Subject: Attenuate amp inputs
Posted by Barry Solof on Sun, 22 May 2005 13:25:42 GMT
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Can anyone recommend a resistor circuit that will attenuate the input of the tube monoblocks approximately 12db? The amps have about 20db gain. I've tried a few t-pad configurations that work but seem to affect certain frequencies more that others. In a word, they have sounded horrible.The attenuation is needed to get a digital equalizer working at peak performance between a preamp and the monoblocks.Many thanks.

Subject: Re: Attenuate amp inputs
Posted by Wayne Parham on Sun, 22 May 2005 13:59:25 GMT
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Hi Barry,If your attenuators have affected the tonal balance, then perhaps the input impedance is reactive rather than resistive. Sometimes a feedback loop has to be considered too. I can provide you a simple diagram for a 12dB resistive attenuator based on a specific input resistance but if the input is reactive or complex, then it will affect the tonal balance, as you've described.Can you provide more info, a schematic perhaps?Wayne

Subject: Re: Attenuate amp inputs
Posted by Barry Solof on Sun, 22 May 2005 23:47:48 GMT
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Hi Wayne!Resistive and reactive? Don't know ... guess it is time to pull out an electronics textbook.The current attenuators (20 db) do the same thing to every system they have been installed into (1 tubed, 2 solid state). They attenuate the signal but the bass and dynamics of the system get squashed.There are no schematics of the amps. Is that what would help? The digital eq has an output impedance of 120 ohms.

Subject: Re: Attenuate amp inputs
Posted by Wayne Parham on Mon, 23 May 2005 10:26:26 GMT
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Usually you can expect a pair of resistors configured as a voltage divider to work pretty well as an attenuator. You want 10-to-1 for a 20dB divider or 4-to-1 for a 12dB divider. But since the resistors place a load on the output, they can affect its response if it has reactive components in

the output, like a coupling capacitor or transformer. You could also overdrive the output. Generally if the load impedance is high, these aren't a concern. Likewise, the input stage could be modified by the shunt resistance of your attenuator, which effecively acts as a partial short circuit. As an example, if you had a 20dB attenuator using 43k series and 4.7k shunt, then the input will have 4.7k ohms across it. If the first component is a 100k potentiometer, you'll be shorting it and the volume control may act weird. The interaction of values on global feedback loops can have unintended consequences too. Usually these kinds of things won't cause problems but sometimes they do.Try this. Try a couple of attenuators, with different impedance levels. Try hooking them up as a series resistor followed by a shunt resistor. Pick one of the two decibel levels and try both attenuators shown. Let me know what you hear.For 12dB:36k series, 12k shunt- or -150k series, 47k shuntFor 20dB:43k series, 4.7k shunt- or -430k series, 47k shunt

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Subject: Re: Attenuate amp inputs
Posted by Barry Solof on Mon, 23 May 2005 17:59:59 GMT
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Impedance never crossed my mind. One of the attenuators was a 30k series and a 10k shunt and it sounded horrible. So tonight I'll build the 150k series with the 47k shunt.Many thanks!

Subject: Re: Attenuate amp inputs
Posted by Wayne Parham on Mon, 23 May 2005 18:22:55 GMT
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Do you know what the input impedance is? Do you happen to know what components are connected right at the input connector? Whatever impedance is across the input of your amp will be in parallel with your attenuator shunt value.

Subject: Re: Attenuate amp inputs
Posted by Barry Solof on Tue, 24 May 2005 11:49:42 GMT
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Hi Wayne,The input impedance of the amps measure about 100k. So that would put the total input impedance of 100K + 47K = 147k?I've built 4 attenuators of various values so far using cheap Radio Shsck resistors. It seemed a reasonable assumption that cheap resistors would sound better in the circuit than cheap pots. Yet every one of the attenuators (on tube and solid state amps) seems to have an overly strong attenuation in the treble. Could the cheap parts be the issue or is it more likely that I still haven't gotten the impedance issues ironed out?

Subject: Re: Attenuate amp inputs
Posted by Wayne Parham on Tue, 24 May 2005 12:33:03 GMT
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If there is more attenuation in the treble, then there may be interelectrode (or interelement) shunt capacitance to blame. Or perhaps there is some amount of series inductance. In either case, you can use a bypass capacitor on the series resistor to counteract this. You can also use a partially bypassed resistance, by breaking the series value into more than one resistor and bypassing each individually. As an example, if your series value is 430k, maybe you'll use a pair of 220k resistors instead and bypass one of them with a 100pF capacitor.If your amplifier's input impedance is 100k, then putting 47k in shunt will reduce it to 32k. The formula for parallel resistors is:RT = 1 / (1 /R1 + R2...)For two resistors, you can also calculate with this formula:R1 · R2 / R1 + R2At any rate, the total amount would be 32k. That's probably OK, but I might try values that shifted it less. Maybe use a divider that has a shunt value equal to that of your input impedance.Since the shunt resistor is paralelled with the input impedance, that value becomes lower than you might think. So in this case, if you went with a 100k ohm shunt resistor, you'd effectively have 50k input impedance. The series resistance you'd want for 12dB attenuation would be about 150k. So instead of having resistor values of 150k series and 47k shunt, you'd use 150k series and 100k shunt. That would make the circuit function as 150k series value and 50k shunt, providing 12dB attenuation. From the resistor values, it would aoppear to be an 8dB attenuator. But because of input impedance, the attenuation value would be 12dB.

Subject: Re: Attenuate amp inputs
Posted by Barry Solof on Wed, 25 May 2005 13:07:13 GMT
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Many thanks for the math lesson. There is nothing more humbling than trying to figure out electronics on the Internet whilst everyone and their brother can see you make mistakes.!!The latest and greatest attenuator circuit was built last night. Early listening in the basement system sounded ok with a tad of rolloff of the high frequencies. It is in the basement system cooking for the day and we'll see what it can do tonight in the main system.Thanks for all the help!

Subject: Re: Attenuate amp inputs
Posted by Wayne Parham on Wed, 25 May 2005 13:56:14 GMT
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What resistor values?

Subject: Re: Attenuate amp inputs
Posted by Barry Solof on Wed, 25 May 2005 14:20:55 GMT
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The lastest and greatest used the 150k series and 100k shunt. I did not have a chance to pick up bypass capacitors.To try the bypass capacitor, you suggested splitting the series resistance in two (75k + 75k) and placing a capacitor in parallel with one of the resistors. What would you suggest for the value of the cap?I'll stop by Radio Shack tonight on the way home and give it (another!) try.

Subject: Re: Attenuate amp inputs
Posted by Wayne Parham on Wed, 25 May 2005 16:57:59 GMT
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You might get an assortment of resistor values up to 150k and an assortment of capacitor values in the pF range. You can bypass the 150k series resistor with a capacitor and the size will determine where treble boost starts. But that won't set the amount of boost, only where it starts. You can reduce the amount by splitting the series resistance into two parts, and bypasing them separately. One resistor might have no bypass or it might have a different value than the other. This just gives you some flexibility, that's all.

Subject: Many thanks! (nt)
Posted by Barry Solof on Thu, 26 May 2005 15:11:16 GMT
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