AUDIO PREVIEWS

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Podium Sound M

Reviewers: Marja & Henk
Sources: CEC TL5100, Audio Note tube DAC, Audio Magic (Peter van Willenswaard) DAC [on loan]; Philips DVP 5500S SACD/DVD player
Preamp/integrated: TacT RCS 2.0 room control system, modified Audio Note Meishu with WE 300B (or AVVT, JJ, KR Audio 300B output tubes); Moscode HR401; Trends Audio TA-10; *Avantgarde Acoustic Model Three* [in for review]
Speakers: Avantgarde Acoustic Duo Omega; Avantgarde Acoustic Solo in HT 2.0 setting; Audio Note AN/Jsp silver-wired
Cables: Audio Note AN/Vx interconnects; Siltech Paris interconnects; Gizmo silver interconnect; Qunex 75 reference interconnect; Crystal Cable CrystalConnect Reference interconnect, CrystalDigit S/PDIF RCA/RCA and RCA/BNC, Y-cable, Crystal Cable Piccolo iPod to XLR, CrystalPower Reference AC-Eur/IEC' CrystalSpeak Reference; Audio Note AN-L; Gizmo silver LS cable; *Virtual Dynamics Revelation power cords* [in for review], *Harmonic Technology Magic Woofer, Magic Tweeter & Pro AC11* [in for review]
Power line conditioning: Omtec PowerControllers; PS Audio Quintessence [in for review]
Equipment racks: Two double sets of Solid Tech Radius; Acoustic System amplifier shelf
Sundry accessories: IAR carbon CD damper; Boston Audio graphite CD damper, Denson demagnetizer CD; Furutech DeMag; Nanotech Nespa #1; TacT RCS calibrated microphone and software; Exact Audio Copy software; Compaq server w/Windows Server 2003 and XP; wood, brass and aluminum cones and pyramids; Xitel surround processor; Manley Skipjack; Boston Audio Design TuneBlocks
Room treatment: Acoustic System Resonators; Gizmo's Harley Davidson cap
Review component retail: Approximately € 9,600/pr

At the recent High End show in Munich -- lucky for them *and* us -- a small booth in the big Zoo-like hall became the event's revelation for many. Tucked away between all that makes an open exhibit hall an open exhibit hall were a few sound booths. One of the least flashy ones, in as plain white as they come, housed Podium Sound. During our final round through this cavernous expanse -- you always miss things when the amount of stuff shown is *so* immense -- we discovered the surprise of 2007 quite by chance.

From our coverage of the show, we quote: "Upon entering [the Podium Sound booth], we were the only visitors and took a seat facing two fairly large flat loudspeakers clad in a shiny copper disguise [Model 0.5]. Some classical music played and the flat panels produced an exceedingly pleasant sound. As we were unfamiliar with the music, there wasn't much more to say. Luckily the gentleman running the exhibit offered to play some of the CDs we had brought along. We chose a lengthy Vicente Amigo track that features plenty of fiery transients, deep bass lines and male and female vocals. Well, some eight minutes later we had tears in our eyes and a warm feeling in our solar plexus. Admittedly, bass extension was not exactly stygian but the remainder was so bloody natural. Above all, things were so intensely musical that it was downright scary."

Later we listened to the big Podium 1 panel. They topped the Podium 0.5 with more bass extension. Hadouk Trio's synthesized tripping bass lines were no problem. From this initial encounter with these truly amazing loudspeakers, things developed in a hurry. We made an appointment to review the largest panel, the Podium Sound Model One. It took a few weeks and then two boxes arrived on our doorstep. Unfortunately, shipping had damaged one speaker. This became cause for an urgent repair. It happened that Shelley Katz, owner and designer of Podium Sound, was on the continent and could visit us in Rotterdam for a personal repair.

Inspection of the faulty speaker made it clear that it would take considerable time for the repair. As all things have two sides, we took the opportunity to get to know the designer and familiarize ourselves with his ideas. Next, we could witness Shelley working on the speaker and see the panel full Monty style. From extensive vis-à-vis and follow-up e-mails with Shelley Katz comes the following. We think it is important to know as much as possible about a designer's background, his ambitions and ideas.

Who is Shelley Katz?

At the ridiculous age of two and in Montreal, Canada, Shelley much to the consternation of his parents discovered that a piano was the most effective toy for making noise. His ability to conjoin whacks and thunks in a unique manner led to early success with recording on national radio at the age of six. It went downhill from there. Throughout his teens, Shelley determinedly refused to chose sports over music. Does this sounds like Glenn Gould revisited? For his sins, he was interned for five years as a scholarship student at the Juilliard School in New York where the best efforts of teachers and counselors did not succeed in dissuading Shelley from continuing on the mad career path of a musician.

Now take a deep breath for what's next. After a brief two-year attempt at normalcy (in which he renovated a Victorian appartment house and completed the science requirements to apply for med school), he had a total relapse and escaped to Germany where he turned his frenetic energies to any and every musical endeavour possible, from conducting and coaching singers to accompanying, solo performances and composition.

The Germans were relieved -- and some started to reconsider the involvment of the UK in the EU -- when Shelley finally moved to England where he completed a multidisciplinary
PhD; *multidisciplinary* because the music, psychology and mathematics departments in question were so generously inclined to offer each other the privilege of primary responsibility for Shelley's research that it left the question as to who actually supervised Shelley a conundrum for the departments of Philosophy and Religious studies.

Interestingly, Shelley's thesis is expected to have a major impact on sleep disorder. Negotiations are under way for a worldwide licence agreement with GlaxoSmithKline to issue small vials that contain the abstract of Shelley's PhD to put children to sleep, a full synopsis to put adults to sleep, and the first chapter for crowd control during prison riots. At last, Shelley settled down (sort of) with his magnificent wife and two children in Cambridge, UK. When not poking around in piles of electronics and destroying loudspeakers, he works as the lesser half [the other being his wife the coloratura soprana Diana Gilchrist] of the two Musicians in Residence at the ISC. This is the International Study Centre at the Herstmonceux Castle in East Sussex. The ISC is a faculty of the Queens University of Ontario, Canada.

From this quick biography, the man is a multi-disciplinarian, a sort of Homo Universalis, frantically pursuing his goals on various terrains but with music the leitmotif. **Why is Shelley Katz building a loudspeaker?**

I have a life-long obsession with sound and in particular, with the sounds of Western classical music. In 1987, when working at an Opera House in Germany, SK was among the first individuals to arrange for a digital piano to be used in a classical orchestral pit. Although the digital piano was better than the in-house harpsichord (which could never make it through a performance without going badly out of tune), the digital piano sounded very unnatural and electronic. I then decided that I would find out why. After moving to England and while working toward a PhD in the area of

Cognition of Expression in Music, I took advantage of the academic environment to also conduct research into acoustics and sound propagation. By 1998, I had successfully built an electronic piano which did indeed approximate closely the sound and behaviour of an acoustic instrument, and soon thereafter reduced the technology to loudspeakers alone.

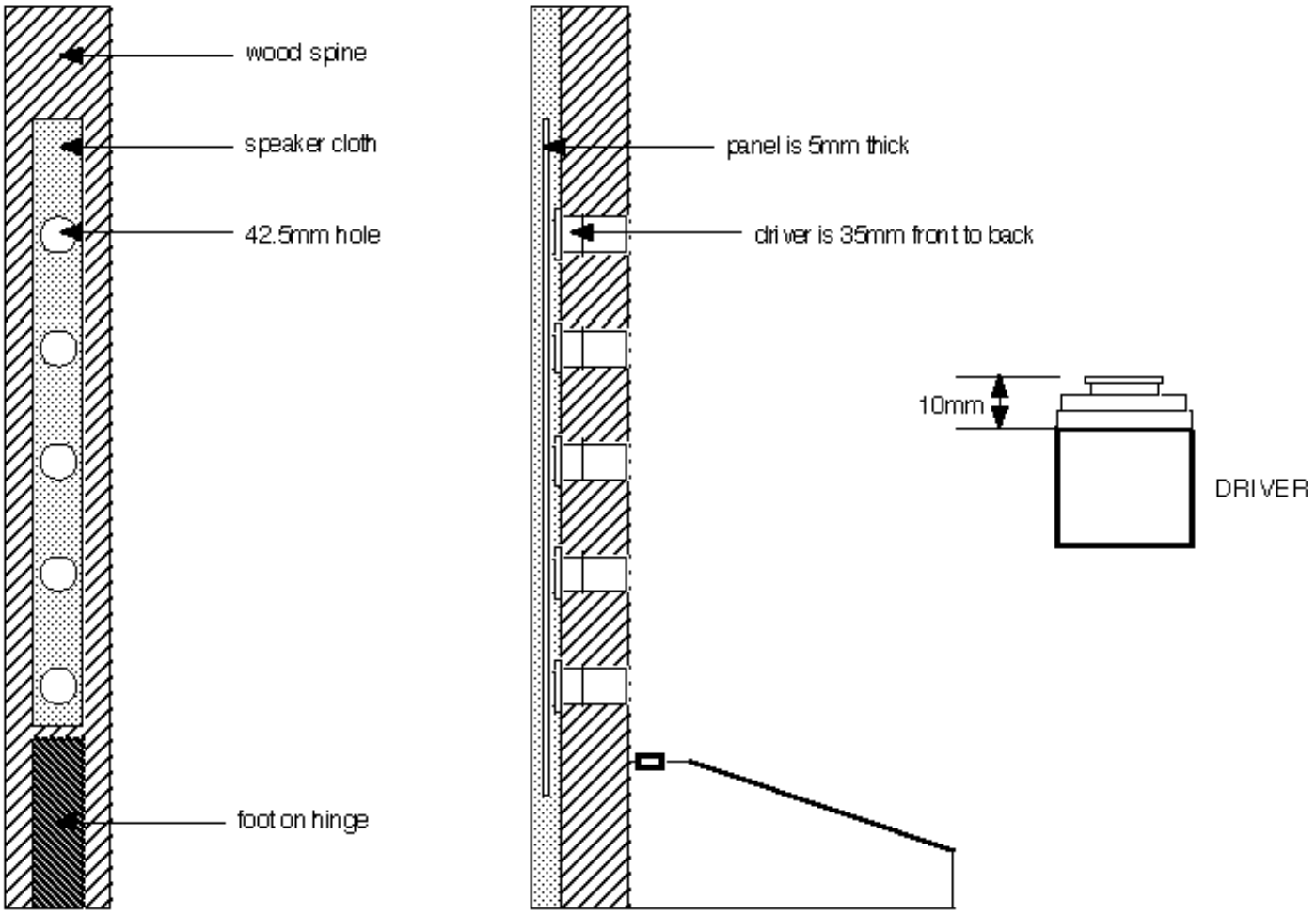
In short, SK was not satisfied with the sound from any loudspeaker he heard and consequently had to develop his own. This is a story similar to many. However, many or most of the people who seek to develop the ultimate loudspeaker do so on the basis of the quality of the components or the performance of the loudspeaker. The target or goal which I sought was to match a particular sound, the sound I was most familiar with - an acoustic instrument heard in a concert hall.

What is the relation to *Layered Sound* anyone who Googles your name will find?

Layered Sound is the name given by me to the method of designing a loudspeaker which most closely approximates the air disturbance patterns of *natural* sound. It is the term I applied to a discovery which became the subject of several patents, some of which are now granted and in full force. Natural sound (for example, an acoustic instrument) propagated in a given acoustic space will generate sound waves that are perceptually both binaurally correlated and binaurally de-correlated. The sound waves are processed by the mind into directional and non-directional (i.e. reflected) sound.

Binaurally de-correlated sound is sound which enables us, with our two ears, to cognate the size of room we are in, our location in the room, our distance from a sound source in the room, our proximity to a perimeter of the room and various other pieces of information. This type of sound is classified as reflected sound..

Conventional loudspeakers are actually a machine which propagates binaurally correlated sound waves. So the question arises, how can conventional loudspeakers truly *reproduce* reflected sound? The answer is that they cannot. Any other answer is fooling around with the truth. For example, suggesting that it is possible to reproduce the diffuse qualities of reflected sound by using multiple conventional loudspeakers as in surround sound is nonsense for many reasons, only one of which is the destructive interference created by the multiple transducers. One can attempt to approximate the effect, but it is important to accept that one starts with some fundamental limitations imposed by the nature of the technology, and which cannot be overcome by other means, for example, through processing or other effects. This is one of the main reasons why conventional loudspeakers always sound like loudspeakers and never like an acoustic instrument. To create sound waves which are binaurally de-correlated, the best method to date is to use a sound radiator which propagates sound waves that are mostly binaurally de-correlated. And among others, the panel loudspeakers I design do exactly that. So, to answer the question, my research into panel loudspeakers was a result of my research into Layered Sound, and the Podium loudspeakers are a spin-off of the Layered Sound technology.



Why panel loudspeakers?

One could answer by saying:

- it is wonderful to challenge a listener's conceptions of reproduced sound by producing a dramatically different loudspeaker
- one result of the years of research into Layered Sound was to provide me with the knowledge regarding panel loudspeakers and how to build the best
- there are design possibilities which are dramatically different from conventional loudspeaker
- they are a technology which is in many ways much more robust and simple than conventional loudspeakers and because I am a fan of simplicity, I favour these loudspeakers
- they sound fabulous and in some ways, superior to anything else I've heard.

Or one could answer by saying: Why not?

Does Podium Sound Ltd. use the NXT patent?

No, not at all. Interestingly, that question was also asked of several individuals who were or are still involved with the NXT company and they concur - the Podium technology is completely different in many ways. Where the NXT DML (Distributed Mode Loudspeaker) uses maths to predict and design a given panel, the Podium technology uses no maths at all. Where the DML is designed to maximize the distribution of modes, especially in the bass frequencies through analysis and prediction, the Podium is 'tuned' empirically like an acoustic instrument.

Because the Podium Sound loudspeakers are hand-tuned as we witnessed and the tone of the input equipment is so important to the outcome, what gear did you use to voice the speaker?

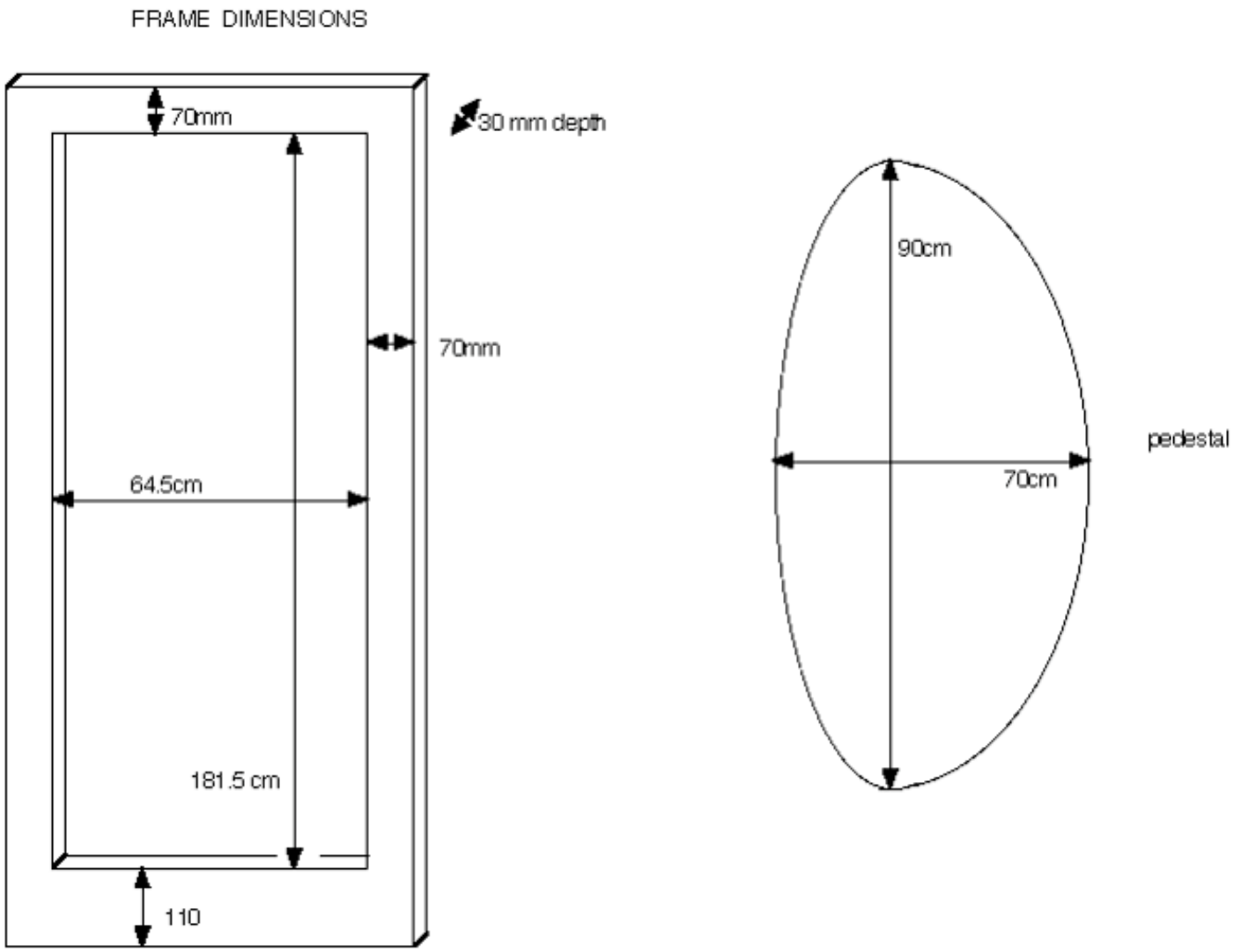
My ears, my hands and music that I've listened to thousands of times. Those are the main tools. I also compare many different amplifiers, from very crummy cheap garbage to high-end units. And yes, I measure with CLIO, the Italian measuring system, but I use two microphones as often as one and I also use the DSSF software from **Yoshimasa Electronics**. In short, I think part of the difference is the manner in which I use the tools. For me, the measurement system is nothing more than one more method of asking "what do you think?" but in the case of a measurement system, the question is addressed to an electronic device. I listen politely to what the machine tells me and where the machine makes sense to me, I consider the feedback valuable. But I do not slavishly follow the frequency response curve because there are too many factors that will affect the measurement by the machine and yield an inaccurate response. You will not be surprised to learn that my worst fears are of the magazines and reviewers who start and base their opinions on their own 'measurements' of my loudspeakers - I truly do not understand how the loudspeakers can be measured in a manner that provides a meaningful result in relation to music.

What is the history of Podium Sound?

In the summer of 2006, I reached an extremely desperate moment financially. I had turned over every rock I could reach in order to commercialize the Layered Sound technology. As a single individual with a family to maintain, the task was simply beyond me. I needed something, some success, or I would truly have had to declare personal bankruptcy and start again with absolutely nothing. It became clear that where a Layered Sound loudspeaker was relatively difficult to design and build in the garden shed, a basic panel loudspeaker was easier. It was something that could be built in small numbers, was relatively familiar to the audio community and assuming it would have sufficient quality, could be made profitably and thus not only save the day but provide a way of emerging from disaster.

Together with an engineer/technician who was working for me at the time, we quickly designed and developed a very rough bench-top model held together with tape and chewing gum and covered it entirely with a cloth wrap to hide how fragile the thing was. I then called Howard Popeck whom I had heard of, and after hearing the loudspeakers he took a chance and agreed to present them at his own risk at the Heathrow show in September 2006.

In retrospect, it's frightening to think about moving and taking those really fragile bench-top models to an important show. They weren't tuned, the sound design was done on concept much too quickly and consisted more of guesswork than careful attention to detail. Fortunately, the technology is fundamentally quite robust and in spite of its many flaws when simply thrown together, the rough models were received with great enthusiasm.



Within the next two months, I designed the Podium 1, began the design for the Podium 2, planned and organized production through to packaging and shipping, raised funds, dealt with the creditors and then launched Podium Sound Ltd. by December 1, 2006.

It is simple enough to write, "I designed the Podium 1" etc. But the simplicity of the sentence entirely belies the complexity and difficulty of that first design. A given design is always a balance between at least three major factors: cost, looks and technology. Under cost resides the entire panoply of elements which include complexity of manufacturing, materials, availability of resources, packaging etc. Looks are exceedingly complex and of course, the functionality of the technology is supposed to be paramount (which it rarely is). Consequently, the design process is usually exceedingly drawn out as one goes through multiple iterations to get it right.

Achieving a satisfactory, reasonably successful design through production and delivery in under two months while doing many other things at the same time required an investment of time and effort which is virtually indescribable. Suffice it to say, an average of three hours sleep was only part of the sacrifice needed.

Here Shelley is a bit modest. One of his associates reports that three hours is a generous rounding up of 'less than two'.

When the company was launched, we took the approach of selling directly to the end user. However, in spite of the benefits to the customer, there is an interesting paradox which arises. The fundamental benefit to the customer is a significant saving in cost of ownership and for the manufacturer, a significantly better margin. But the drawbacks are the issues associated with customer support, availability of demonstration facilities, ancillary equipment and the entire panoply of benefits which come with a traditional network of distribution and dealerships.

Furthermore, in terms of growth for the business, there are issues associated with awareness, trust, reach, history and others. Perhaps if we had the time, we could have very slowly built the company by continuing to sell direct. However, I decided that I wished to grow the company quickly and the only way to do that was to change our strategy from direct sales to the traditional distribution and dealership. And that is exactly what we are doing. Here's to the future!

***Bending wave*, *Distributed Mode*, can you explain these terms?**

These are terms, which I believe were first coined to describe the loudspeaker technology now licensed by NXT plc under their granted patents. It seems a 'Bending Wave' loudspeaker is meant as a generic term to describe a loudspeaker which propagates sound as a result of transverse waves flowing through an element which is free enough

to vibrate in at least some directions. The Distributed Mode loudspeaker or DML is the specific instance of this kind of loudspeaker which is built according to the principles published under the NXT patents.

Can you describe the Podium 1?

The frame is solid English oak. It consists of a single vertical spine down the centre of the back and a seemingly simple rectangle (similar to the stiles and crossbars of a door), to which the spine is glued. The final frame design was established only after many trials. Some of the factors which had to be considered in the design of the frame were:

- sonic behavior
- the ability of the frame to support very high tension created by the strongly stretched fabric across the front and back
- a reliable method of holding the cloth in place
- an elegant method of holding the cloth in place
- the nature and placement of the footing (I like a tripod)
- the ability of the frame to vibrate sympathetically and constructively
- the method of holding the drive units and the electrical wiring

These issues are not to be underestimated and the cabinet maker whom I use, **Jeff Powell**, is certainly a gifted man. It's not surprising that he is a third-generation cabinet maker and owner of a family business which goes back many decades. In fact, the final cabinet design is a wonderful example of English understatement. From the front, the joints seem almost crudely simple. It's only when one examines the back of the frame and sees the perfectly angled bend at each joint that one begins to suspect there is some very serious joinery taking place. There are absolutely no screws of any kind. The frame is both rigid enough to resonate and vibrate constructively yet supple enough to give and flex as needed, either for safe transportation or more importantly, so as to provide exactly the right timbre to the sound.

There are five drive units, perfectly spaced in a vertical line along the centre of the spine. The drive units are fairly standard electromagnetic drive units, exactly similar to a conventional driver for a conventional loudspeaker minus the cone, dust cap and basket. The only difference is that instead of the voice coil attached to a cone, there is a rigid footing which enables the movement of the voice coil to be transferred to the vibrating element (panel) and which directly induces the transverse waves into the panel.

The vibrating element of the Podium 1 is a single panel. The vibrating element is very similar in many ways to the soundboard of a piano or the body of a stringed instrument (violin, guitar...). When selecting the vibrating element, the goal is to find something that will ring true and cleanly. I started with the conviction that in order to get a truly satisfactory frequency response, I needed something big. Although there are an infinite variety of materials available, I quickly decided to use a honey-comb core panel because it has wonderful characteristics difficult to find in any other single material. It is lightweight, relatively easy to work with, extremely stable over time, resistant to humidity and most importantly, can ring like a bell.

There are, as always, a number of factors which are important when designing the vibrating element but of critical importance is the edge treatment of the panel. It is my belief that similarly to an airplane wing, the edge of the panel is crucial to performance. It's where the greatest turbulence occurs. In the particular case of a panel with a honey-comb core, there is a serious difficulty. Once cut, the honey-comb core is fully exposed and if left, will contribute significant noise and distortion to the sound. Even where the panel is fully held in place as in the loudspeakers designed according to the principles espoused by NXT, the core may still add noise at odd frequencies and thereby cause unwanted distortion.

Consequently, I spent months working with a wonderful English company, Parafix, and in particular a terrific consultant by the name of Peter Short. Parafix specializes in glues and tapes from around the world and Peter was kind enough to send me bag after bag of samples until my workshop started to look like a small warehouse of everything sticky.

I would stick tape to anything that moved (you should have seen the neighbour's cat!), glue anything that I could grab and then put the results of my *adventure in stickiness* into the worst possible circumstances. I'd throw glued panels into a sink full of water, soap and various chemicals. Leave taped panels in direct sunlight, leave panels for days in the oven and I even ruined a perfectly good toaster when the panel (and glue) I was testing burst into flames. Even now there is a large panel hanging straight down from the ceiling where after several months in position, I can feel confident that the glue indeed exceeds my need for linear strength.

The edge treatment I finally chose has the following special qualities:

- it is a very powerful and relatively permanent fixing without rigidity
- it causes no damping but eliminates totally any possibility of the exposed honey-comb core causing noise
- it is exceedingly light in weight
- it is virtually transparent, making it visually attractive

There are a few other benefits as well but this is primarily to give an idea of the complexity and subtlety of designing the vibrating element. The vibrating element is fundamentally rectangular in shape, with rounded corners. The purpose of rounding the corners is because empirically, it was discovered that pointed corners simply do not provide as good a sound. This may be due to the nature of the internal reflections, and/or the physical movement of the panel through the air.

Why the chosen sizes?

There are, regretfully, mostly banal reasons for the size selection. The large loudspeaker uses a panel size which is the maximum size we can get for a pair of panels out of a single sheet from the manufacturer. The smaller loudspeaker is based on the maximum size we can get out of the width, or precisely five panels.

Why no crossover?

It is important to be exceedingly precise about this point. I like working with materials according to their nature and according to what allows them to function with a minimum of intervention. In this way, materials and systems tend toward greater stability and longevity.Perhaps I will open myself up to attack here but I must make a distinction between what I do with the Podium 1 loudspeakers and conventional crossover design. As you well know, a conventional crossover, from an electrical perspective, attempts to progressively limit the signal to two or more drive units, at one or more ends of their natural frequency range in order to allow pairing of drive units and the impression of a unified frequency response. From the perspective of a mechanical system, the first part of the crossover is actually taking place in the air immediately in front of the loudspeaker and the second, at the air/human-receptor interface. There is a fundamental assumption here, which is that human cognition will integrate and unify the certainly disparate components into a single frequency range. Given the issues related to differences in mass, speed, air displacement (to name only a few), it seems to me a great leap of faith to depend on human cognition to kindly integrate what is a fundamentally disparate system and yet for the same human cognition to kindly avoid noticing what it is being required to do. Clearly, this is naïve at best and surely must be one of the many causes for the obvious distinction between a live performance with an acoustic instrument and a conventional loudspeaker.

From an electrical perspective, I use conventional crossover techniques to limit the signal going to one or more of the drive units. However, unlike the mechanical system described above, the first part of the Podium 'crossover' takes place at the interface between the drive units and panel (which is the skin of the panel) and the second part of the 'crossover' occurs with the blending of the transverse waves, induced by each drive unit, within the panel itself. Once I am happy with the manner in which the panel is being induced to ring, I am then able to tune it by using what I describe as *sound bridges* with which I am able to either limit or boost specific frequencies and frequency ranges.

So my claim to having no crossover in the Podium 1 is due to the fact that as far as the mechanics of the system are concerned, there is only a single driver (the vibrating element or the panel), and it clearly does not manifest any separate parts. It is worth noting that whereas there are admittedly some electronics built in which are necessary to optimise the Podium 1 loudspeakers, there are, with the exception of a single 1-ohm resistor, absolutely none in the Podium 0.5. And the reason for the resistor in the Podium 0.5s is to make it a comfortable load for all possible amplifiers. Should anyone wish to purchase a special unit, I would be happy to leave the resistor out but their amplifier would have to be able to handle a 2.5-ohm load at the lowest frequencies.

Are you unique in having multiple drivers for one panel?

No, not at all. For example, Amina Technologies Ltd. owned and managed by Richard Newlove (a wonderfully kind and scrupulously honest individual) uses multiple drivers in some of their loudspeakers.

Do you spread frequencies?

Aha! In the Podium 1, yes, in the Podium 0.5, no. In the Podium 2, yes.

Where?

The split is between drive units and depends on the nature of the physical design. You may be surprised to learn that the choice of drive units for the different frequencies, in terms of their location on the vibrating element, is neither simple nor predictable. In the case of the Podium 1, it is, for example, not merely one or two of the drive units at the top or in the middle.

With a capacitor?

I use capacitors only in the Podium 1. There are none in the Podium 0.5 and Podium 2.

How did you achieve the amazing bass extension?

Although the size of the vibrating element (panel), density, surface tension and a few other factors affect the bass extension, that is not really what you are asking. The proper answer is in relation to the sound-bridge parts of the loudspeaker. As you saw [while Shelley was doing the repair job on one speaker], I use a high-quality, completely inert, partially rigid rubber to hold the panel in particular places. And if one looks at the loudspeaker with light behind it, one will see some strange dark spots on the sides, which are not aligned with each other and seem to have no relationship with each other at all. But the placement of these sound bridges is absolutely critical and crucial to the bass extension. By adding these to the design, I can alter flaws in the frequency response, sometimes by in excess of

a (perceived) 14dB.

As you can imagine, the placement of these sound bridges is what takes so much time in the design and cannot really be measured. This is where I will do the design many times until I find an arrangement which is both simple and effective. You may be interested to know that I have a design for a Podium 1 which uses a very large number of sound bridges and absolutely no built-in electronics. But I did not like the performance and the complexity of the physical design concerned me so I went with the electronic/sound-bridge hybrid.

Who knows, perhaps one day I will have access to a programmable laser that can carve the surface of a vibrating element for me in the same way a violin maker carves his cabinets - and then I will use absolutely no electronics and very few soundbridges, if any.

How did you come to the drivers you now use?

Regretfully, they are simply the only ones currently available that have a reasonable price for what they are, are available in large quantities and are reasonably consistent in their manufacture. It was a question of simply no other choice - not even close.

What about speaker placement - critical/non-critical and room interaction?

Thank you for asking about this. Most loudspeakers are placed in a room with a fundamental assumption in mind, namely let's find the place where one can listen mostly to the loudspeakers, with as little impact from the room as possible. There are many reasons why I have difficulty with that concept, not the least of which is that it suggests that the perfect listening environment must be an anechoic chamber. That's clearly ridiculous.

The Podium loudspeakers are not meant to be listened to without the room. Placement is important but with a difference. Manufacturers of conventional loudspeakers have taught us to place their loudspeakers in a manner which is supposed to permit us to listen exclusively to the loudspeakers themselves. The corollary is that they wish to find the room placement where the acoustic environment is least involved. The Podium loudspeakers are the complete reverse. My suggestion is to try and find the place where the acoustic environment is most involved. Although one can try to listen exclusively to the loudspeakers themselves, I believe that one cannot get away from the simple fact that a loudspeaker will be listened to in a space that has boundaries. So my goal is to work *with* the space and not fight it.

The result is that the Podium loudspeakers will sound good everywhere but there will always be places where the loudspeakers extract more from a room than other places. This may give the impression that the loudspeakers sound different but in fact, it's the result of maximising the use of the acoustic space rather than reducing its impact on the sound from the loudspeakers.

Dr. Marja Vanderloo &
Dr. Henk 'Longbeard' Boot

Podium Sound website