To: **Tom Andry at Audioholics.com**
CC: **Sean Bowman at Auralex Acoustics**
Project: **Listening Room Acoustical Tests**
Date: **November 25, 2008**

Hi Tom,

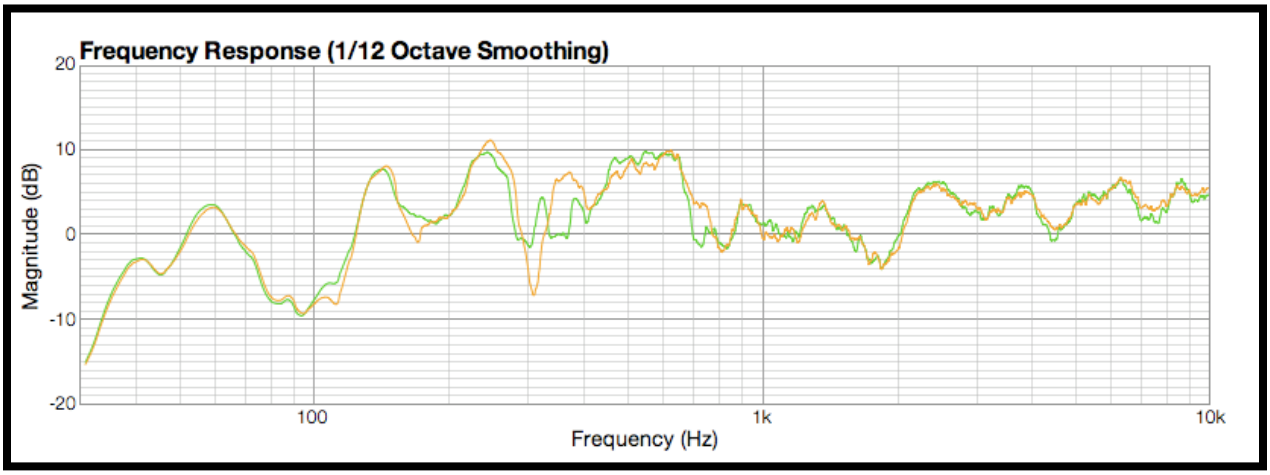
Thank you for sending the recorded frequency sweeps back to me. This has allowed me to gain insight into how your room is currently performing with the existing acoustical treatment that you have constructed and installed while offering evidence where things can be improved.

I have color coded all of the graphs corresponding to the measurement location numbers you provided:

1 – Left Speaker, Back Left Mic Location, With Treatment – DARK GREEN
2 – Left Speaker, Back Left Mic Location, No Treatment – ORANGE
3 – Right Speaker, Back Left Mic Location, No Treatment – RED
4 – Right Speaker, Back Left Mic Location, With Treatment – DARK BLUE
5 – Right Speaker, Back Center Mic Location, With Treatment – PLUM
6 – Left Speaker, Back Center Mic Location, With Treatment – LIGHT BLUE
7 – Left Speaker, Back Center Mic Location, No Treatment – BLACK
8 – Right Speaker, Back Center Mic Location, No Treatment – YELLOW
9 – Right Speaker, Back Right Mic Location, No Treatment – MAGENTA
10 – Left Speaker, Back Right Mic Location, No Treatment – COBALT BLUE
11 – Left Speaker, Back Right Mic Location, With Treatment – LIME GREEN
12 – Right Speaker, Back Right Mic Location, With Treatment – PURPLE

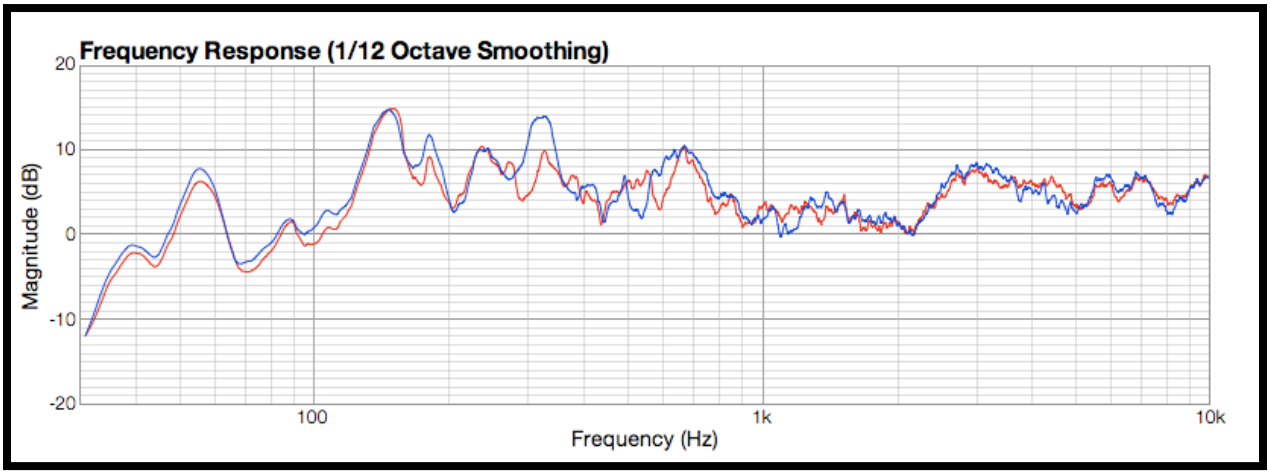
Let's first look at the comparison between the measurements that are identical besides the fact that the room is either treated or untreated.

Measurement 1 & 2:



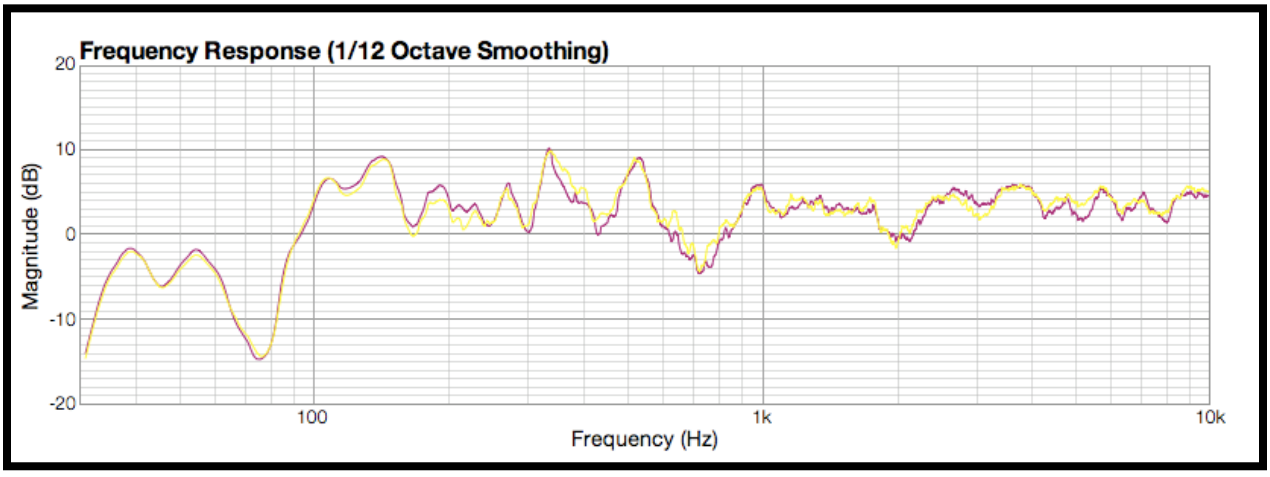
Curiously, there is not much of a difference between the treated and untreated versions. Also, there is a more significant dip at approximately 310 Hertz (Hz) when the treatment was removed. As is evident in all of the graphs where the microphone was in the back left (1-4) or back right locations (9-12), there is a dip in the frequency response between approximately 75 Hz and 125 Hz. In the modal analysis I conducted (attached), you can see that this frequency range is dominated by Tangential Modes with an (x, x, 0) distribution. This means that more significant vertical corner bass trapping would improve this issue. Adding thicker traps to the rear corners and adding them up front as well would help to level out the response.

Measurement 3 & 4:



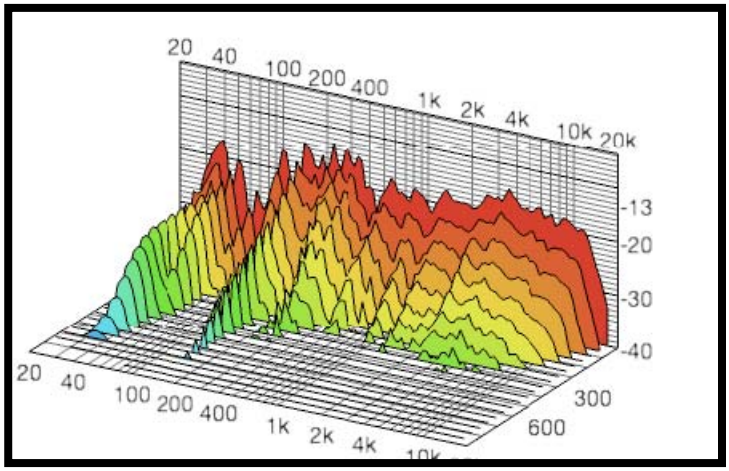
In this graph we see that again, the treated versus untreated scenarios are very similar. In this case the treated measurement (4) has a bump instead of a dip at 310 Hz. I believe that this issue is a harmonic of the fundamental front-to-back Axial Mode of 39 Hz, which could be improved with thicker treatment on the rear wall or adding a larger airgap to the existing panels. From reading some of the threads on your room, I know that you desire the flush to the wall look, so thicker treatments may need to be built.

Measurement 5 & 8:

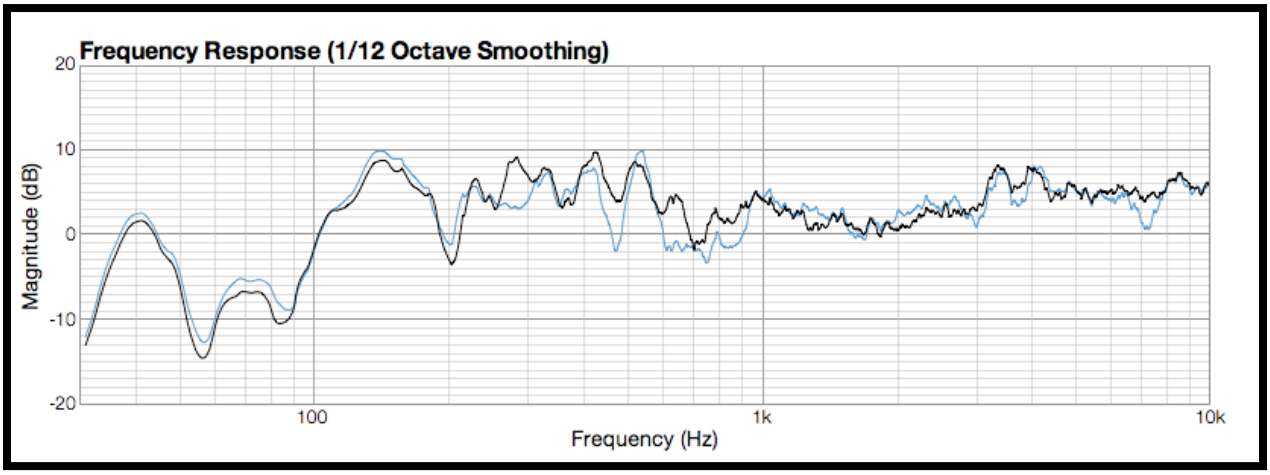


This extreme dip centered at 77.9 Hz is the front-to-back Axial Mode that I mentioned above. You can also see this dip propegate throughout the graph around 116.9 Hz, 155.9 Hz, 194.8 Hz, etc. Refer to suggestions above regarding how to improve this.

You can see the lack of energy over time in the 77.9 Hz area in the waterfall plot of Measurement 5 to the right. Also, there is lingering low frequency energy in your room – but not nearly as severe as it would be if this room was closed off.

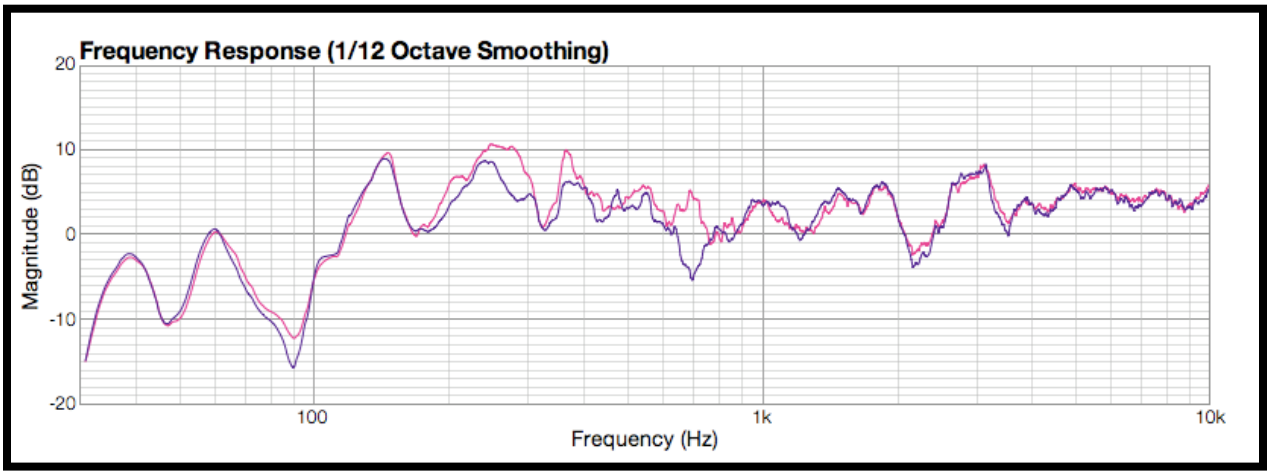


Measurement 6 & 7:



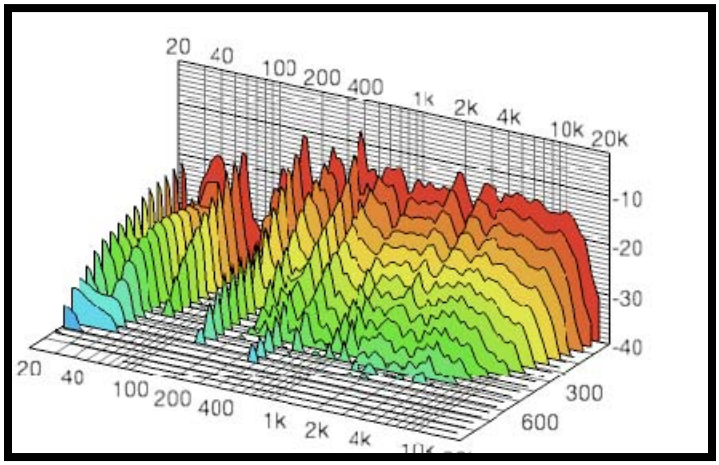
The Tangential Mode issue at approximately 200 Hz is improved slightly with the corner treatment you currently have in place. Again, thicker treatment will begin to affect this even further as well as lower frequencies. The two distinct dips in the low end occur around 59 Hz and 85 Hz. The first one is the lowest fundamental Tangential Mode. This one will be difficult to address without significant trapping in all four corners. If you plan to build fiberglass bass traps, I would suggest at least extending at least 18-24" along each side wall from the corner, filling the corners will thick insulation.

Measurement 9 & 12:

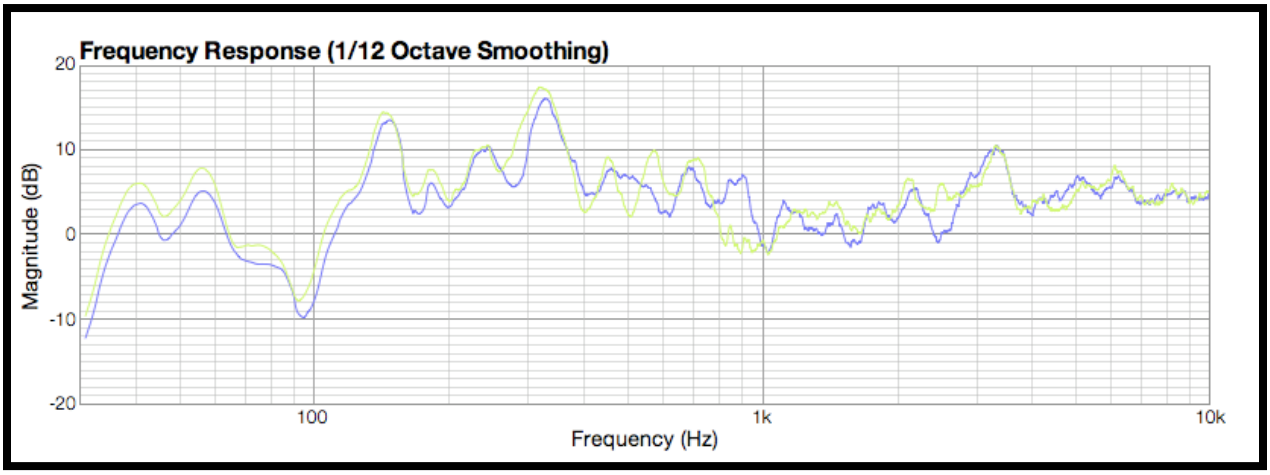


The significant dip at 90 Hz is a result of a couple issue – a Tangential Mode at 90.1 Hz and a side-to-side Axial Mode at 90.4 Hz. Thicker corner traps will help the Tangential issue and thicker side wall panels will improve the the Axial Mode issue.

Again, this issue shows up in the waterfall plot of Measurement 9 shown to the right.



Measurement 10 & 11:



Very similar to the 9 & 12 graph as expected. Same advice applies.

As discussed in some of the threads I read, it is difficult to predict your room's response due to the openings leading to the Foyer and Dining Room. There are significant reflection issues that come back from these areas at a much later time as compared to the direct sound and the early reflections produced inside of the room. I know that closing these rooms off with a solid surface is out of the question, but would a temporary thick dense curtain be possible? Be sure to oversize the curtain so that you obtain deep folds even when the curtain is drawn to a close. The openings are approximately 5' wide, so a 10' curtain would be appropriate. This will not help with pressurizing your room as discussed, but it will reduce the effect of late reflections.

I would also recommend diffusion on the ceiling of your listening room. Diffusion will help to reduce harsh reflections coming from this surface and create a wider "sweet spot" so that each listening position is more consistent. Auralex has numerous options for diffusion that you can view at www.auralex.com. I would suggest approximately 25% coverage of the ceiling, which works out to 48 square feet or twelve (12) 2'x2' diffusors. These diffusors should be centered in the room between the speakers and the listening locations.

If you have any questions, I would be more than happy to discuss them with you. You can contact me 9am-5pm est. @ 800-959-3343 x229 or at my personal e-mail, gavin@auralex.com. Take care and have a great day!

Sincerely,

Gavin Haverstick
Lead Acoustical Engineer
Auralex Acoustics, Inc.