Subject: Rise in Spl with third order 11 khz high pass around 5.5khz
Posted by Lothar on Wed, 01 Aug 2001 22:23:50 GMT
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Hi Wayne and forum,Wayne put me on track with some experimenting with piezo's.I am using two paralell ksn 1005 piezo's together with a tannoycheviot speaker with the HPD 315 dual concentric unit.The goal is giving some air to the upper octave somewhere between10 and 20 khz.First I asked Wayne for the value of the cap in creating a first orderhigh pass filter starting at prox. 20 khz.Stimulated by the results I calculated a third order high pass, starting at prox. 11khz.Setup: 20 ohm resistor paralell to the 2 piezo's, 1.5 ufd in series,.22 coil to mass and then .49 ufd in series again.Not altogether unsatisfied with the sonic result (It really gives "some air"), I connected a sinus generator to the amp and gave it a sweep.I put a radio shack Spl meter in front of the Piezo's so thatI also had some visual control over what I was about to hear.Well, to come to the point, I was a bit disapointed about the outputabove 16 khz and, most important, I noticed a sharp audible andmeasurable increase in output sharply around 5.7 khz.In fact, according to the spl meter, the output was somewhere around 5 db higher then on 12 khz.And that after I thought I am using a third order 11khz high pass!Is it possible that I have to use something that is called a notchfilter?Well Wayne and the rest, I hope that you have some time for a sugestion.Robin.

Subject: Re: Rise in Spl with third order 11 khz high pass around 5.5khz
Posted by Wayne Parham on Thu, 02 Aug 2001 09:14:47 GMT
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First. Do not use a notch filter. Let's not complicate the issues here.Second. Let's get rid of those 0.22mH inductors. Replace them with 15 ohm resistors. Also, your choice of capacitors is a little large, and I would recommend that you use 1uF and 0.33uF instead of 1.5uF and 0.5uF. What you chose would be appropriate for 11Khz, if that's what you really want. But if you are really looking for -3dB at 16Khz, and -12dB at 8Khz, then use the components I'm suggesting. What you have (after replacing the inductor with the resistor) will offer you -3dB at 11Khz, and -12dB at 5.5Khz.Third. Look at the response curve of the KSN 1005's. I can't recall if it's the same as the 1038's or not. If so, then you'll have pretty much the response curve I've described above. But if it's not similar - and instead has a peak at 5Khz - then you may have increased output because of that. After all, if the tweeter has a 12dB peak at 5Khz, then the tweeter would be just as loud at 5.5Khz as it was at 16Khz. It would drop 3dB at 12Khz from 16Khz, but would be back up 3dB at 5500Hz. So if the tweeter is truly 6dB louder at 5500Hz, then it may be that the 1005's have an 18dB peak at 5500Hz. I don't know.But let's start with the crossover itself. Remove the inductors, and replace them with resistors. Make certain that you've chosen the slope you want, and if you're looking for output in only the top octave - "the air" - then go with the 1uF and 0.33uF caps. If you're looking for some output in the very highest midrange, the "top of the brass instruments" and the "wisp of female vocals," then keep the capacitors you've got.

Subject: Re: Rise in Spl with third order 11 khz high pass around 5.5khz
Posted by Lothar on Wed, 15 Aug 2001 21:51:41 GMT
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Wayne,Why get rid of the coils?I am sure there is a very good reason to sugest this. Could you please explain?Robin

Subject: Re: Rise in Spl with third order 11 khz high pass around 5.5khz
Posted by Wayne Parham on Wed, 15 Aug 2001 22:55:19 GMT
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You don't want shunt inductors across piezo tweeters. They're piezoelectric devices, which are fundamentally capacitive. So by putting a coil across them, we are building a reactive resonator also known as a tank circuit. And parallel tank circuits have minimum impedance which approaches zero at their resonant frequency, which is determined by the formula:Fr = 1 / 2 * Pi *

zero with the coils installed. It also means that the current through the tweeter approaches infinity, so naturally you'll expect a puff of smoke to accompany this frequency. Even if it's outside of the audio bandwidth by a considerable margin, I'd still discourage use of coils across this tweeter. Amplifier oscillation or the impulse of power-on or power-off surges could very well excite the system into resonance and make a nice demonstration of pyrotechnics for you.