Subject: Where To Learn More?
Posted by NoDirections on Sun, 28 Nov 2010 19:27:39 GMT
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I've gotten pretty good at hooking up the components of home entertainment systems for friends and family members - with Christmas around the corner, though, I think this time around I want to know more about room acoustics. Any suggestions on where I can get some free reading material on it?

Subject: Re: Where To Learn More?
Posted by Adveser on Sun, 28 Nov 2010 22:11:26 GMT
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You can just google the following terms, which is how I learned:

Room modes
speaker Reflection/Refraction
Room dampening
speaker toeing
speaker placement

by the time you read all that you should run into just about everything. But remember, always consider the context as it relates to speaker size and type of speaker.

Read the posts on the forum too. We've covered a great deal of the above.

Subject: Re: Where To Learn More?
Posted by NoDirections on Tue, 30 Nov 2010 19:24:41 GMT
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Thank you, Adverser, I really appreciate you putting together all those terms...some of them I've heard but I know I don't fully understand. Can't wait to get cracking during my winter break from school.

Subject: Re: Where To Learn More?
Posted by Adveser on Tue, 30 Nov 2010 21:26:26 GMT
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You're very welcome.

You guys all do me the favor of keeping the fundamentals fresh on my mind, so thank YOU.

Subject: Re: Where To Learn More?
Posted by jazzlover on Sat, 29 Jan 2011 09:28:19 GMT
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Adverser, I started searching for those terms in Google and ended up in Wikipedia. I still find the discussion a bit more advanced Is there such a thing as audio for dummies or something like that?

I understand speed of sound, which is 344 m/s. 1Hz would therefore be 344 meters. 1KHz would be 344mm. 10kHz would be 34mm. From this there is a specific range that is audible to the human ear, right?

Secondly, what does the word "response" mean in acoustic terms? Is an echo a response?

These questions may bug you, so forgive me in advance

Subject: Re: Where To Learn More?
Posted by Adveser on Sat, 29 Jan 2011 18:33:41 GMT
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Yes. There is. Every book on audio engineering and mixing I have found could be called "audio for dummies"

Those books are easy to read and they explain how sound works effectively enough.

The Human range of hearing is 20hz-20,000Hz (20hz-20Khz) though most people's hearing stops between 15-17Khz.

Response is generally considered the electrical output/conversion to acoustic energy (which is the movement of the speaker, not be confused with "acoustics"). I am not sure, but I think the specs are what works in a vacuum where there is no such thing as room acoustics. You can take a speaker's response as 20-40000hz as being just that. The only qualifier is the amount of space between yourself and the speaker that is required to produce a complete waveform of 56.5ft at 20hz, ~28ft at 40hz, ect.

I am not sure though because I have heard conflicting information about the ability to hear a waveform even if it physically can't exist in a space. I've been told that headphones can only reproduce the frequencies that can fit between the space between the speaker and the inner ear, but if that were true, why can I play a 20hz tone through them and it sounds like 20hz? Wayne, do you know what the deal is with this?

Check your PMs, jl

Subject: Re: Where To Learn More?
Posted by Wayne Parham on Sun, 30 Jan 2011 17:04:43 GMT
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The sound in a room passes through three distinct ranges, the pressure range (where the room is acoustically small), the modal range (where the room is approximately equal in scale to wavelength) and the reverberant range (where the room is acoustically large).

In the case of very small rooms (like car cabins), the pressure range extends much higher than in a typical indoors room. It often extends through the whole subwoofer region, and in this range, there is approximately 12dB/octave bass boost. That's why a little speaker in a car can produce so much bass (and a larger woofer can get really ridiculous).

In the case of headphones, a large part of the audio band is in the pressure region.

At the opposite end, very large rooms like auditoriums, only infrasonics are in the pressure region, so it effectively does not have one. In the largest rooms, even the modal range is shifted down below the passband, so again, it effectively doesn't have one. These sort of very large rooms can be treated pretty much the same as an outdoor space.

There's more information about speaker-room interactions in the document called "High-Fidelity Uniform-Directivity Loudspeakers", towards the end, starting on page 25.

Subject: Re: Where To Learn More?
Posted by Adveser on Sun, 30 Jan 2011 19:29:39 GMT
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Thanks Wayne. That is why I quit audio engineering school and went to electronics school. They gave me some story about how unless a waveform can physically fit (in the modal range it appears or above) it can't be produced. Another thing they were dead wrong about.

Do you know of a good room calculator to see what the response is to fix the deficiency of a room? Can there be something that you give it the dimensions and speaker placement and it tells you how the frequency response will behave? You know everything else ignored, like the speakers response. That would be a great tool to have so you could instantly equalize the room by inverting the frequency response.

Subject: Re: Where To Learn More?
Posted by Wayne Parham on Sun, 30 Jan 2011 21:18:59 GMT
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I suggest CARA. There are online room calculators, but they only show the frequencies where

standing waves are produced, not the positions of the nulls and peaks. At low frequencies, i.e. first axial mode, they line up pretty evenly. But above that, sometimes the modes interact with one another and bunch up in odd places.

Subject: Re: Where To Learn More?
Posted by Adveser on Sun, 30 Jan 2011 22:17:13 GMT
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It's starting to make a lot more sense now on the recording end now as to why smaller rooms are used and all the factors that go into a recording space. Most of the bands I've worked with can't appreciate that aspect at all. If you can't use a good room to your advantage you have to improvise and be unconventional, which people don't get. For instance, I like close miking a guitar amp and covering the front of the amp with pillows so it only captures the front of the speaker.

Thanks a lot Wayne, even more stuff to put in the bag of tricks. Since I haven't ever designed a A level studio it's another thing you don't know until you actually run into the problem or learn the factors that go into the decisions. I have books that refuse to explain this, even in the chapter regarding building a studio on paper.

I know you dampen to reduce reflections, but that wouldn't change the amount of pressure or what frequencies (SIC) the room amplifies and cancels from phase. You can't trap every sound where it diffuses into the wall at all frequencies is what I am taking from your posts.

Awesome information.

Subject: Re: Where To Learn More?
Posted by Wayne Parham on Mon, 31 Jan 2011 00:00:31 GMT
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At low frequencies, you have to make the absorbers physically large for them to do any good. Framed drywall construction actually provides a fair amount of damping because the walls have some "give". Panel absorbers - sort of like large false walls - can be used in rigid rooms that have brick, stucco or concrete.
"False wall" bass trap panels
