Subject: Learned some more audio truth outdoors
Posted by Bill Epstein on Mon, 04 Sep 2006 23:26:23 GMT
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We had a day-long "tailgate" behind the building today while the labor Day crowd was inside buying paint and light bulbs.I brought the Sorta Studio 2 "patio speakers", a 15 watt receiver and CD player. Sitting on the asphalt, away from the building, there was little bass output below about 60 Hz. Zero Low "E" on the bass.Amazing how powerful boundary reflections and reinforcement are. An entire octave gone!So what does an anechoic environment do to evaluate bass? Can't, right? And if there is lttle bass, how does the anechoic room offer a correct way to evaluate mids and highs so unbalanced?

Subject: Re: Learned some more audio truth outdoors
Posted by Wayne Parham on Tue, 05 Sep 2006 02:58:17 GMT
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Yes, that's right. Boundary reinforcement does a lot.Outdoors, things are much clearer sounding, but bass gets lost sometimes. It takes a much more powerful speaker to drive bass outdoors than it does indoors.Anechoic chambers are attempts to make an echo-free environment. It's not too hard to do at high frequencies, but gets much more difficult down low. Most anechoic chambers are only truly anechoic down to the midrange. That's why it's better to test subwoofers outdoors - It's a truly anechoic environment.

Subject: Re: Learned some more audio truth outdoors
Posted by GarMan on Tue, 05 Sep 2006 13:29:01 GMT
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The thing that surprised me about room boundaries is how much they reinforce total volume too. I took out my amp to do some outdoor testing on speakers I built earlier this year and was very disappointed by how loud I had to turn the volume knob to get decent volume. Thought it was driver inefficiency. A week later, took the speakers inside, had the volume knob set at the outdoor level and was greeted with ear-splitting volume when I pressed play.I was also burned for not considering room-effect on bass when I built my 5 cu ft cabinets for a pair of JBL 2235. One the computer model, the port tuning was supposed to be flat down to 30Hz. But in-room, the bass was overpowering. Through trial and error, I found that a sealed cabinet worked best. I'm beginning to understand the Japanese's taste for early shallow rolloff vs late and sharp.gar.

Subject: Re: Learned some more audio truth outdoors
Posted by Bill Martinelli on Tue, 05 Sep 2006 14:59:20 GMT
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It's been my feeling for a long time that outdoor or chamber testing is good for common ground so one manufacturer can compare to another. It makes the baseline the same. (in theory it should be no effect)Testing in a chamber or outdoors is no good for building speakers. The speaker needs to be tested and build for room it's intended to be used. a common type of room at the very least. Ideally, custom made for the specific room.

Subject: Re: Learned some more audio truth outdoors
Posted by Wayne Parham on Tue, 05 Sep 2006 16:24:41 GMT
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"The speaker needs to be tested and build for room it's intended to be used."My design philosophy is to design the speaker to sound right on axis and generate a uniform reverberent field. That makes them sound good just about everywhere. Using this approach, the main thing left is boundary influence, and making speakers designed for corners pretty much sets that. Other models are generally designed to be placed near the wall or corner, for similar reasons.

Subject: Re: Learned some more audio truth outdoors
Posted by Bill Martinelli on Tue, 05 Sep 2006 17:40:02 GMT
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"My design philosophy is to design the speaker to sound right on axis and generate a uniform reverberent field"I dont fully understand what you mean. can you give some understanding and examples?

Subject: Re: Learned some more audio truth outdoors
Posted by Wayne Parham on Tue, 05 Sep 2006 20:04:59 GMT
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Pretty much every speaker you've ever seen me do has this as one of its main design objectives. Controlled directivity is part and parcel of the design process. That's why my loudspeakers sound consistent throughout the room, and tonal balance is good even outside the room.A loudspeaker's directivity determines the reverberent field. Uniform directivity along with uniform response makes a uniformly charged reverberent field. If directivity fluxuates up and down, then the reverberent

field won't be uniform even if on-axis response is good.Uniform directivity is one reason why the

pattern. Every horn uses a 90° flare. So from the deepest bass (set by the room wall angle) to the midrange (set by its horn flare) to the treble (set by the tweeter's horn flare) - Every sound source radiates a uniform 90°.The bass-reflex boxes use another technique that is good. They are designed for DI matching between bass and treble. This isn't contant directivity, but it is uniform. The midwoofer exhibits collapsing directivity up to the crossover point, where it is equal to the directivity of the horn. That way the transition is smooth, so the reverberent field is smooth. Uniformly collapsing directivity isn't as good as uniformly constant directivity, but it is better than directivity that narrows up to the crossover point and then abrubtly widens back up again, as is common on most direct radiating (non horn loaded) speakers.

Subject: Re: Learned some more audio truth outdoors
Posted by GarMan on Tue, 05 Sep 2006 20:42:01 GMT
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Wayne, I might be saying the same thing in a different way, but I find it easier to understand in terms of off-axis response. For good overall in-room response, you're looking for a speaker with not just smooth on-axis, but also smooth off-axis response. Uniform DI would accomplish that.I forget for the percentage is, but the large majority of what we hear in-room is reflected sound and a lot of that comes from first reflection of the speaker's off-axis response.

Subject: Re: Learned some more audio truth outdoors
Posted by Bill Martinelli on Wed, 06 Sep 2006 00:14:39 GMT
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Thanks for the explanation, your speakers sound good. It's been my experience that what works on paper doesn't always work best once put to use. The paper is a great place to start but the difference in a venue can require some refinement for the best design. I'll make changes in the size of the box, the tuning frequency, rigidity of the cabinet and bracing. Crossover work should also be worked on too. Sometimes changing the frequency point or the slope a little bit can make very nice improvements. Attenuation of the upper frequency horn drivers is probably the first place to get improved sound.

Subject: Re: Learned some more audio truth outdoors
Posted by Wayne Parham on Wed, 06 Sep 2006 02:39:41 GMT
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What do you use to measure your speakers to make these refinements? Do you measure at various places in the room to get a grid of points for room distribution? Or maybe do you get a polar plot?

Subject: Re: Learned some more audio truth outdoors
Posted by Wayne Parham on Wed, 06 Sep 2006 02:40:05 GMT
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That's right, exactly.

Subject: Re: Learned some more audio truth outdoors
Posted by Wayne Parham on Wed, 06 Sep 2006 02:44:56 GMT
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Oh, definitely. Boundary reinforcement from corner loading is 9dB. The gain from increased directivity is another 9dB. Of course, damping from wall compliance, insulation, carpeting, furniture and room treatments takes some of this but you can get as much as 18dB over freespace. If not well damped, room modes can bump certain ranges even more than that.

Subject: Re: Learned some more audio truth outdoors
Posted by Bill Martinelli on Wed, 06 Sep 2006 03:10:23 GMT
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Computer software on a laptop, Stanford Research FFT spectrum analyzer, Ultra-curve spectrum analyzer. I like the FFT most of all. I mic at 6 places all 4 room corners with mic pointing into the corner at 2' away, mid height. in the center of the room with the mic pointed at the ceiling 1' down and at the primary listening position, all to get a feel or the room. Then make adjustment by measurements in one place (listening position)The measurements give you a good feel for deficiencies, shortcomings or room gain. You still need to listen to a good selection o music at different sound levels for a completely balanced system. Sometimes the perfect flat sound isn't what sounds best. With a combination of a graphic and parametric you can make a temporary voice before hardwiring parts. ALK engineering does my crossover work. He can build a very special filter network with fast turnaround. everything is impedance matched and I only have to deal with box tuning and attenuation these days. I like to build a special speaker that is designed for a particular application if I'm going to do the whole cabinet. Just once in a while. Too busy with wood tweeter horns most of the time, and when summer is in the good days I like to be on my boat.

Subject: Re: Learned some more audio truth outdoors
Posted by Wayne Parham on Wed, 06 Sep 2006 05:34:54 GMT
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How much do you charge and where will you travel?Do you use a sweep, discrete sines, white (or pink) noise or a maximum length sequence for your measurements? If a sweep or MLS, how do you synchronize the input capture with the output signal?How do you decide on the best places to put your speakers?In any case, might I suggest that measurement microphones placed as an array of points showing response in the listening area might be more useful than the placements of microphones in room corners.To measure or not to measure (and what good is it anyway?)

Subject: Re: Learned some more audio truth outdoors
Posted by Bill Martinelli on Wed, 06 Sep 2006 12:45:44 GMT
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I agree with you on micing the room corners. It does give a baseline for room mode and depending on results it can show a room anomaly that can be helped by an acoustical treatment. The placement of the speakers is determined in large by where the customer wants them. There is always a little wiggle room and when you evaluate what you hear and what measurements look like you can make a placement change. For the most part the speakers already have a designated place in the home. been good chatting, take care.

Subject: Re: Learned some more audio truth outdoors
Posted by Wayne Parham on Wed, 06 Sep 2006 15:10:04 GMT
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Actually, depending on speaker placement, the room corners can show huge dips in response that don't occur anywhere else in the room. If you EQ'ed for that, you'd have way too much bass, like 20dB. No one sits in the corners, so there is no need to measure there. Check several places in the listening area instead, a uniform grid or polar plot is best.