

Ed Momkus reaches for sonic heaven with the \$ 3,800 Lyngdorf RP-1 RoomPerfect™ Room Correction



Why We Need Room Correction

If you've read about human hearing, the effects of your listening environment on your sound, and the difficulties associated with getting realistic bass, skip the first two sections and proceed to "My Prior Attempts to Deal With My Room". If not, read on.

How does human hearing work? Most of what follows was pulled from several sources, notably <http://hyperphysics.phy-astr.gsu.edu/hbase/sound>, maintained by Georgia State University.

The first thing to understand is that you perceive different frequencies differently at different dB levels. As the Georgia State University website puts it:

"The measured threshold of hearing curve shows that the sound intensity required to be heard is quite different for different frequencies. The standard threshold of hearing at 1000 Hz is nominally taken to be 0 dB, but the actual curves show the measured threshold at 1000 Hz to be about 4 dB. There is marked discrimination against low frequencies so that about 60 dB is required to be heard at 30 Hz. The maximum sensitivity at about 3500 to 4000 Hz is related to the resonance of the auditory canal."

Specifications:

Type: Room correction processor
Frequency Response: 20 ~ 20kHz, +/- 0.1dB
S/N ratio: 113dB, analog to analog (at Neutral voicing Ref 4.4V)
Dynamic range: 113dB, analog to analog (at Neutral voicing Ref 4.4V)
Channel separation: 114dB
Input sensitivity: 4.4V (2.2V with high sensitivity)
Input impedance: 10kΩ balanced & single-ended
DAC output impedance: 50Ω
THD+N: 103dB, A-weighted, analog to analog (at Neutral voicing Ref 4.4V)
Power consumption: 4W (standby mode), 23W (operate mode)
Dimensions: 17.72 W x 13.58 D x 3.94 H (inch)

Weight: 14.6lb

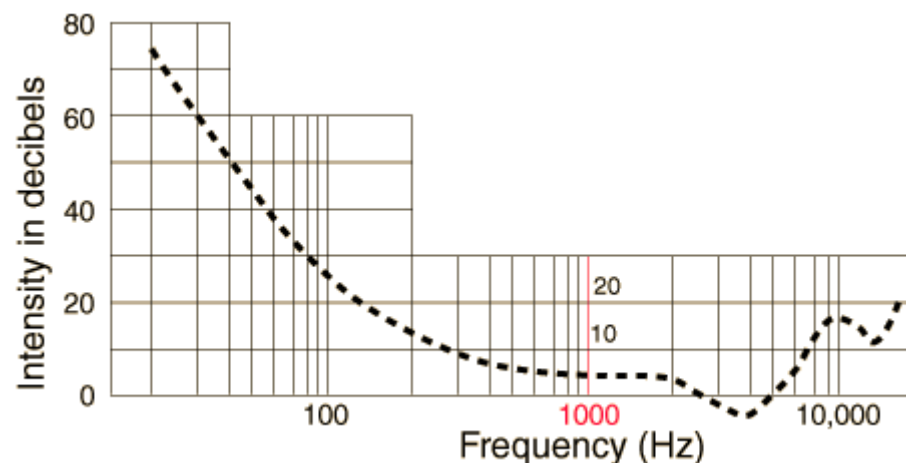
MSRP: \$3,800

Manufacturer: [Lyngdorf](#)

U.S. Distributor:

Triad Speakers, Inc.
15835 NE Cameron Blvd.
Portland, OR 97230
Tel. (800) 666-6316

This is illustrated by the following chart:



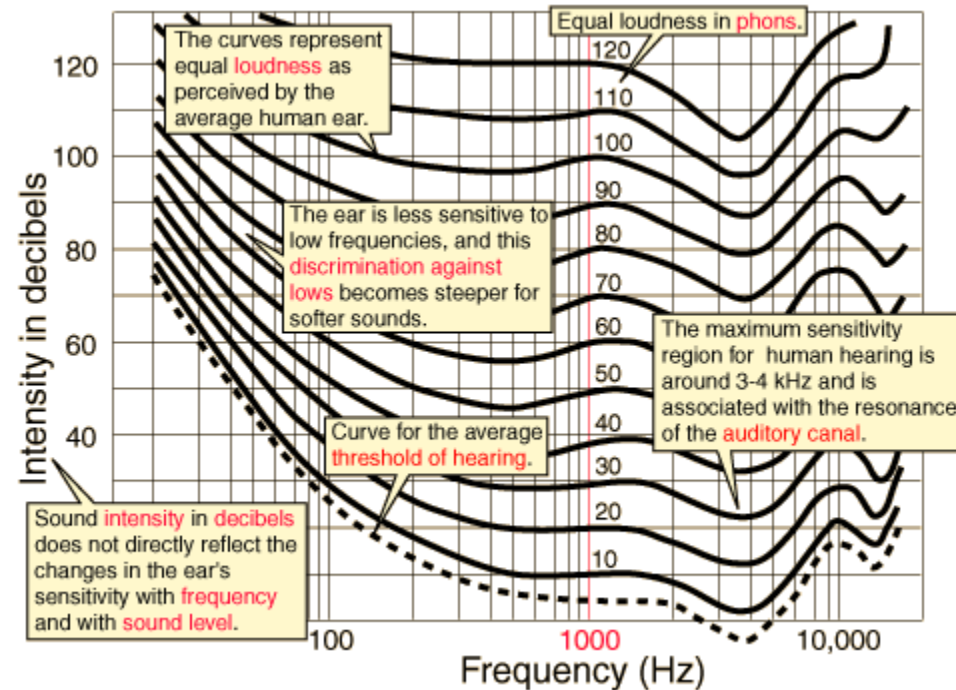
A related thing to understand is that the differences between how we perceive the loudness of different frequencies can be very large.

“For very soft sounds, near the threshold of hearing, the ear strongly discriminates against low frequencies. For mid-range sounds around 60 phons, the discrimination is not so pronounced and for very loud sounds in the neighborhood of 120 phons, the hearing response is more nearly flat.”

We audiophiles have experienced the problem that arises when you turn the volume way down: the bass becomes less pronounced. The Georgia State University website puts it as follows.

“One of the implications of this aspect of human hearing is that you will perceive a progressive loss of bass frequencies as a given sound becomes softer and softer. For example if you are listening to a recording of an orchestra and you turn the volume down, you will find that the bass instruments are less and less prominent. This is the purpose of the so-called "loudness contours" on audio amplifiers; they allow you to boost the bass frequencies when you are listening at low sound levels to give you a more realistic balance of the high and low frequencies in the music.”

These principles have been translated into a series of graphs that show perceived loudness of different frequencies at different decibel levels. You can see that in some cases the perceived “loudness gap” between low, middle and high frequencies is quite huge, while in other cases, such as when the music as a whole gets louder, the differences shrink. These graphs also show the frequency range in which our ears function most efficiently. These differing perceptions of loudness then become further complicated by reflections caused by the room, including reflections that reinforce particular frequencies, or in some cases create nulls that completely cancel out a particular frequency.



As if the vagaries of human hearing aren't enough, your room will affect the sound of any speaker you try. This means that any set of speakers you try will sound very different in different rooms. Furthermore, depending on the particular speaker and its interaction with the room, as well as the particulars of your own hearing, a pair of speakers may sound good or poor at different volume levels. You've probably experienced some systems that sound very good at low volume levels, but others that don't sound right unless you're playing at higher volumes. On practical effect of this is that some speakers sound better when played louder or, in some cases, will only sound good when played loudly. If you put such speakers in a room that muddies the bass or has trouble replicating the lowest bass notes you will invariably exacerbate the problem. If you could eliminate the room interaction you would at least be able to retain respectable bass reproduction at lower volume levels.



Getting The Bass “Right”

Your listening environment affects all frequency ranges, but anomalies in the bass are the toughest to fix. Even when listening to very high-end systems, I often had the feeling that the bass was too timid, or too flabby, or that it lacked realistic weight. Moreover, whenever I went to a live indoor concert I was always struck by the fact that the bass seemed louder and more powerful than what I heard coming out of so-called “high-end” systems. In fact, it bothered me very much that many renowned reviewers seem to praise products that totally fail to produce realistic bass. (I don’t want to start a war here, but I include a few of the most renowned reviewers and highly praised products in this category – perhaps I’ll put a list together and include it in a future article.)

As a result, I put years of effort into addressing bass reproduction in my main system. I purchased a front-end that went as low as possible, secured amps with great bass weight and installed speakers that were capable of realistically replicating 25 Hz. I supplemented this by working with an assortment of accessories, including cables, power conditioners, isolation, room treatments, etc. Bit by bit I inched closer to the goal. I minimized bass boom. I attacked slow and bloated bass. I added more bass weight. The problem was, I often improved one aspect of the bass, but affected a different aspect. Finally, in the middle of 2007 I achieved what I felt was the best bass I’d heard in any of my own personal systems, and in most cases better than the bass I’d heard in other high-end systems. However, it still seemed to occasionally lack the slam that I heard in live concerts at top notch venues, and I began to think that I would never get it completely right in my current room.

My Prior Attempts to Deal With my Room

As you can see, I have been acutely aware of the effect that the room has on an audio system, and I’ve taken very extensive steps to address the problem. My listening room sports three 20” x 78” ASC Tower Traps, two 20” x 48” ASC Tower Traps, one 16” x 48” ASC Tube Trap, two 16” x 60” Quarter Round traps, twelve 8” x 48” ASC Sound Panels and 4 Corner Busters. I’ve been to very high-end listening rooms, but I’ve only encountered 2 or 3 that have paid as much attention to room treatments as I have. Consequently, I assumed that digital room correction would have some, but not much, effect on my listening environment. Furthermore, I have always felt that I should keep the signal as “pure” as possible, and that introducing A-to-D and D-to-A conversion is audiophile blasphemy. However, a true audio addict eventually has to try everything, so I asked Constantine Soo if I could review a digital room correction system for Dagogo. He told me to have at it, so I started to look for a model that would work well in my system. As it turned out, it wasn’t as easy as I thought it would be.

The first problem I encountered related to my Esoteric P-70/D-70 front-end. The Esoteric sounds the best in its dual AES mode. In the dual AES mode, the transport splits the digital signal into left and right and transmits the signal this way to the DAC, which accepts the left and right digital signals. The dual AES mode ONLY operates with AES/EBU digital cables – no RCA cables need apply. This means that any black box that would go between my transport and DAC must accept dual AES/EBU cables and also output a dual digital signal via dual AES/EBU cables. Seen any device that meets those criteria? Nope! That meant that whatever device I used would have to be inserted in the analog path of my system.

The second thing I encountered was the dearth of room correction devices which employ balanced analog inputs and outputs. Not only does the P-

70/D-70 combo sound best with AES/EBU digital cables running between the transport and DAC, but it also sounds better via its balanced analog outputs, and I run my whole system balanced. Few digital room correction systems have balanced analog inputs and outputs.

After all of these limitations were taken into account, the only room correction system that would work for me was the Lyngdorf RP-1. I was initially worried that I wouldn't be able to compare the Lyngdorf to other room correction devices. I will tell you right now that I had no reason to worry. I don't know if other room correction devices are better, but the Lyngdorf RP-1 wrought great improvement in my system.

Who Sells Lyngdorf?

Or maybe even more importantly, how do I get a Lyngdorf? I had no idea. Lyngdorf distributes its products through a limited number of dealers, but it just so happens that one of them is Ken Walker of Sound Design Systems, located in Winfield, IL, which is a western suburb of Chicago. I was happy that there was a dealer in the Chicago area, but I was apprehensive after I looked at his website. I worried that he would be a home theater guy who would not appreciate my two-channel obsession. I should never have worried. Ken turned out to be an audio enthusiast who loves great two-channel music and fine tequila. He was incredibly helpful by securing a demo RP-1 and personally coming to my house to install and program it.

I want to make clear that I never told Ken that I'm a reviewer or that I write for Dagogo. I simply told him that I'm interested in the RP-1 and would like a demo, and he showed up on a Saturday morning to install it.

There is also the question of who is Lyngdorf? It's a company named after its main man and chief designer, Peter Lyngdorf. We are not talking about a novice designer. I won't go through Peter Lyngdorf's entire audio history, but I will mention the name Tact Audio and the Millennium digital amp. Yep – that Peter Lyngdorf.





What Are We Doing Here ?

Legitimate philosophical question, but that's not what I mean. The question is, what does digital correction actually do? As it turns out, different correction devices have different goals. Some are massively ambitious devices that allow you to tri-amp your speakers and adjust the bass, midrange and treble, as well as adjust for the effects of the room. Others are less ambitious and make limited adjustments to the speakers, or try to make adjustments in the time domain. I encourage you to go to the Lyngdorf website for a detailed description of what Peter Lyngdorf is trying to accomplish with the RP-1, since I will only summarize it here.

As I understand it, Peter Lyngdorf starts with the assumption that you basically like your speakers and do not want to mess with their fundamental sound. Based on this assumption, the RP-1 does not try to correct for speaker performance. Instead, the concept is to allow the speaker to sound its best by only adjusting for the pernicious effects of the room. How does the RP-1 do this? No idea. For all I know, Lyngdorf could be applying secrets learned from the Krill who reside on the planet Zartran. I know something about the electronics and design theories that apply to preamps, amps and speakers. I know less about the technology behind transports and DACs, but enough to sound intelligent (I talk a good talk). However, I know nothing about sophisticated digital correction devices, so I am acting here purely as a subjective reviewer.

Installation

Installing the RP-1 was simple. I know, how can it not be simple when someone else installs it for me? Well, I'm an obsessive guy, so even though Ken Walker installed the system for me originally, I later disassembled and reprogrammed the system using different speakers, such as the \$28,000 Eventus Audio Lysitheas (review to follow). In my case, I inserted it between my preamp and amp. You can also insert the RP-1 into your system via a tape loop, or you can put it between your source and your preamp, although this last method is not desirable if you have multiple sources.

After connecting the RP-1, you need to set the measurement volume level. Setting the measurement volume level is important, since the microphone must be able to pick up the test tones, but the volume shouldn't be so loud as to risk clipping. This is very easy, as the RP-1 actually tells you whether you should increase or lower the volume.

The next step is to measure the distance from the speakers to your ears when you are sitting in your principal listening position. The distance information is then input into the RP-1.

Once these initial steps have been taken (about 10 minutes), you connect a supplied microphone (microphone stand and long cord included) and position it at your principal (called "focus") listening position. You then run a series of test tones, all of which are automatically initiated and

measured by the RP-1 from your left and right speakers. Once this sequence is completed, the RP-1 tells you the percentage of “Room Knowledge” it acquired from the test tones and invites you to measure a second position in the room. You then move the microphone at least 1 meter to the left or right and repeat the test tones. This process is repeated at different positions in the room until you maximize the RP-1’s “Room Knowledge”. In my case, I stopped at 99% “Room Knowledge”. You’re done. The entire process took me 24 minutes; it might have taken me 35 minutes if I had not seen Ken Walker do it the first time.

Keep in mind that this process needs to be repeated if you move or change speakers, or do something else significant to your listening room, but once you’ve done it the first time you will breeze right through it. The RP-1 also allows you to display the amount of correction being applied to correct for the anomalies of your room. In my case, the correction level was only 10%, which I understand is on the low end of expected correction. This was consistent with my expectations, given the extensive room treatments I’ve installed.

This is not the end of the Lyngdorf RP-1’s capabilities, which include the ability to integrate dual subs, which can be a great boon in satellite systems. However, I did not bother doing this since the RP-1 transformed my full-range speakers into really full-range speakers. If you have a satellite/sub system, you should seriously consider the Lyngdorf (or something like it). I suspect that you will find your system transformed. You can find this info on Lyngdorf’s website (<http://www.lyngdorf.com>) in the RP-1 owner’s manual that is posted on the site.

Listening & Comparing



Despite the fact that the correction percentage was only at 10%, the improvement in the sound was very large. Everything sounded better.

First, the lowest bass notes were now clearly audible, whereas they were previously a muffled rumble. Second, the impact of the bass was dramatically enhanced. Kick drums really kicked with a force I had not previously experienced. Third, and this may relate to the second, the timing of everything improved, with more coherence to the music. Fourth, gaps in some lower midrange and upper bass frequencies got filled in, creating more body and warmth to the presentation. Fifth, the relationship between the lowest and highest notes became more natural and realistic-sounding – more like they are heard in a live concert. I did not need to turn the volume up to get the bass intro to sound lifelike, only to be forced to turn the volume down when the vocalist began singing. Here are three examples.

The lowest bass frequencies on the Mobile Fidelity Sound Lab Ultradisc of Yes' Fragile (UCCD 766) were felt before the Lyngdorf, but were not distinct notes in my system. Other listeners would rave about the bass, but I knew that there were some notes that I was not really hearing. The instant the RP-1 was engaged, those notes became clear tones, not just a rumble, and the organ and lead guitar snapped into much better focus. I involuntarily pumped my fist and blurted "Yesssss!" (Really)

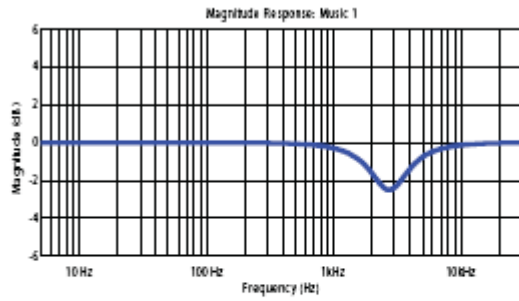
The Supreme Beings of Leisure's self titled CD (PALMCD 2006-2) contains a tune entitled 'Strangelove Addiction'. This piece has synthesizers, bass and a variety of percussion and other instruments that collapse into a big mess if the system cannot sort out all of the rhythms and sustain the music's drive. I thought that my system did a pretty good job of it until I heard it with the RP-1 engaged. For the first time, everything fell into place. I heard notes I had not heard before.

The first track on World Party's Private Revolution (Chrysalis F2 21552) is not a very good recording, and it contains what sounded like the sounds of a compressed organ that swirl around the center of the soundstage. Mildly interesting, but certainly not memorable. However, with the RP-1 engaged these sounds clarified and expanded in both width and depth and, for the first time, were clearly an organ. It was as though I had just received a superbly remastered replacement to an old, poorly mastered CD.

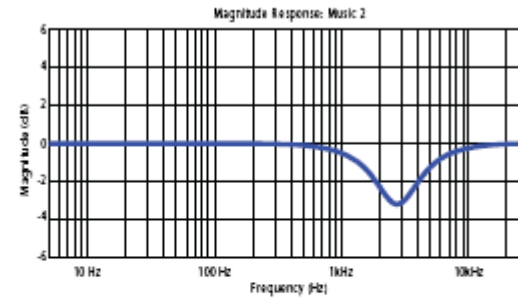
These experiences were repeated with every recording I played. But that's not all. The Lyngdorf RP-1 allows you to engage room correction in FOCUS mode, GLOBAL mode or BYPASS mode. FOCUS mode is the best correction algorithm for your main listening position. GLOBAL mode lessens the effect at your main listening position, but enhances the sound throughout the room, which is perfect if you have several people seated in different locations. BYPASS allows you to engage and disengage the RoomPerfect™ digital room correction algorithms and compare processed to unprocessed sound. This can be done from the remote control. You can compare the processed and unprocessed sound in a direct A-B fashion (make sure you equalize the volume). Doing so is instructive. The improvement is immediate and unmistakable. You will wonder why your mother never told you about this when you were growing up.

In addition, the Lyngdorf RP-1 allows you to "voice" the resulting sound. Voicing applies an EQ filter that makes mild adjustments designed to either: (a) compensate for recordings that sound too bright or dark or (b) adjust the sound for your own personal preferences. The Voicing settings are called Neutral, Music 1, Music 2, Relaxed, Open, Open Air, and Soft. These settings correspond to the frequency curves displayed below (from [Owner's Manual](#)).

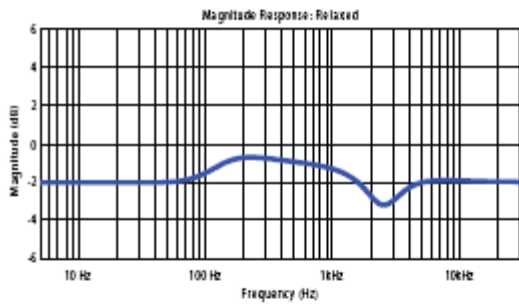
Music 1



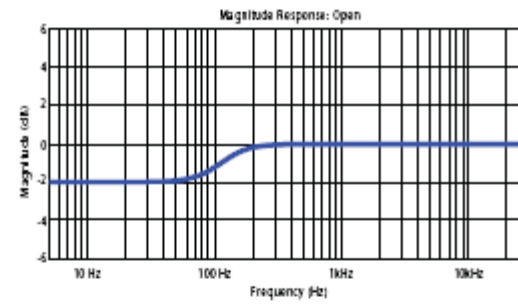
Music 2



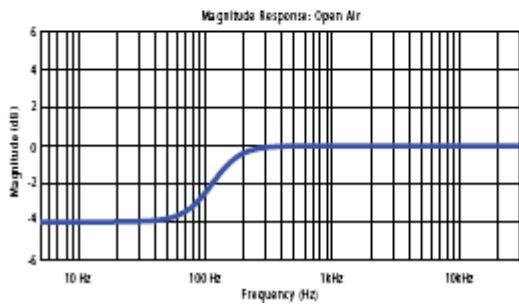
Relaxed



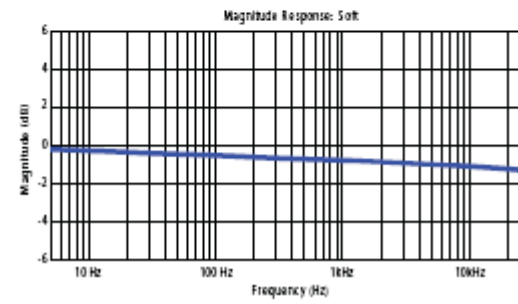
Open



Open Air



Soft



I preferred Neutral about 95% of the time, but some visitors liked the Music 1 and Soft filters slightly better. They all said that the improvement that came from engaging the RP-1's processing far overshadowed the additional adjustments you could make to suit your own personal preference.

Conclusion

The Lyngdorf RP-1 has changed my entire perception of equalization. I know – this is not the equalizer of the 1970's, but I have always considered it a sacrilege to mess with simple and pure two-channel sound. To my ears, the Lyngdorf RP-1's contribution ranks among the top improvements I've made at any time since I took up this hobby, and it's clearly the largest improvement since I've had my reference system of Esoteric P-70/D-70, Electrocompaniet Nemo Monoblocks and B&W Nautilus 800Ds.

When you consider that I have over \$5,000 worth of room treatments and that I could have avoided buying them, and can now actually consider removing them, the \$3,800 cost of the RP-1 is a bargain. In fact, I think it's fair to say that the Lyngdorf RP-1 is the most cost-effective piece of audio hardware that I've personally tried. This does not even take into account that fact that an audiophile can address the Spousal Approval Factor by moving speakers closer into walls and corners. The Lyngdorf allows much more latitude in speaker placement since it addresses the speakers' interaction with the room and will correct for less-than-ideal positioning.

The only thing that the Lyngdorf DP-1 might have considered adding was the ability to program custom voicing, which would allow a user to, in addition to the preprogrammed voicing filters, create a filter that perfectly matches his personal taste.

For example, such a feature is built into the Copland DRC205, which permits a user to use the programmed filters or to connect the unit to a computer and create a custom filter. However, I really like the RP-1's Neutral voice setting, which happens to exactly match what I personally think is the most realistic voicing that I can get from my B&W 800Ds. (Not to mention the fact that the Copland does not provide any balanced inputs or outputs.) Thus, I feel absolutely no need to program any further custom filters, especially in view of the fact that the filter choices provided by Lyngdorf address most problems created by poor recordings.

Though the RP-1 is an add-on "black box", you can also purchase a Lyngdorf DPA-1 digital preamp that incorporates RoomPerfect™ room correction. I kind of wish I had heard of the Lyngdorf DPA-1 before I purchased my current preamp. I love my MBL 5011 preamp, but adding it did not make anywhere near the impact of adding the RP-1. Assuming that the quality of the other digital features was up to par, I might have saved a ton of money and gotten a preamp that incorporated room correction.

As final proof of how impressed I was with the wonderful effect that this product had in my system, I bought one. Not the review sample whose price I might have negotiated to save Lyngdorf the shipping costs, but a new full-price RP-1, including Illinois taxes. Now that's an endorsement! (It is so difficult to convince my fellow Dagogoans to always purchase products at industry accommodation prices. Sigh. –Ed.)

Comment From Lyngdorf :

Excellent review - which I feel captures the essence of RoomPerfect. Ed's review accurately captures Lyngdorf's room correction philosophy in the paragraph titled, "What Are We Doing Here" as well as the improvements in sound it provides. Bravo!

It might be helpful to note that a primary differentiator of the Lyngdorf RP-1 from other room correction systems is that it maps the entire listening space in 3 dimensions.

This is illustrated by the fact that after you take the Focus Position measurement at the listening position, you are supposed to take subsequent Room Measurements with the microphone randomly positioned and oriented in 3-dimensional space. This means up near the ceiling, down near the floor, near walls, in open and adjoining areas, etc. Other systems look for mic to be located solely at the listening position (1-D) or at multiple listening positions (i.e. in 2-D plane).

On background information described in the paragraph titled, "Who Sells Lyngdorf" (last paragraph), while Peter is definitely the Main Man at Lyngdorf Audio (he is the owner and inspiration of the company), he is not the chief designer. That role is held by Lyngdorf Audio's CTO Jan Abildgaard Pedersen, who happens to be one of the world's foremost acousticians as well as a brilliant engineer and programmer. In fact, Peter has assembled one of if not the most remarkable engineering staffs in the history of high end audio. Over 30 of the 50+ employees are engineers, including the CEO. Talk about engineering driven! (BTW, Peter also owns Dali Speakers.)

I was please to see you mention the real world applications of RoomPerfect where speakers can be made to sound their best in the locations where most of us are forced to listen to them – typically much closer to the front wall than ideal for best frequency response. However, this close-to-the-wall placement provides an additional benefit: since the direct and reflected sounds are emanating from (almost) the same point in space, transient response and attack are improved, giving even better performance on percussion and plucked instruments. Domestic tranquility is merely a bonus.

Steve Colburn
Triad Speakers
Lyngdorf U.S. Distributor