Subject: Klipsch KP-3002 Crossover Mods
Posted by tejaus on Fri, 17 Aug 2012 20:38:43 GMT
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Hello,

I have an older pair of Klipsch Professional KP-3002 cabs that I'm trying to mod the crossovers. They're a two way with a 15" 4ohm woofer and Eminence PSD-2002 8ohm mounted on a 60 x 40 Tractix horn. I emailed Klipsch tech support and posted at their forum and haven't heard back.

The pair I have is a very early version with a hand wired crossover board crossed over at 800hz. That makes for a pretty harsh and loud horn to say the least. They both have new diaphragms installed.

Klipsch later revised the xover to around 1250hz by lowering the HF 1.5mH inductor like mine has to the 0.7mH as shown on the schematic. (I scribbled padding mods on it. I think the 15uF should be drawn in before the coil instead looking at in now)

Here are some pics of a PCB version I found that looks to have a 15uF paralleled across the existing LF cap.

I've already swapped out the 1.5mH for the 0.7mH and that made a big difference for the better but it's still hot on the high end.
According to the spec sheet for the woofer it's around 94.40 db efficient vs the PSD-2002 at 106.1db

Tue 12:22PM LEAP Loudspeaker Enclosure Analysis Program V 4.60 May 19,2009 |
| |
| ? TSL Operations Menu (Transducer Speaker Library) |
| |
| TSL Entry Num= 7 SPLo= 95.83 dB|SPLi= 94.51 dB|SPLi= 94.40 dB
| TSL File Name=KLIPSCH1 | no= 2.40 % | ni= 1.77 % |@ Eg= 2.00 V
| Name = K 1548/K 48 K 15" Woofer Rem= 0.00 O, Lem= 1.000 mH @ 1KHz
| Model= Speaker Woofer/ Midrange Rem= 0.00 O, Lem= 1.000 mH @ 20KHz
|
| Znom= 4.000 O Sd= 0.0890 M5 Fi= 34.968 Hz Hvc= 20.477 mM
| Revc= 4.100 O BL= 14.0656 TM Fo= 37.701 Hz Hag= 9.525 mM
| Krm= 0.000 mO Vas= 213.2900 Litr Qms= 4.535 Xmx= 5.476 mM

| Erm= 0.000 Mms= 93.9800 Gram Qts= 0.419 Cmo= 1.000
| Exm= 1.000 Mmd= 78.7131 Gram Pmx= 400.00 W Tvc= 0.625 C/W |
|
| User2=8/5/92 Klipsch

I came across this article written by the owner of PI Speakers and his crossover padding using a PSD-2002
https://docs.google.com/viewer?url=h..._Crossover.pdf

My question could I use the same component values for the tweeter compensation circuit even if the crossover for the HF is a little lower than Waynes schematic? And what would happen adding that extra 15uF cap in the LF side?

Subject: Re: Klipsch KP-3002 Crossover Mods
Posted by Wayne Parham on Fri, 17 Aug 2012 22:26:25 GMT
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If it's a tractrix horn, it won't need as much top-octave compensation for mass-rolloff because the horn provides acoustic equalization by way of collapsing directivity. Add to this the fact that many modern compression drivers have some diaphragm surface resonances that increase the top-octave and you probably don't want C1 to bypass R1 in my schematic. In fact, you'll probably like the sound better if that 0.47uF cap is put in parallel across the tweeter instead.

Subject: Re: Klipsch KP-3002 Crossover Mods
Posted by tejaus on Sat, 18 Aug 2012 02:47:05 GMT
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Thanks for the quick reply.

I'm going to try it tomorrow with my bag of resistors. I still have to get the 0.47uF cap though.

Subject: Re: Klipsch KP-3002 Crossover Mods
Posted by tejaus on Sat, 18 Aug 2012 21:40:14 GMT
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Well I added a 24 ohm attenuation resistor using the 15 ohm damper resistor and 0.7mh coil. It's in the right direction but maybe a little too much attenuation. What is the ratio to figure between R1 and R2?

Subject: Re: Klipsch KP-3002 Crossover Mods
Posted by Wayne Parham on Sun, 19 Aug 2012 01:34:05 GMT
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It's not as simple as setting an L-Pad, because we're looking not only for attenuation but also a specific load on the splitter filter to set its Q. You'll really need to run a program like Spice to plot the transfer function and attenuation. But I've published a set of values that give 6dB to 20dB attenuation and the (mass-rolloff compensation) transfer function I prefer for my crossovers here: Compensation component values

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Subject: Re: Klipsch KP-3002 Crossover Mods
Posted by tejaus on Tue, 21 Aug 2012 02:34:23 GMT
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Thanks Wayne. I've been educating myself about horns by reading all of your white papers before I order the parts. Lot's to learn for sure.

BTW, what type of horn is yours? And what does putting the 0.47 cap across the HF terminals do instead of in series with it and paralleled with the resistor?

Subject: Re: Klipsch KP-3002 Crossover Mods
Posted by Wayne Parham on Tue, 21 Aug 2012 02:58:30 GMT
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The H290C horn I use has an oblate spheroidal flare profile, something often called a waveguide these days. It provides constant beamwidth, smooth response and minimum wavefront distortion.

The R1/R2/C1 network is used to tailor response for compression drivers on constant directivity horns. See the following links for more information:
High-Fidelity Uniform-Directivity Loudspeakers
Crossover configuration
Notes for the DIYer

Subject: Re: Klipsch KP-3002 Crossover Mods
Posted by tejaus on Thu, 23 Aug 2012 17:03:14 GMT
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Well, I tried the 16ohm x 16ohm combo with a 0.47uF bypass across R1. Sounded OK but still didn't sound great although less output and less harshness on vocals.

I then tried just placing the 0.47uF cap across the tweeter as shown in red in the stock schematic below without using a R1 resistor. Just used the stock 15 ohm dampner.

What a huge difference that made to the midrange. The vocals are some much clearer now. What exactly does this do?

I have to get some more resistors to try the attenuation at -6db and -3 db. Any harm running it as is without R1 in circuit?

That will probably all it needs vs the -10db.

Subject: Re: Klipsch KP-3002 Crossover Mods
Posted by Wayne Parham on Thu, 23 Aug 2012 18:13:14 GMT
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the tweeter. If that's what you have, it will slightly reduce the load impedance, causing the circuit to be slightly overdamped. This will reduce output around the crossover frequency, but just

capacitor will shunt some of the top octave, and reduce the output above 10kHz just a smidge.

Subject: Re: Klipsch KP-3002 Crossover Mods
Posted by tejaus on Thu, 23 Aug 2012 21:32:58 GMT
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Yes, you're correct about the wiring.

With that cap across the tweeter it reminds me of how a aural exciter changes the sound. It seems more then just a change in frequency response. I'll know more later after I fix the power supply caps in my Behringer DSP-8024. I'll run the RTA on it.

I wonder what effect would a smaller or larger cap have? Say up to
1.0uf down to 0.22uf.

Subject: Re: Klipsch KP-3002 Crossover Mods
Posted by Wayne Parham on Thu, 23 Aug 2012 21:51:10 GMT
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A larger cap in shunt will remove more top-end, and a smaller cap will remove less.

Subject: Re: Klipsch KP-3002 Crossover Mods
Posted by sbdj on Wed, 31 Oct 2012 05:52:38 GMT
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I just picked up a pair of KP 3002's and KP 4000 subs I had to recone one of the passives in the sub they are 18" drivers with 15" passives I also replaced both diaphragms in the HF drivers the other were tired. I'm interested in what you think of the crossover upgrade ? Thanks