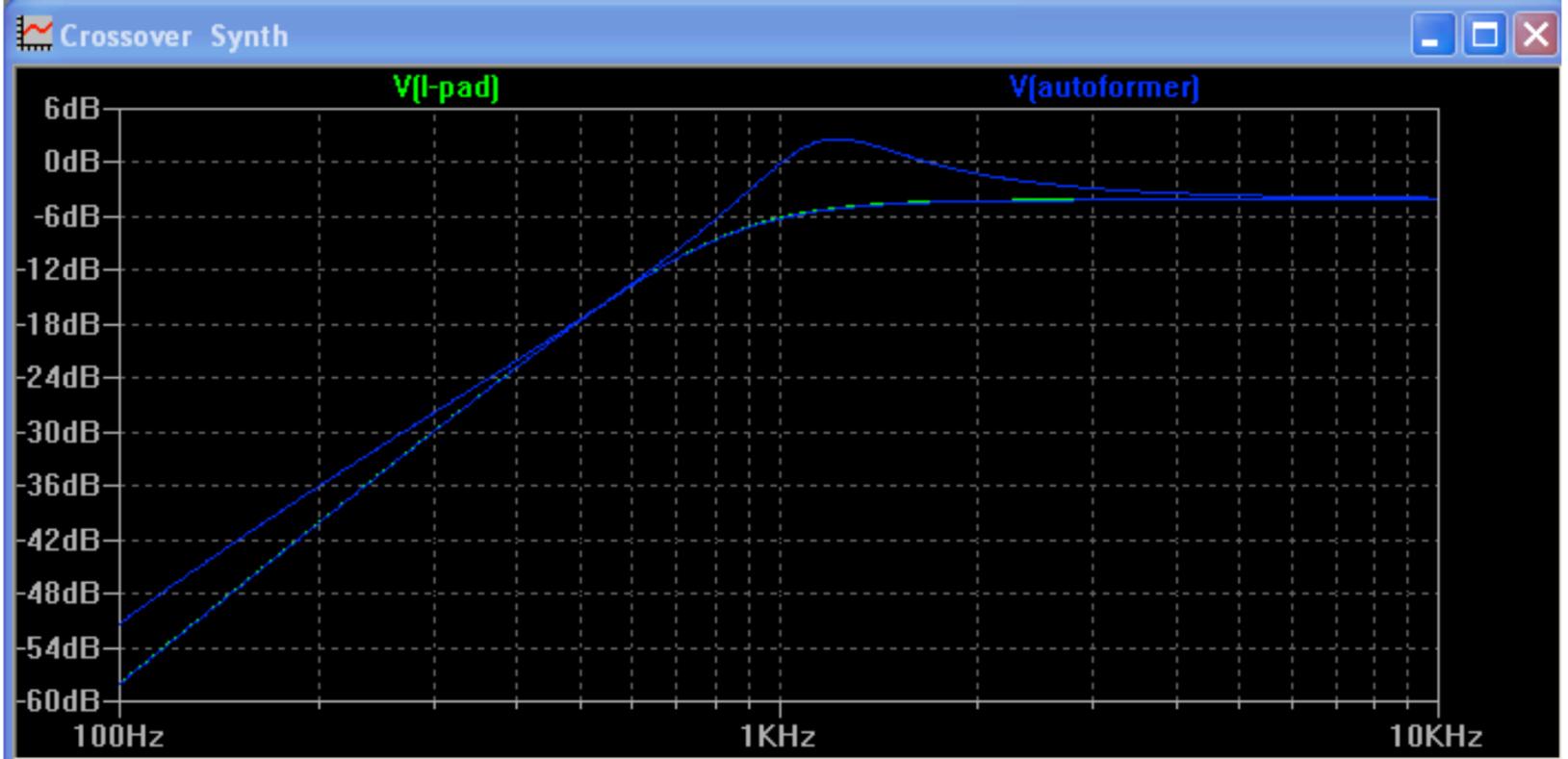
[dave slagle](#)
Manufacturer

Posts: 5046
Location: NYC
Joined: April 27, 2001

This is a perfect example of what I was saying. Here is the simulation of your crossover by simply replacing a 4dB pad with a 4dB autoformer.



The underdamped LC resonance gives a 4 dB bump at the crossover frequency which will definitely change the sound. Simply changing the value of the shunt resistor from 1E99 to 13 brings the response back to match the L-pad situation. (1E99 is a simple way to take the shunt resistor out of circuit) In the sim below you can see the autoformer response with and without the shunt resistor compared to the L-pad.



The LT spice file is at the link below. Simply download LTspice and run it to get playing.

dave

- [Lt spice file](#)

post reply

Alert

RE: Can I wind an optimized x-former for my needs?, posted on February 13, 2016 at 12:30:59

Synthsayer
Audiophile

Posts: 113
Location: Lexington, KY
Joined: December 20, 2009

I went back through these graphs.

It is very likely the mid voice coil was already going bad.
"Ad Astra Per Alia Porci", - To the stars on the wings of a pig: John Steinbeck

post reply

Alert

RE: Can I wind an optimized x-former for my needs?, posted on February 13, 2016 at 12:22:06

Synthsayer
Audiophile

Posts: 113
Location: Lexington, KY
Joined: December 20, 2009

Thank you again for all of the great help, Dave.
I can't thank you enough!

Here is another possibly very important thing. Could you answer this?

One of my EV DH1/D1012A mid diaphragms went bad and I haven't played the system very loud. Luckily, I still had a really old replacement to use.
Ugh.
I have had trouble from this one rubbing before so maybe it was ready to go bad.
BTW I am using the autotransformers in a DIY high efficiency system, not as mods to Klipsch or others.

When I hooked up the autotransformer without changing my high pass crossover values or using a shunt resistor, was the crossover point shifted down due to the resulting impedance change?

Maybe to a point unsafe for the voice coil?

Thanks again.

Tom Purdon

"Ad Astra Per Alia Porci", - To the stars on the wings of a pig: John Steinbeck

post reply

Alert

RE: Can I wind an optimized x-former for my needs?, posted on February 10, 2016 at 15:09:22

**[Synthsayer](#)
Audiophile**

Posts: 113
Location: Lexington, KY
Joined: December 20, 2009

There is a noticeable difference after adding $R2 = 13$ ohms. If this is normalizing the impedance seen by the filter, then isn't the overall system impedance seen by the amp improved?

Adding the appropriate valued shunt resistor for the amount of cut in db seems like a valid idea. Doing so seems to have smoothed out a hump just above the 800Hz crossover point that I have to admit not noticing very much until it was gone.

"Ad Astra Per Alia Porci", - To the stars on the wings of a pig: John Steinbeck

post reply

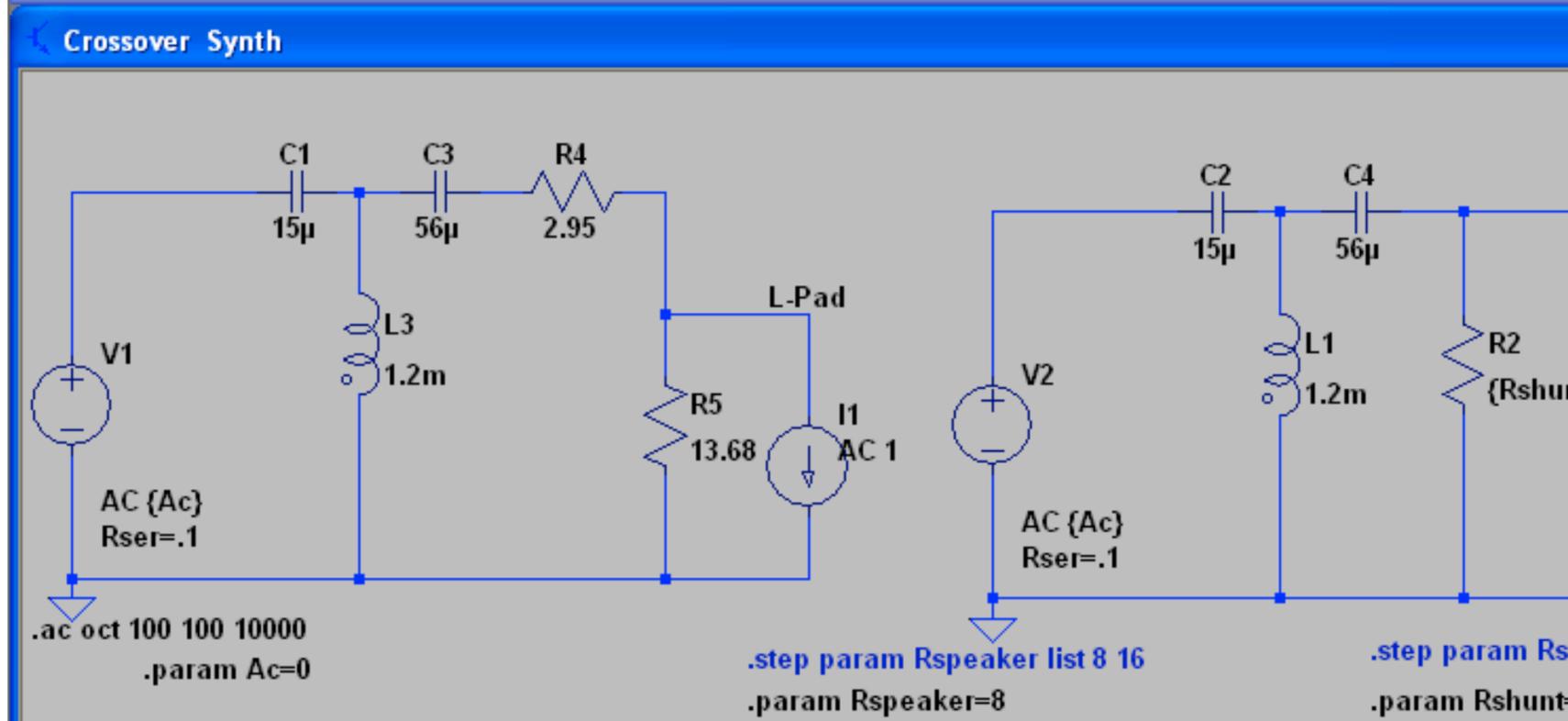
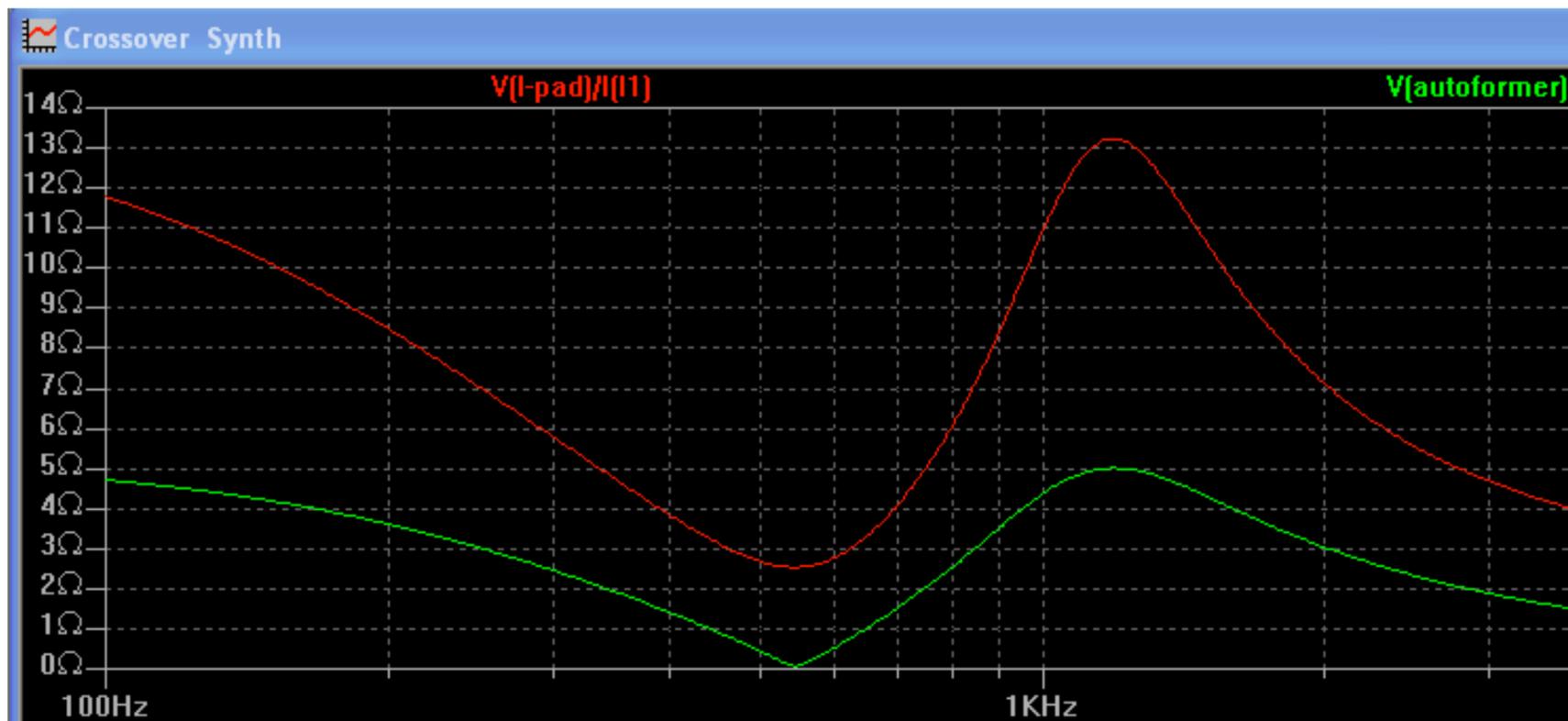
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RE: Can I wind an optimized x-former for my needs?, posted on February 10, 2016 at 19:46:11

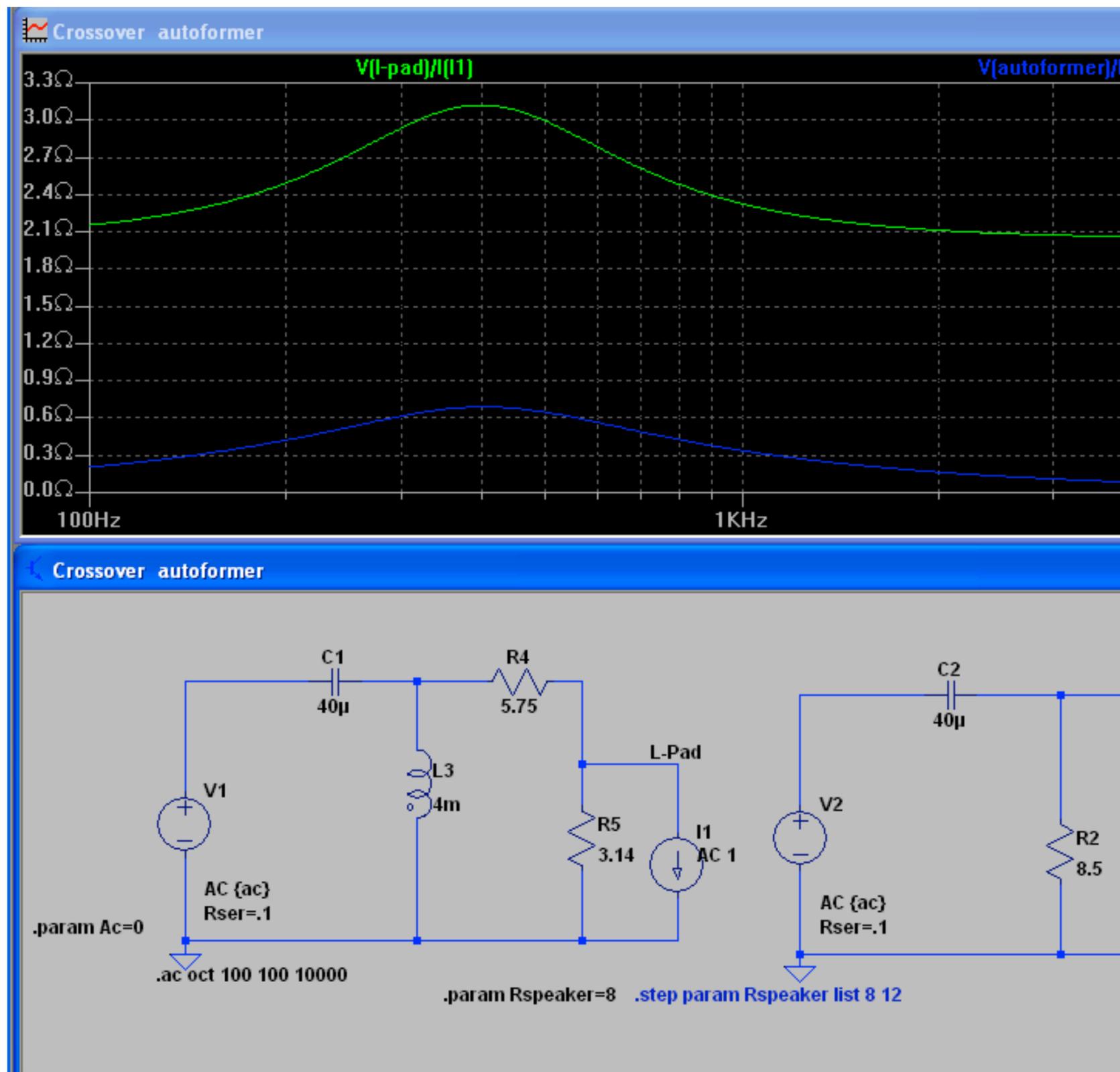
**[dave slagle](#)
Manufacturer**

Posts: 5046
Location: NYC
Joined: April 27, 2001

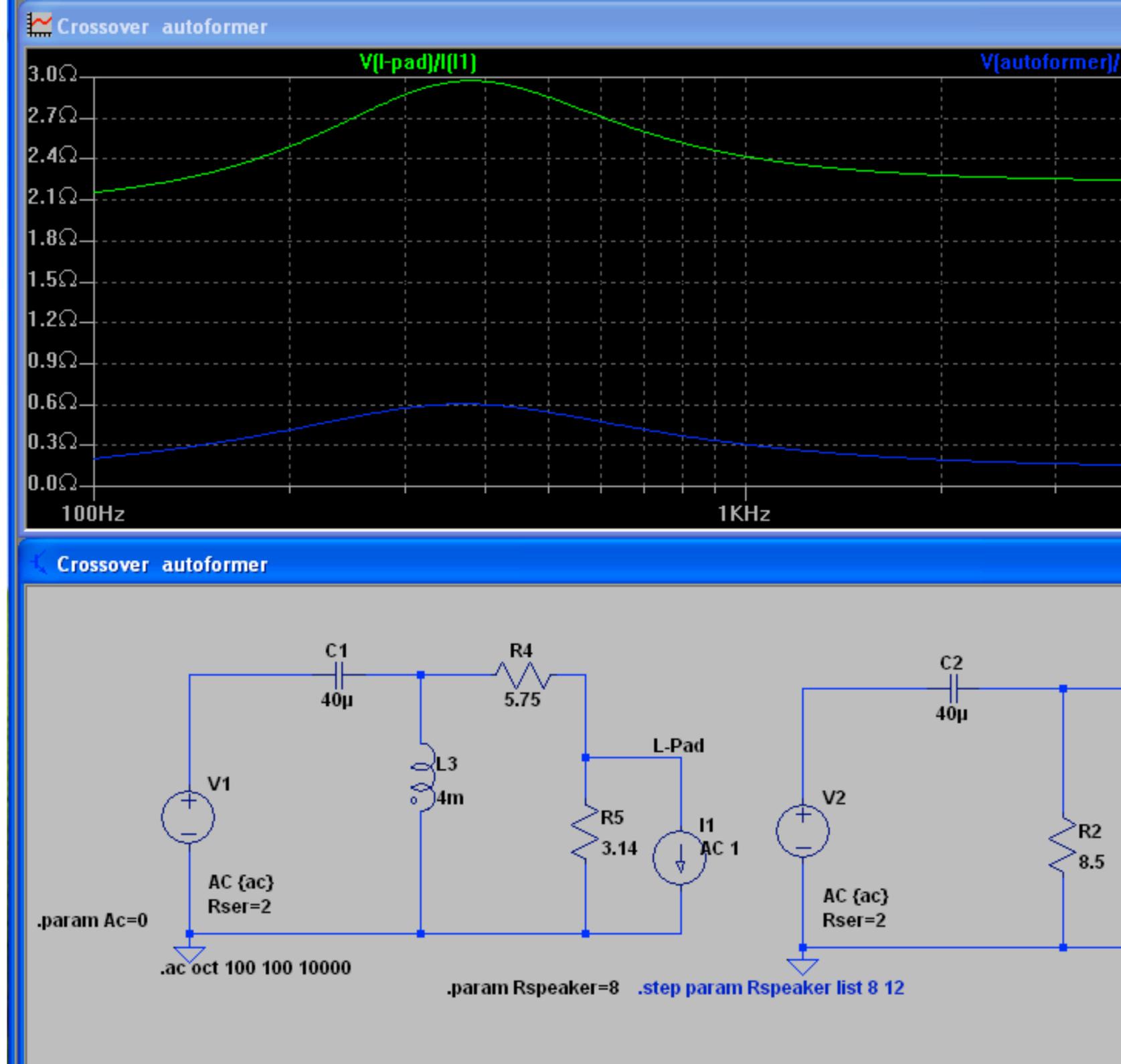
The load presented to the amp in both situations is the same however the source impedance driving the speaker is different. It always bothered me how people rant about needing a low source impedance to drive a speaker and in your case it isn't too bad since you only needed 4dB of attenuation and the results are below.



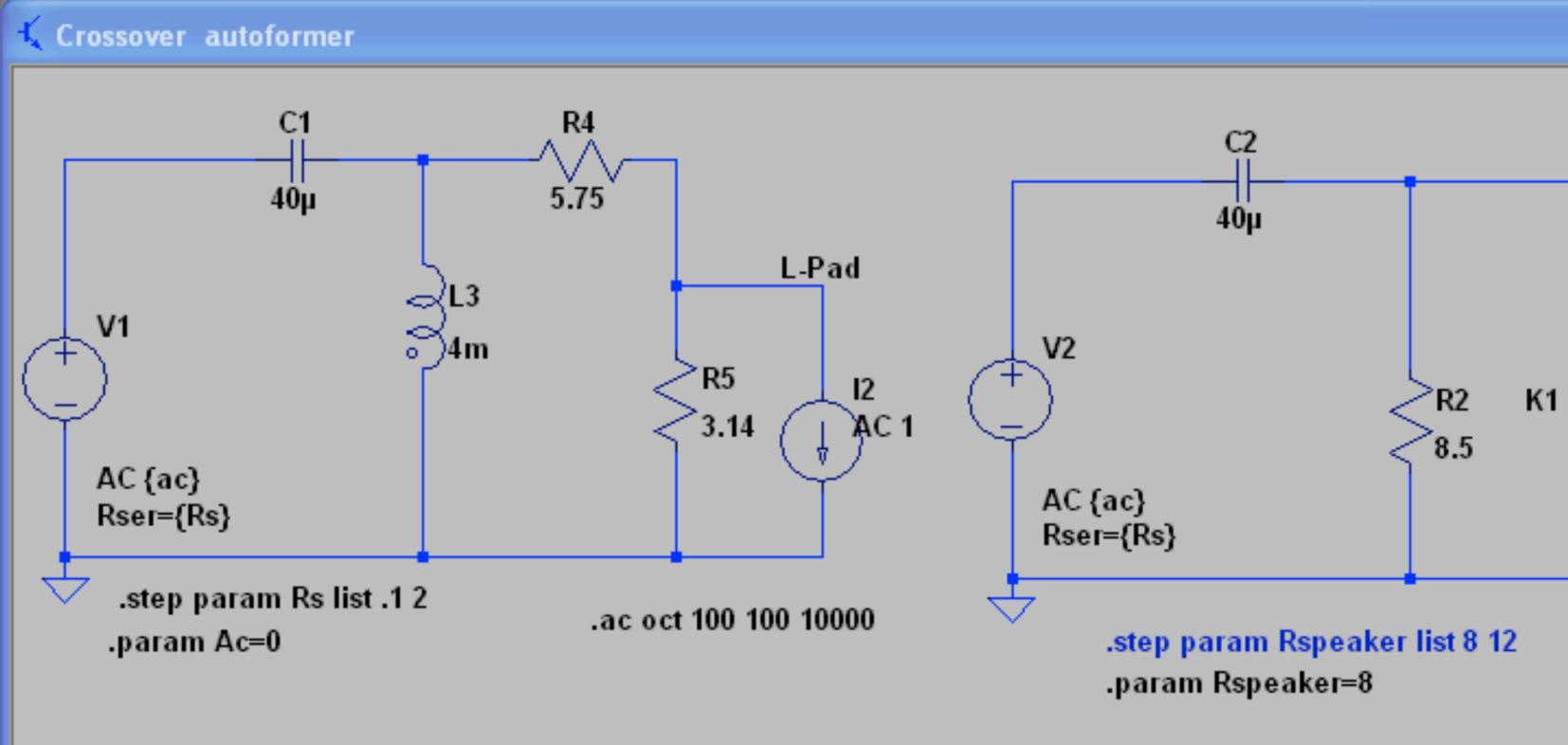
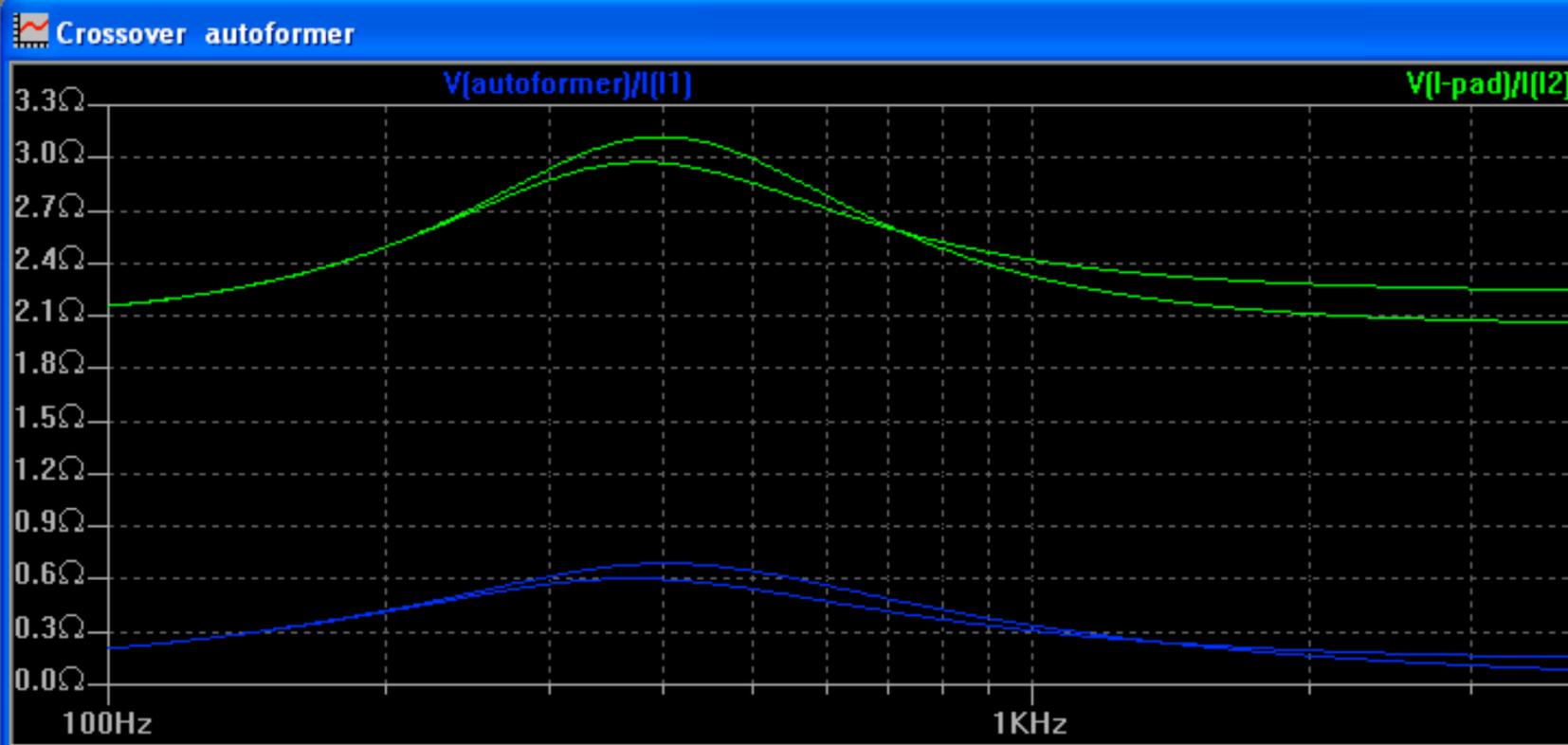
However if we go to the case where the pad is taking a driver down 12dB it becomes a bit more clear what the auto



Note that the source impedance of the amp in this case is 1/10th of an ohm yet the speaker is being driven by 2-3 ohms, which is significantly higher than in the autoformer case. I'm not suggesting that it is always a good thing to drive a speaker with a low source Z but for fun let's assume we are driving this crossover from one of those antiquated tube amps with a 2 ohm output Z and



not much change... lets look at both values on the same plot and it becomes clear that the output impedance of an ar factor of a driver.



I find it kind of comforting that even with a high output Z of a tube amp that an autoformer can still feed the driver.
dave

[post reply](#)

RE: Can I wind an optimized x-former for my needs?, posted on February 11, 2016 at 05:26:13

[Synthsayer](#)
Audiophile

Posts: 113
Location: Lexington, KY
Joined: December 20, 2009

My mind is totally blown.
That is amazing, Dave!
Thank you, again for all the help.
"Ad Astra Per Alia Porci", - To the stars on the wings of a pig: John Steinbeck

[post reply](#)

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RE: Can I wind an optimized x-former for my needs?, posted on February 10, 2016 at 13:57:25

[Synthsayer](#)
Audiophile

Posts: 113
Location: Lexington, KY
Joined: December 20, 2009

Thank you, Dave!!!!

I am heating up my soldering iron and getting out my bin of resistors.

13 ohm pad. Is that right?

Thanks for the link too. I will experiment with it and see if I can figure it out.

Thanks a million, Dave!

All the best!
"Ad Astra Per Alia Porci", - To the stars on the wings of a pig: John Steinbeck

 post reply

Alert

RE: Can I wind an optimized x-former for my needs?, posted on February 10, 2016 at 16:35:24

[thermionic addictions](#)
Audiophile

Posts: 863
Joined: June 16, 2006

There are numerous how to videos on youtube on how to use ltspice I know because I needed help myself.

Cal

 post reply

Alert

RE: Can I wind an optimized x-former for my needs?, posted on February 10, 2016 at 12:15:54

[Synthsayer](#)
Audiophile

Posts: 113
Location: Lexington, KY
Joined: December 20, 2009

Thank you, Dave.

4db of attenuation.

Does adding R2 negate the need to change high pass crossover values?
"Ad Astra Per Alia Porci", - To the stars on the wings of a pig: John Steinbeck

 post reply

Alert

But values listed are not universally useful, posted on February 8, 2016 at 15:38:40

[Edp](#)
Audiophile

Posts: 3986
Joined: September 23, 1999

I would still think the issue with 4, 8 and 16 ohm having different results for same transformer configuration/hookup.

Plus with only 3, 6, 9, 12 DB values, that is not enough granularity to be a universal fix. 3 to 6 db is where most Lpads / resistors live, but "3 not enough and 6 too much" for unit that needs 4.5db. Possibly other sources exist to support more granularity.

Then again I have limited first hand knowledge of transformers as attenuators, mostly vintage implementations that needed fixed.

 post reply

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RE: Not true, posted on February 8, 2016 at 18:05:59

[claudej1@aol.com](#)
Audiophile

Posts: 439
Location: Detroit
Joined: August 17, 2007

Actually Bob has autoformers that use 1 db steps. Had a few myself refurbishing LaScalas Years ago. before converting to active Klipsch theater woofers, and efficiently matching my drivers and stuff and now all Danley speakers in my HT. Progress.

 post reply

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RE: RESIST-'ORS' NO MORE!!!, posted on February 8, 2016 at 15:20:12

[lugnut 1](#)
Audiophile

Posts: 131
Location: Austin, TX
Joined: September 24, 2011

I'd like to try a pair on the Altec 604-8G's. 2-way , 1500HZ, 12DB low pass, 18DB high pass.

 post reply

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RE: RESIST-'ORS' NO MORE!!!, posted on February 8, 2016 at 10:29:43

[thermionic addictions](#)
Audiophile

Posts: 863
Joined: June 16, 2006

I just got a pair of these in the mail today. I can't wait to try them out. Very nice transformers and Bob is a pleasure to do business with.

Cal

 post reply

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RE: RESIST-'ORS' NO MORE!!!, posted on February 8, 2016 at 13:12:52

[Synthsayer](#)
Audiophile

You are going to be pleased.
I promise!!

Posts: 113
Location: Lexington, KY
Joined: December 20, 2009

"Ad Astra Per Alia Porci", - To the stars on the wings of a pig: John Steinbeck

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RSD 88,436



RSD 43,685



RSD 31

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