the absolute sound®
December 2015, Issue 258

Muraudio Domain Omni PX1 Omni-Directional Electrostatic Loudspeaker

Robert E. Greene

“I had not realized that music could be so beautiful.” Thus spake Bruno Walter after conducting in the Vienna Grosser Musikvereinsaal for the first time. His words came to mind listening to the Muraudio PX1 omnidirectional electrostatic speakers for the first time. I had perhaps not realized that music reproduced in the home could be quite like this: the purity, the smoothness, the roundness, the filling of the room, the effortlessness, the deep bass extension, the sense of speakers vanishing as sources, and the stability of the sound with respect to listener position, all combined to disarm my critical self and switch me over to the state of a listener hearing live music in a great concert hall, immersed in an ambient soundfield, albeit with the locations of instruments still clearly perceived. The experience is so different from ordinary stereo listening that it calls for some careful thought about what one wants from a stereo system. By intention, the PX1s present a unique experience — entrancing, but different.

And the mechanism of this is truly something new. The PX1s are not just a slightly different version of something else, not just another variation on themes already stated and varied by others. Most of the speakers in our world would not really surprise Rice, Kellogg, Olson, Villchur, Walker, Hughes, and the other giants of the past. They would be impressed by the refinement of execution (and the prices!) but not startled by the designs, which would seem to them the natural extensions of their own work, using improved materials technology. The big floorstanding towers of today are the speakers Rice and Kellogg would have built if they could have. But I think it is safe to say that none of the masters of the past really envisioned as a practical possibility an electrostatic speaker with panels that curved in both directions with three of them fitting together to form not a pulsating sphere, but rather a sort of pulsating kiwi fruit with a radiation pattern that is horizontally omni. One can imagine Peter Walker saying, "Jolly clever work there."

Reviewer comments from audio shows suggest that everyone had much the same experience as my own—of being swept away on first exposure to the PX1s. But it is, of course, part of review work to take such unified, more or less ecstatic experience and analyze it, slice it, and dice it to figure out how the speaker does what it does, and whether what it does is what one wants a speaker to do.

These sentences are not a preamble to finding fatal flaws in the PX1s later on. This won't be like the Cheater: "He's gonna build you up just to let you down." But it will be necessary to describe the distinctive nature of the PX1s—not so much in terms of what the "right" transducer is (a question with no objective answer), but rather in terms of the differences among speaker types. Omnidirectional radiators are distinctive, without doubt, and this one is particularly so.

As it happens, I liked the PX1s just as much on the last note I heard from them (just a few minutes before they went back into their crates) as I did on first exposure. Maybe I even liked them better. But as with any speaker, the PX1 chooses a path, and one needs to understand what its path is and what its virtues and inevitable restrictions are. As I mentioned, it's different from other speakers—not a little different, with this, that, or the other small variation of frequency response or whatever, but a lot different. And a potential purchaser has to decide whether the difference is what he wants.

How the PX1s Work

The frequencies below 450Hz are handled by a sealed-enclosure bass unit with three dynamic drivers, separated by 120 degrees, which have a total effective radiating area of 100 square inches. The enclosure is cast aluminum. On top of the bass enclosure is the electrostatic mid/tweeter unit made of three curved electrostatic pieces, each subtending 120 degrees, which fit together to give a continuous round unit. But the unit is not a cylinder—rather it is tapered at either end with maximum diameter in the middle and small diameters at either extreme. The effect is that the combined electrostatic units radiate in an omni pattern horizontally but, unlike what a cylinder would do, they spread their radiation vertically both up and down. The radiation is effectively uniform over a +/-8 degree window and thereby eliminates any sense of vertical beaming. The transition from woofer to mid/tweeter unit is effectively seamless, with the narrowing down of the vertical radiation to +/- 8 degrees happening much further up than the crossover frequency. However, at close-up positions there can be a hint of highs-up, bass-down.

In order to accomplish all this, it is clear that the electrostatic panels have to be curved in both horizontal and vertical directions. They have to have what mathematicians call "positive Gauss curvature"—curvature in all directions. This presents a challenge for metal-forming because thin metal parts are usually made by rolling flat sheets with the results curving only in one direction at each point. Here, the stators of the electrostatic elements are made by hydraulic pressure-forming with heat annealing at an intermediate point in the process to prevent excessive internal stress accumulation from resulting in fracture. This is not the typical electrostatic panel we are used to, not even of the curved sort; those curve only in one direction.

The whole speaker thus has a horizontally omni pattern. Vertically, it goes from omni in the bass (as usual for enclosed woofers) to a narrowed pattern in the top end as the vertical pattern gradually narrows with increasing frequency into the +/- 8 degree directionality mentioned.

The Sound in Tonal Terms

Let me start with the bass. This is the least distinctive part of the speaker, but it is in fact extremely good. "Gnomus" from Mussorgsky's *Pictures at an Exhibition* arranged for pipe organ and played by Jean Guillou [Dorian] had not only the required power but also excellent definition. Pedal tones that often are undifferentiated rumbles became precise musical (and mechanical) items. These speakers supply full-range bass with superlative precision on their own and so do not need subwoofers. (The nominal -3dB point is 30Hz, but given room gain and the slow roll-off of sealed enclosures, these speakers are full-range.)

What's needed here is power. The nominal sensitivity of the PX1s is 82dB—quite low! The otherwise excellent Benchmark AHD2 amplifier, with 100 watts into 8 ohms, 190 into 4 ohms, did not enable the PX1s to give their best; there was clipping on orchestral climaxes at even moderate levels. So I brought over my big Bryston 14 ST, which can pretty much drive anything, and it drove the PX1s without any fuss or bother. (The PX1s are rated to accept 1000W peak power so you are not likely to over-drive them, but, say, 250 watts on bass transients won't be as loud as one might think.) Both the Benchmark and the Bryston have clipping indicators, so it was clear what was happening in metered as well as listening terms. The Sanders Magtech would have been another obvious choice, but I was using it back at my place. (The Muraudio review samples were in fact in Paul Seydor's home, as I did not have the space for them at that moment and as PS was partnering in the review in any case. I am very familiar with PS's listening room and system—we live not far apart and often listen together at his place—so this was not an issue. And PS was out of town during part of the review period, so I could indulge myself in listening without being a nuisance.)

One just has to face the fact that the PX1s are not terribly sensitive speakers, and you must give them the kind of amplification they need. In this price range, this does not seem a major issue since suitable amplifiers — suitable and then some! — are available at prices far lower than the speakers themselves.

The speakers' maximum SPL output is rated at 105dB at 2 meters (this would be around a 200-watt input for a sensitivity of 82dB, if one takes these things at face value). This is loud, especially with an omni speaker. In practice, I never felt any need at all to play them louder than where they seemed happy playing. Due to the speakers' omni pattern and resultant "direct arrival" loudness, this SPL is actually louder than its number suggests. In any case, 105 dB is plenty loud! Still, you do need a powerful amplifier to get out of them what they can offer. (Big bass notes can amount to a surprising lot of power for short times.)

"The PX1s are one of the all-time triumphs of speaker design … This is really a landmark in speakers, a huge step in a new direction that previously hardly figured in anyone else's imagination, much less reality."

"The PX1S' RTA measurement was uncanny in its smoothness… effectively the speakers were in-room flat… This is as good an in-room performance as I can ever recall seeing without DSP, and far, far better than most… Usually such super-smooth curves are obtainable only at a particular sweet spot, but the PX1s did the trick over a variety of listening positions."

Beyond the bass, two things were immediately striking. One was that the sound was extraordinarily smooth in both in-room and perceived response. In-room measurements were also much smoother than one usually finds. Every speaker is pushed around a little bit below around 300Hz by room effects (though the PX1s looked good from there down, as such things go), but from there on up the PX1s' RTA measurement (1/6th-octave smoothing) was uncanny in its smoothness. It matched within 1dB a very gently sloping target curve, say a 2dB droop by 10kHz. There was a very subtle broadband lift at 1kHz and a small dip at 2kHz but effectively the speakers were in-room flat up to the usual (and desirable) roll-off of the very high treble. This is as good an in-room performance as I can recall ever seeing without DSP, and far, far better than most. Moreover, it was very stable over a variety of listener positions. Usually such super-smooth curves (e.g., *www.regonaudio.com/Harbeth Monitor 40.html*) are obtainable only at a particular sweet spot, but the PX1s did the trick over a variety of listening positions. Large displacements vertically from the center of the electrostatic unit caused some irregularities and extra treble roll-off. But otherwise stability was the rule.

The slight tendency to relax a bit around 2kHz brings up another point: Above 1kHz the PX1s generate more diffuse than direct sound compared to most speakers, and the ear's response to a diffuse field is quite different than the response to frontal arrival. This means that a speaker with more diffuse field will in fact sound different, other things being equal, than one with relatively more direct arrival and a less diffuse field. The nature of this difference is known, with the main distinction being is that around 3kHz there is a dip of about 5dB in the ear/brain's diffuse-field

response compared to frontal-arrival response. Physically both responses rise, but the diffuse field rises considerably less. So diffuse sound will have in effect an audible suck-out around 3kHz. This works the other way, too— when the response of a microphone that is picking up a diffuse field is played back frontally, it will have an apparent peak of about 5dB at 3kHz. This is the reason many speaker designers have found that a dip at 3kHz makes things "sound better" (cf. Siegfried Linkwitz's website).

The effect of all this is that the PX1s, which are quite close to truly flat in in-room RTA measurement, sound pleasantly non-aggressive and natural in the 3kHz range compared to flat speakers with primarily frontal radiation. This is, in the case of recordings where a lot of diffuse field was recorded, a kind of higher truth— the playback resembles the sound the microphone picked up and hence sounds more natural.

This is not to say that the PX1s lack top-end sparkle. Sibilance in speech, for instance, is not lost. Nor is high percussion dulled. If anything, the speakers are a bit extroverted on top though not in any displeasing way. Note also that many speakers roll the RTA response off considerably earlier than the PX1s, as a result of their tweeters becoming beamy. Played at natural levels the PX1s give front-row-center sound in that sense.

The Spatial Character of Things and the Impressions of Instruments

The uniformity of tonal character with respect to changes of listener position is a key part of a second aspect of the speaker. One really feels *immersed* in a soundfield rather than listening into a soundfield in front of one. Now to some extent one can get this feeling from ordinary speakers if one sits very close to them. But here one gets the "nearfield" experience in tonal terms as well as in immersion terms over the whole room. One could move almost anywhere, and the tonal character of the sound would remain effectively constant. This is, of course, what happens at a concert — most of the sound there is diffuse field (cf., http://www.regonaudio.com/Records_and_Reality.html), so there is little of the variation one typically gets with even relatively small changes in listener position.

The immersion in the soundfield is, however, more than a matter of tonal stability and accuracy. The imaging of the PX1s is also very distinctive. First of all, the images are rounded and not quite as tightly focused as with directional speakers. But at the same time, they are very stable. One gets a rounded image, which one might think of as more natural than a tightly focused image (whatever stereo theory might say); moreover, this image does not shift nearly as much with respect to sideways movement of the listener as it would with more directional speakers. And large ensembles sound large, too. This is all very impressive, though one cannot help thinking for a moment that much of the scope and immersion of the experience here (and the uniformity with listener position, too) is offered in a somewhat different but effective way by the Carver ALS at a much lower price (Issue 256).

"One could move almost anywhere, and the tonal character of the sound would remain effectively constant. This is, of course, what happens at a concert."

Not surprisingly, the imaging is a lot different than that provided by speakers that emphasize direct arrival. Stereo reproduced anechoically tends to make the speakers more audible as sources unless the recordings are done exactly right, and the image, while very tightly focused in anechoic stereo, is unstable with respect to head position. Here the opposite happens. The image is built in good part out of room sound and it acquires stability while losing somewhat the sense of exact focus.

This effect can be quite startling and very convincing. The Chopin Nocturne Opus 9, No. 1 in B-flat minor played by Janne Mertanen [Gradient] sounded to me considerably more like a real piano than one usually hears from a stereo system. The tonal character was exceptionally realistic, and so was the size and presence of the instrument.

By comparison, most speakers—even really good speakers— sound too small, too specific, not extended in the bass, and artificially focused in position. Grand pianos are large. A real concert piano in Paul's room would stretch almost from wall to wall (along the shorter direction). And the sound would have enormous depth and power. The PX1s were creating this impression to a surprising extent.

Similarly, Harnoy and Dussek's recording of the Schubert *Arpeggione* Sonata [RCA] had a size that matched the reality of cello and piano at relatively close range.

On orchestral music, the PX1's anti-miniaturization effect, if I may call it that, came into its own in a big way, as it were. My Rachmaninoff favorite, *Symphonic Dances* [ProArte], sounded enormous not just in the "soundstage" sense—which never really happens without trick signal processing (orchestras never sound 60 feet wide reproduced in a living room of moderate size)—but in the sense that one felt immersed in a large acoustic space with instruments of power and substance before one.

All this was, of course, hugely gratifying, almost hypnotically so. One had a wonderful time listening and experienced a remarkable suspension of disbelief. One could sink into the music and forget all about audio and its categories.

At the same time, smaller-scale music that was precisely recorded—*Tiden Bar Gaar*, Blumlein-recorded on Opus 3 for instance—sounded sufficiently focused to be natural, albeit without the "X marks the spot" imaging of highly directional speakers. It was different, but it was still convincing.

"The Chopin Nocturne Opus 9 … sounded to me considerably more like a real piano… the tonal character was exceptionally realistic, and so was the size and presence of the instrument."

Also convincing were recordings of nonmusical material. The Sherlock Holmes "Boscombe Valley Mystery" recorded as a radio play by the BBC had natural speech timbres and very realistic sound effects, which could make one really jump from being startled.

If one thought about the matter in terms of, say, reverberant versus non-reverberant halls, one might suspect that more sound coming off the walls would somehow reduce resolution, would tend to obscure details. But this turned out not to be true. Pieces like the often subtle harpsichord *continuo* part in the Bach/Sitkovetsky recording of the *Goldberg* Variations arranged for string orchestra were easily audible, unmasked, and very well resolved. The main effects of the extra sound off the walls turned out to be in keeping with the previously discussed tonal and imaging matters.

And the Differences: Who is Right?

From the early days of *The Absolute Sound*, and even earlier elsewhere, controversy has raged—sometimes almost literally raged—about how stereo recordings should be reproduced. If you go back into the early years of TAS, you will find arguments made vigorously on both sides of the question of whether speakers should be directional and generate as much direct sound as possible, or whether speakers should spread sound around the room, so as to use its characteristics to help recreate an acoustic environment.

This controversy ultimately it is not a matter of right or wrong, but of what sounds most natural and convincing to you, the listener.

I am in the position of admiring good speakers of both types. When I first encountered the PX1s at the 2014 Newport show, I picked them as having the best sound—but tied with Sanders speakers, which are highly directional and about as far from the omni sound as possible. For me, either approach can work wonderfully if it is done right. And the quite-directional Janszen ZA1.1s that I was reviewing at the same time as the PX1s also offer some wonderful qualities, but quite different ones from the PX1s.

"The PX1 belongs right up there with a small handful of the finest loudspeakers ever made, and it is superior to most of them and all in all inferior to none."

Each approach has its virtues and its drawbacks—I would not call them failings in either case—compared to the other. The omni approach with its room-filling sound has a kind of scale and an independence of listener position that gives some truly compelling naturalness. At the same time, one could have a certain sense that all that sound bouncing around the room was not exactly on the recording and that the space generated is in part generated by the room, and thus tends to be somewhat similar from recording to recording. And the imaging is less tightly focused and more impressionistic, albeit convincing in its stability. The choice is a personal one, since of course one cannot have both things at once.

Overall

The PX1s are one of the all-time triumphs of speaker design. The goals that were envisioned are so nearly perfectly accomplished that one is stunned with admiration and, for me, musical pleasure. The in-room smoothness is all but incomparable, the bass is superb, the midrange and treble are not only neutral but pure and clear in true electrostatic style, and the desired radiation pattern is realized to perfection. This is really a landmark in speakers, a huge

step in a new direction that previously hardly figured in anyone else's imagination, much less in reality.

And musically, I was enchanted. But the question remains: "Is this the form of enchantment you want?" If it is, if the omni sound is your audio goal, this is a speaker almost without competition. On the other hand, the controlled-radiation-pattern speakers have their own enchantments. I think of the closing lines of "St. James Infirmary": "She can search this whole wide world over, she won't find another man like me"—or a speaker like this one. A nonpareil if ever there was one.

Paul Seydor Comments

With his customary thoroughness, REG has covered all the important bases in his review of the Muraudio PX1, and I concur with his enthusiastic evaluation. If, like me, you get a little tired of the way audio reviewers seem to discover fresh masterpieces each month, to say nothing of so-called breakthroughs and innovations that are in reality little else than reworkings of long-established technology, it may be difficult fully to appreciate a truly unique and unprecedented design such as this omnidirectional electrostatic. It represents the most original thinking in loudspeaker design since Jorma Salmi found a way to suppress the backwave in his aptly named Gradient Revolution loudspeakers. The observations that follow will involve some criticisms, but I should like them to be understood in the context of my conviction that the PX1 belongs right up there with a small handful of the finest loudspeakers ever made, and it is superior to most of them and all in all, inferior to none. My enthusiasm should also be understood in another context: I have never been a great fan of omnidirectional loudspeakers, or for that matter even wide dispersion. I prefer the greater precision and accuracy of restricted dispersion that's found in speakers such as Quad ESLs and several classic designs from the BBC school, designs that attempt to excite the acoustic characteristics of the listening space as *little* as possible.

As REG has explained, perhaps the paramount reason for the PX1's success is its exceptionally smooth, extended, and uniform frequency response. This is one really *neutral*-sounding transducer. It's truly uncanny to be able to walk around a loudspeaker and perceive virtually no alteration in tonal balance from front to side to back to the other side. Allied to this neutrality is a dynamic range that approaches lifelike (though you do need *gobs* of power). Robert's observations about how it reproduces a piano are well worth paying attention to, since the room adjoining my listening room houses a gorgeous Bluthner grand piano. Yes, the speaker does have a slight forgiving character in the presence region, but while audible, it really *is* slight and in no way, at least to my ears, detracts from any sense of lifelikeness, vitality, or excitement. In any case, this is something I tend to prefer inasmuch as the vast majority of recordings are so closely miked and thus peaked in that very region. Most omnidirectional loudspeakers and most other loudspeakers that reflect a lot of sound from room surfaces image terribly. Not so the PX1. No, it doesn't have the absolute pinpoint accuracy that, source permitting, something like my Quads or Harbeths do, but neither is there any sense of image wander, instability, nine-foot violins or vocalists, or other such anomalies. On the contrary, all the staged-for-the-microphone sources I regularly use for evaluating imaging and soundstaging— *The Christmas Revels*, the Bernstein *Carmen*, the Water Lily Mahler *Fifth*, the Solti *Ring* —are beautifully reproduced in an enveloping acoustic space that recreates a very convincing realism, one that frees the presentation from the impression it's restricted to one end of the listening space. Furthermore, owing to the omnidirectional radiation, I can sit well out of the so-called sweet spot—in fact, practically across from one or the other speaker— and with judicious application of the balance control (one

"I can sit well out of the so-called sweet spot … and hear an essentially perfect soundstage that does not collapse into one or the other speaker or compromise the tonal balance. In this specific sense, the PX1 is a rare and absolute triumph."

of the reasons I detest control units without one) hear an essentially perfect soundstage that does not collapse into one or the other speaker or compromise the tonal balance. In this specific sense, the PX1 is a rare and absolute triumph.

Of course, as REG points out, because an omnidirectional radiates in all directions and invariably reflects off all surfaces, the acoustical character of your room is going to be more mixed into the presentation than would be the case with conventional loudspeakers — and far more than with loudspeakers that deliberately restrict the dispersion of the mids and highs (bass frequencies are always omnidirectional and always heavily influenced by one's listening space). Acoustically speaking, my listening room happens to be an exceptionally pleasant space, so the PX1 was able to do its thing to best advantage. I'm uncertain how it would do in a less accommodating setting, say, one with lots of hard, flat surfaces. My guess is that it would perform much better than speakers of considerably less neutrality, but perhaps at some further sacrifice to imaging precision—because highly reflective rooms generally don't allow for very good imaging under any circumstances unless you sit very close to the speakers, and the speakers are fairly restricted in their dispersion.

The only aspects of the PX1 that Robert and I react to differently concern bass response and bass integration. It is certainly true that the PX1s are at the state of the art when it comes to bass articulation, definition, detail, and resolution, and they will certainly plumb the depths with considerable reach and power. However, play a recording like Volume 2 of Kei Koito's Bach recital [Claves Records]—which *The Diapason* magazine judges a benchmark recording for organ music—on the PX1 and then play it on a system which uses, say, an REL subwoofer, and you would hear that the PX1s don't *quite* have all the bottom-end reach some recordings have. On the vast majority of sources this won't matter, though I would add that precisely because the PX1 is so good so far down, a top REL would make a splendid partner for that last half octave inasmuch as it is a true sub-bass woofer, principally intended to extend already superb bass response. Then there is the obstreperous matter of integration. I want to hit this one as lightly as possible.

"While I'm often "impressed" by the large super-expensive monster systems that so many audiophiles seem to lust after, I rarely actually like them… I find their sonic presentations … all too typically assaultive rather than beautiful or powerful in the way that live music is. In that context, the PX1 is the only speaker system I've heard that costs more than my Quad 2805's that I would consider buying if I had the money."

When I heard the PX1 the year before last in a large room at the Newport show, I heard no discernible issues as regards cone bass to electrostatic mid and high integration. But in my much smaller room, from time to time I felt I did. It was nothing very serious, nothing that distracted from the listening experience, and it was infrequent and vague enough that it's even difficult for me to put into words exactly the effect. All I can say is that on

occasion I was aware that I was listening to two different kinds of transducers. (As a point of comparison, once I had the woofer level dialed in on the MartinLogan Montis hybrid electrostatic, which I reviewed a while ago, the integration was seamless.) As I said, I don't want to hit this too hard, because it may be a function of the much smaller listening space. However, neither do I want to give the impression you need a baronial-size living room to house these speakers: They're physically large, but they worked perfectly well in my 15' x 21' x 8' room, about seven feet out from the back wall.

The only thing that Robert didn't mention but that does need to be addressed is their appearance. Given what Muraudio has accomplished in this speaker, the styling certainly constitutes a fine example of form following function. And yet, that didn't stop the proliferation of wisecracks from audiophiles and non-audiophiles alike: gasoline pump, popcorn maker, watercooler— you name it, I heard it. SOA—that is, Significant Other Acceptance—factor looms gigantic here. I love the sound, but I can't say I cotton much to the appearance. One big problem, I think, is that the review samples were fitted with an optional contrasting chrome trim (that separates the upper and lower sections and caps) that actually accentuates the mirth-provoking aspects of the appearance. The standard finishes are unicolor, which I suspect will help a lot. But I still think the jokes are going to continue—at least until the music starts playing, at which point all wiseacres are shut up and all critics silenced.

Regular readers of mine will know that while I'm often "impressed" by the large super-expensive monster systems that so many audiophiles seem to lust after, I rarely actually like them, and I've heard none I would personally give house space to. This is because I find their sonic presentations merely impressive—there's that irony-laden word again—or, to put it another way, all too typically assaultive rather than beautiful or powerful in the way that live music is beautiful and powerful. In that context, the PX1 is the only speaker system I've heard that costs more than my Quad 2805s that I would consider buying if I had the money. **TAS**

SPECS & PRICING

Type: Omnidirectional hybrid electrostatic speaker with dynamic-driver woofers in sealed enclosure plus electrostatic unit with three double-curved panels to form continuous 360-degree horizontal coverage at all frequencies, +/-8 degrees vertical pattern in higher frequencies
Total electrostatic membrane area: 5000 square centimeters (775 sq. in.), ultra-thin Mylar film
Maximum SPL: 105dB at 2 meters, on-axis
Low frequency unit: Total driver area (three drivers together) 640 square centimeters (99 square inches, 33 per driver, equivalent to 11-inch driver)
Crossover: 450Hz, fourth-order Linkwitz-Riley
Frequency response: Anechoic, 30Hz-20kHz; typical room, 20Hz-22kHz (-3dB points)
Sensitivity: 82dB/w/M
Impedance: 8 ohm nominal, 2 ohm minimum at 20kHz
Input power: 500W (1000W, program peak)
Dimensions: 56" x 18"
Weight: 145 lbs.
Price: $63,000 (active model is $69,500)

MURAUDIO
11 Tristan Court
Ottawa, ON
Canada K2E 8B9
(855) 955-0360
muraudio.com

Comment on this article at www.theabsolutesound.com

MURAUDIO

SOUND IS EVERYWHERE®