

ROGIER VAN BAKEL

Estelon X Diamond Mk II

LOUDSPEAKER

aste is a funny thing. Love cilantro? Millions swear it tastes like soap. Similarly, design cognoscenti will gush over a minimalist Scandinavian sofa that others dismiss as just a pricey plank with delusions of grandeur.

There's no accounting for taste, or so the truism goes. But arguing over preferences is exactly what many audiophiles do. Similarly, *Stereophile* reviewers are all about parsing and evaluating sound, and how a product *looks* isn't usually a big part of the equation. But I'll buck that convention and say that the radically shaped Estelon X Diamond Mk IIs aren't just the most visually sublime speakers I've laid eyes on; they ought to be part of the Cooper Hewitt Museum's permanent collection. Or MOMA's.

Got to be good looking

If the Estelons looked instead like upright coffins but sounded the same, I'd still praise them without reservation. But the sculpted shape—Brancusi meets Botero—is a big part of why I'm so smitten.

Now, I like shiny things, but I've heard and seen a hundred speakers with glossy automotive paint jobs that made them look merely attractive. Part of what puts the Estelon X Diamonds in a different category is in how the glasslike finish combines with its curves. A third component, light, makes the whole thing very nearly magical. Watch as both window light and floor lighting throw elongated vertical reflections along the floorstander's sloping, rounded flanks. When you move (or as the sun does), those lines change too, subtly and beautifully. There's also just something right about this design, in the way that a dolphin or a Fibonacci spiral is pleasing to look at. Modern technology has imposed an environment on all of us that's built from angles and other geometric shapes. The Estelons, by contrast, look organic, as if they weren't just engineered and constructed, but live-born at the same time.

A friend told me that the X Diamonds reminded him of bishops in a chess game. Others saw a modernist

SPECIFICATIONS

Description Three-way bass-reflex loudspeaker. Drive units: 11" ceramic-sandwich dome woofer, 7" ceramic-membrane mid/woofer, 1" inverted diamond-dome tweeter. All drivers by Accuton. Crossover frequencies: 75Hz (third-order), 2kHz (second-order). Frequency range: 22Hz-60kHz. Impedance: 6 ohms (minimum 3.8 ohms at 55Hz). Sensitivity 88dB/2.83V/1m. Recommended amplifier power: 50Wpc or more.

Dimensions 54" (1370mm) H x 17.5" (450mm) W x 25" (640mm) D. Weight 190lb (86kg) each.

Finishes Black Lava Liquid Gloss, White Gloss. Add up to \$8000 for

nonstandard and custom finishes. Serial numbers of products reviewed 65793A, 65793B. Price \$89,000/pair. Number of North American dealers: 19. Warranty Five years. Manufacturer Alfred & Partners OÜ, Kukermiidi 6, Tallinn 11216, Estonia. Tel: (+372) 661-0614. Email: info@estelon.com. Web: estelon.com. US representative: Aldo Filippelli. Tel: (725) 772-4589. Email: aldo@estelon.com. Web: luxuryaudiogroup.com.



sculpture of a woman with a narrow waist and an ample bottom. And then there's the Reddit commenter who asked "Why do they look like giant sex toys?" Ouch.

I guess it's inevitable that plenty of people will call the Estelons something between homely and fugly. If you're among the naysayers, you could always comfort yourself with the thought that the Estonian speaker's remarkable sound is a direct consequence of its striking silhouette. Form follows function. Let's dive in.

Here come old flat top

The unique shape of the Estelons' enclosures the antithesis of traditional box designs—is intended to avoid diffraction and other colorations. CEO and co-founder Alissa Vassilkova-Rajatalu noted proudly in an email to me that there are no parallel walls and that the surfaces are almost entirely curved. She also relayed that "Inside, each internal chamber is tailored to suit its specific driver." The company turns that approach up to 11: in order to combat microphonics and small vibrations, even the crossovers get their own subenclosures.

The absence of parallel surfaces cuts down on standing waves. The flat top of the speaker has a forward tilt of about 25°, which I'd like to think is also done to stop audiophiles from putting Marvel figurines or cacti there. Oh, the stories I could tell.

It's obvious that Estelons aren't manufactured by gluing sawed panels together. This kind of physique has to be molded. The com-



pany uses a proprietary marble-based slurry, a composite material that has advanced damping properties and combines density and solid mass, resulting in high rigidity. I asked Vassilkova-Rajatalu what she thinks of aluminum as a speaker-building material. She allowed that aluminum enclosures provide great stiffness, but "the flexibility of our molding process allows for shape modifications, which is more challenging with aluminum." That's a solid point. In traditional speakers, changing the bracing or the internal chambers requires the production of new, re-engineered parts—and often a change to the assembly process. Poured cabinets like Estelon's and Rockport's have the advantage that modifying a mold is technically pretty straightforward (if not necessarily cheap), and that design changes don't automatically imply production changes.

Speaking of design changes, the speaker's Mk II designation refers to several upgrades, including higher-grade crossovers that incorporate Mundorf Supreme resistors and SilverGold Oil film capacitors. As I mentioned, the crossovers, set at 75Hz and 2kHz, are now mounted inside dedicated subenclosures. The speakers are also equipped with new inverted diamond-dome tweeters whose bandwidth extends to 60kHz.

As three-way towers go, the X Diamonds break the mold (ha!). The 1" tweeter sits roughly at ear height below the 7" midrange driver, and

1 Think of Magicos, Piegas, and some of YG Acoustics' pricier offerings.

loudspeakers, serial number 65793A, in RvB's listening room, driving it with his Krell FPB-200c amplifier. I used DRA Labs' MLSSA system with a calibrated DPA 4006 microphone to examine the speaker's behavior in the farfield and an Earthworks QTC-40 mike for the nearfield responses. It wasn't possible to raise the 190lb loudspeaker off the floor for the measurements, so the first reflection from the ground occurs earlier than is usually the case with my testing. I therefore measured the response and dispersion with the microphone at 1m rather than my usual 50". The speaker sits on casters, so I could move one of the speakers away from the wall behind it so that it fired along his listening room's diagonal; the goal was to push the reflections from the room boundaries as far back in time as possible. However, it wasn't possible to measure the off-axis response more than 60° to each side of the tweeter axis.

Estelon specifies the X Diamond Mk II's

measured one of the X Diamond Mk II voltage sensitivity as 88dB/2.83V/1m; my estimate was 3dB higher than that of my Rogers LS3/5a that I always measure at the same time as the speaker under test, at 85.5dB(B)/2.83V/1m. I used Dayton Audio's DATS V2 system to measure the impedance magnitude and phase. The Estelon's nominal impedance is specified as 6 ohms, with a minimum value of 3.8 ohms at 55Hz. The impedance magnitude (fig.1, solid trace) was higher than 4 ohms over most of the audioband; while the impedance did drop to 3.8 ohms at 55Hz, there was another minimum value of 2.84 ohms at 23Hz. In addition, the electrical phase angle (fig.1, dotted trace) is high in several frequency regions; as a result, the effective resistance, or EPDR,¹ drops below 2 ohms from 23Hz to 35Hz, from 58Hz to 72Hz, and below 3 ohms from 210Hz to 610Hz. The minimum EPDR values are 1.85 ohms at 65Hz and 2.5 ohms between 322Hz and 372Hz. The X Diamond Mk II is a currenthungry load for the partnering amplifier.

The enclosure was very quiet when I

rapped its panels with my knuckles. Using a plastic-tape accelerometer, the only resonant modes that I found lay at 598Hz and 781Hz (fig.2). As well as the high frequencies of these modes, their low levels and

1 EPDR is the resistive load that gives rise to the same peak dissipation in an amplifier's output devices as the loudspeaker. See "Audio Power Amplifiers for Loudspeaker Loads," JAES, Vol.42 No.9, September 1994, and stereophile.com/reference/707heavy/ index.html.

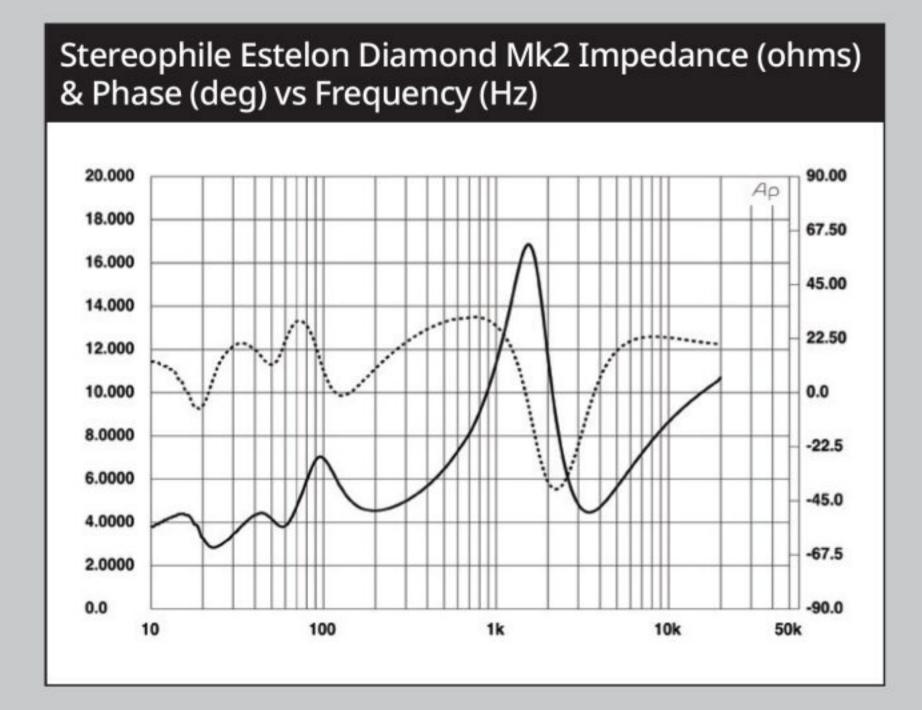


Fig.1 Estelon X Diamond Mk II, electrical impedance (solid) and phase (dashed) (2 ohms/vertical div.).

the two are mounted just millimeters apart, presumably so they'll act as a kind of point source. The 11" woofer is mounted 27" lower, in the thickest part of the enclosure, 5" from the bottom edge. That lets the woofer couple acoustically with the floor. According to Vassilkova-Rajatalu, this approach "maximizes the efficiency and output of the woofer, for a more coherent bass response and an even distribution of standing waves throughout the room." As frequencies rise above 100Hz, sound gets more directional, and the placement of midrange drivers and tweeters becomes crucial. Unsurprisingly, the Estonian team has thought this through: "Our mid-woofer and tweeter are positioned higher in the cabinet to minimize reflections from adjacent surfaces. That improves stereo imaging and also enhances the coherence of sound from low bass notes to the highest harmonics."

Each speaker is heavy—190lb—which helps provide "both static and dynamic stability." Thankfully, getting the X Diamonds into your home and setting them up is less of a struggle than their weight implies. They ship in flight cases on casters. Once the cases are inside, upright, and unlocked, the speakers are ready to be rolled out—they're on wheels too—via a clever built-in ramp. Similar to my reference Focal Scala Utopia EVOs, once you're sure where you'd like to position the speakers, you're encouraged to remove the casters and insert the supplied spikes.

After four, five days of trial and error, the midnight-blue towers ended up 8' 4" apart (measured from the drivers' center) in my 21' × 15' room. Their rear ports were 5' from the front wall; the distance to the sidewalls was 39"; and when I sat in my chair, my ears were

10' 2" from the front baffles. Toe-in was slight: 3°-4°.

It was perhaps a good thing that I didn't read up on ceramic drivers until I'd already had the speakers in my system for a couple of months. Estelon sources the X Diamond drivers from Thiel & Partner, the manufacturer of the acclaimed Accuton transducers. (This Thiel is no relation to the now-defunct American speaker brand, nor to A.N. Thiele of the well-known Thiele/Small loud-speaker parameters.²) The German company states on its website that its ceramic and diamond drivers are somewhat vulnerable to excessive excursion: "Ceramic and diamond cones are brittle and therefore sensitive to severe overload conditions (ie, excursion of more than double the rated Xmax)." On top of that, "both [types of drivers] are sensitive to touching by fingers or hard items—comparable to an eggshell."

I had remained in the dark about these susceptibilities. From time to time, in the mood for something raucous, I'd tortured the Estelons with a metal mixture of Rage Against the Machine, Led Zeppelin, and Tool, all at admittedly unreasonable volume levels. In other words, I never walked on (ahem) eggshells around the Estelons—and luckily, the speakers survived the onslaught just fine.

About that "sensitive to touching" caveat: There's no cause for worry, as each X Diamond driver is covered with a rugged honeycomb black metal grille (convex for the tweeter, concave for the midrange and woofer). It isn't user-removable unless you bring

measurements, continued

high Q (Quality Factor) will work against them having audible consequences.

The saddle centered between 20Hz and 30Hz in the impedance magnitude trace implies that the tuning frequency of the port on the Estelon's rear panel lies in this region. The woofer's nearfield response (blue trace below 210Hz in fig.3) had the expected reflex tuning notch at 25Hz, though the port's nearfield response (fig.3, red trace) peaks slightly lower in frequency. While there is a peak at 180Hz in the port's output, this is very low in level. The woofer crosses over to the midrange unit

(fig.3, green trace) close to the specified 75Hz.

The peak between 40Hz and 200Hz in the complex sum of the nearfield responses of the midrange unit, woofer, and port (fig.3, black trace below 300Hz) is due to the nearfield measurement technique, which assumes the baffle extends to infinity in both planes.² The Estelon's low-frequency alignment is actually maximally flat, which, with the low tuning frequency of the port, means that this loudspeaker will offer in-room low-frequency extension to 20Hz.

across a 30° horizontal window centered on the tweeter axis, is shown as the black trace above 300Hz in fig.3. The response is relatively even through the midrange and treble, though there is a slight excess of energy in the mid-treble region and a lack of energy in the top audio octave. The response starts to rise again above 25kHz; I have encountered this behavior before with speakers that use an Accuton diamond-dome tweeter. With a pistonic tweeter like this that has a high-Q ultrasonic dome resonance, there is a lack

The Estelon's farfield response, averaged

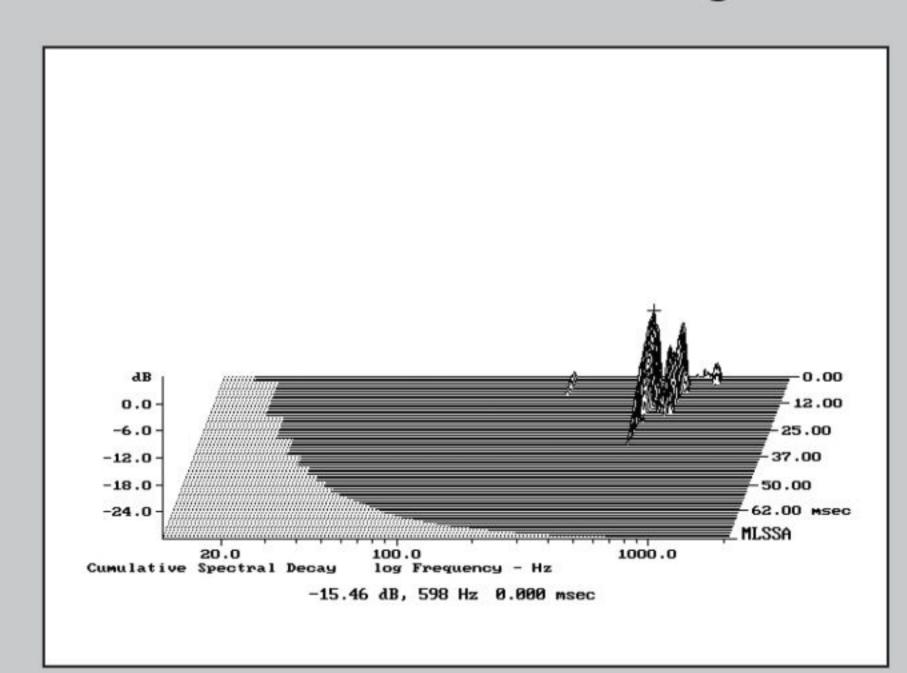


Fig.2 Estelon X Diamond Mk II, cumulative spectral-decay plot calculated from output of accelerometer fastened to the baffle 6" above the woofer (MLS driving voltage to speaker, 7.55V; measurement bandwidth, 2kHz).

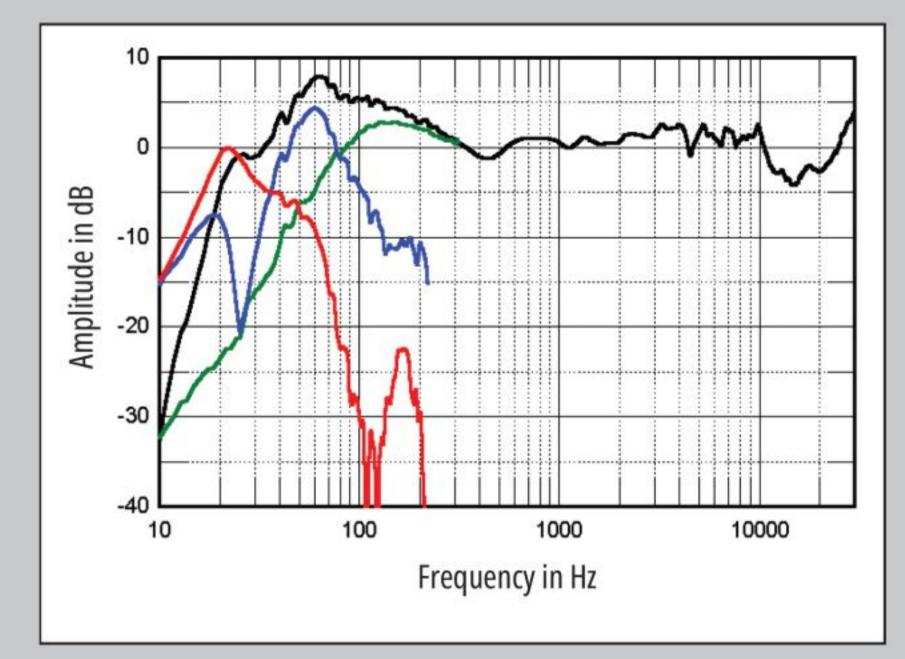


Fig.3 Estelon X Diamond Mk II, anechoic response on tweeter axis at 1m, averaged across 30° horizontal window and corrected for microphone response, with the nearfield responses of the midrange unit (green), woofer (blue), port (red), and their complex sum (black), respectively plotted below 300Hz, 210Hz, 210Hz, and 300Hz.

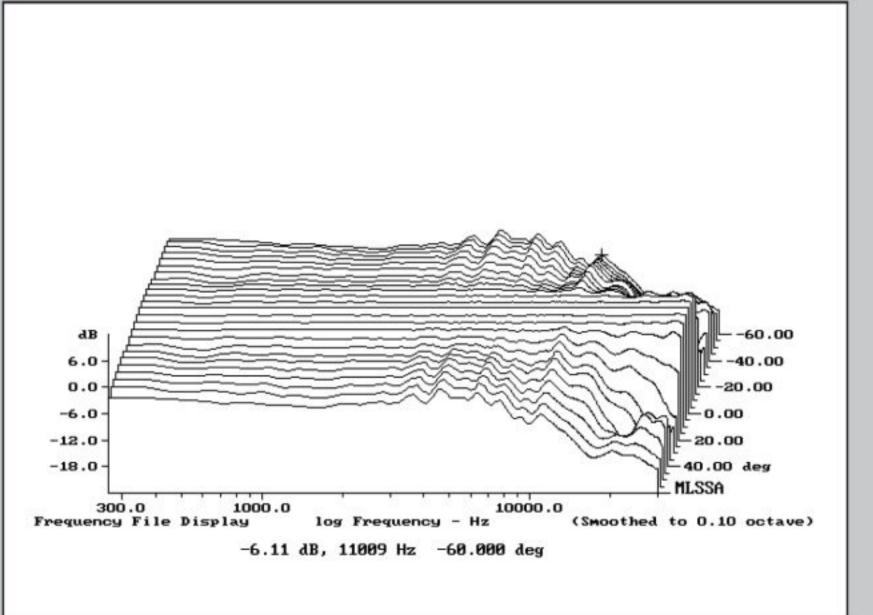


Fig.4 Estelon X Diamond Mk II, lateral response family at 1m, normalized to response on tweeter axis, from back to front: differences in response 60°–5° off axis, reference response, differences in response 5°–60° off axis.

² See en.wikipedia.org/wiki/Thiele/Small_parameters.

³ Xmax is short for maximum linear excursion. The numeric value expresses to what extent a speaker's output becomes nonlinear when its voice coil moves beyond the magnetic gap.

a toolkit and some serious elbow grease. The openings in the grilles are too small for even a knitting needle to poke through, let alone a crayon, a child's fingers, or a cat's claws.

As recommended by Aldo Filippelli, Estelon's amiable VP

of sales and business development for the Americas, I had intended to drive the Estelons with the new Vitus SM-025 monoblock amplifiers, at least for a spell. He feels that pairing the Baltic beauties with the Danish power amps results in unusually good synergy. The release of the Vitus product was postponed, however, which frankly made my job a little easier. I used my reference Krell FPB-200c amplifier, a known quantity instead of a wild card. For most of the duration, my hyperclean Benchmark HPA4 line stage served as a preamp. During the second half of the



of energy at frequencies just below that resonance.3

The Estelon's horizontal radiation pattern, normalized to the response on the tweeter axis, which therefore appears as a straight line, is shown in fig.4. The contour lines below 10kHz in this graph up to 30° are even to the speaker's sides, though there is a slight excess of energy at the bottom of the tweeter's passband at off-axis angles greater than that. As usual, the radiation pattern narrows in the top octave. Fig.5 shows the X Diamond Mk II's dispersion in the vertical plane, again normalized to the response on the tweeter axis. The response doesn't change significantly up to 10° above and below the

Fig.5 Estelon X Diamond Mk II, vertical response family at 1m, normalized to response on tweeter axis, from back to front: differences in response 15°-5° above axis, reference response, differences in response 5°-10° below axis.

tweeter axis. This is useful, as the tweeter is 40" from the floor, which is a few inches higher than what Stereophile has found to be the typical ear height of a seated listener.

In the time domain, the Estelon's step response on the tweeter axis (fig.6) shows that the tweeter and midrange unit are connected in positive acoustic polarity, the woofer in inverted polarity. The tweeter's output arrives first at the microphone, with the decay of its step smoothly blending with the start of the midrange unit's step. Similarly, the negative-going decay of the midrange unit's step blends with the start of the woofer's step. This all implies an optimal crossover topology. Other than a

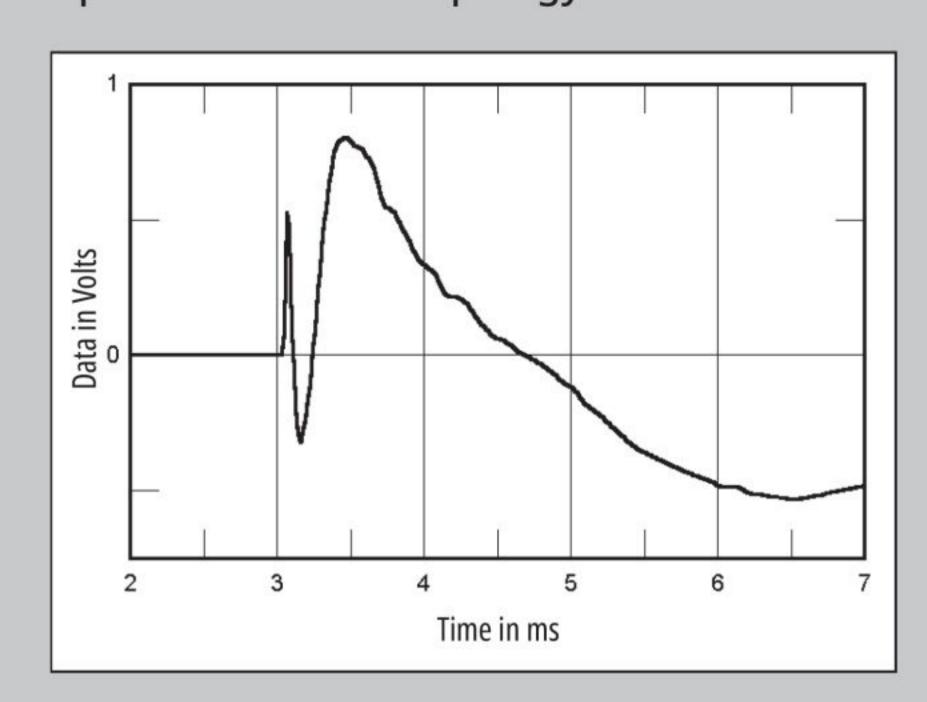


Fig.6 Estelon X Diamond Mk II, step response on tweeter axis at 1m (5ms time window, 30kHz bandwidth).

small ridge of delayed energy at 4.5kHz and some low-level hash in the mid-treble region, the X Diamond Mk II's cumulative spectral-decay, or waterfall, plot (fig.7) is clean.

Overall, the Estelon X Diamond Mk II's measured performance is very good, similar in most ways to that of the smaller XB Diamond Mk II that Jim Austin reviewed in November 2022.4—John Atkinson

- 2 This means that the loudspeaker is firing into hemispherical space rather than a full sphere, which boosts the low frequencies. See stereophile.com/ content/measuring-loudspeakers-part-three-page-6.
- 3 See fig.2 at stereophile.com/content/estelon-forzaloudspeaker-measurements.
- 4 See stereophile.com/content/estelon-xb-diamondmk2-loudspeaker-measurementsf.

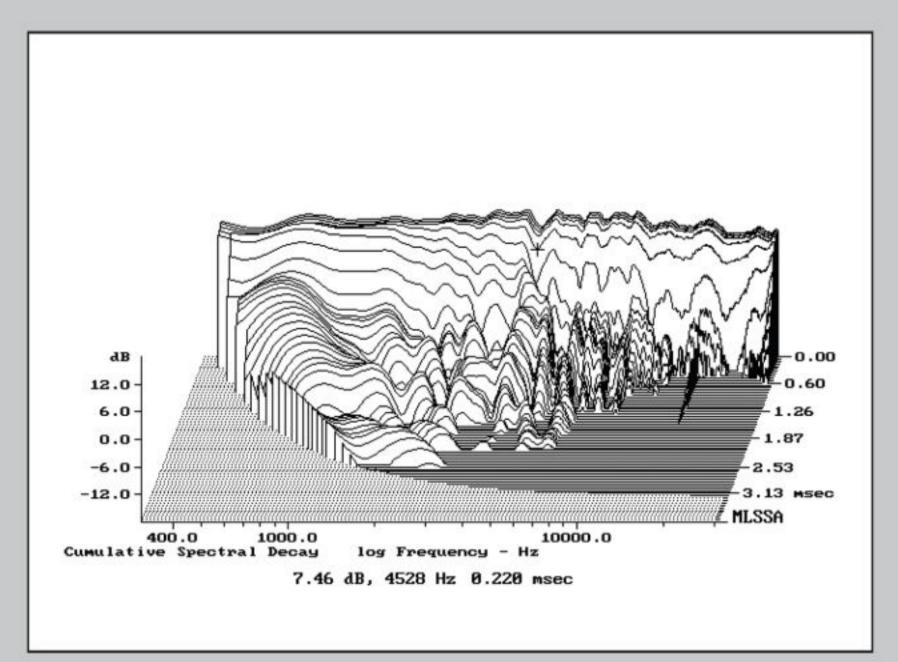


Fig.7 Estelon X Diamond Mk II, cumulative spectraldecay plot on tweeter axis at 1m (0.15ms risetime).

I used the Audia Flight FLS10 integrated amplifier (to be reviewed in the February issue) and found that I preferred it by a slim margin. For the final five days before this review was due, I coupled the Estelons with Pathos's beastly new InPol Legacy amplifier (review to come).

Digital sources were an Aurender A20, a Grimm Audio MU1, and an Eversolo DMP-8, all controlled via an M2 Mac-Book Air. Roon 2.0, tapping into Tidal and Qobuz, was my music program of choice.

Grooving up slowly

The X Diamonds impressed right off the bat with a sound that was pure and seductive. I started with Duke Ellington's Masterpieces (16/44.1 FLAC, Columbia Legacy/Tidal), an almost 75-year-old album that is better recorded than most modern jazz-though there's no doubt that the stellar sound is due in part to Sony's 1998 remaster, which used the company's 20-bit-based Super Bit Mapping scheme. The smoothness and truthfulness of the instruments was off the charts. Jimmy Hamilton's languorous clarinet, Yvonne Lanauze's slow-cooking voice, the waves of energy coming off Sonny Greer's drums during the faster-paced passages, ... it all added up to a thrilling kind of virtual reality, no goggles

needed. The Estelons painted all of it with panache, even suggesting a better approximation of the recording space than we have any right to expect from a mono recording.

I moved on to "Wabash Blues," from Ellington's *Back to Back* collaboration with alto saxophonist Johnny Hodges (24/192 FLAC, Verve/Qobuz). This time I swooned to the stereo interplay between Harry Edison's clear-as-water trumpet (left channel) and Hodges's caramel-tinged instrument (right channel). There was a marvelous continuousness and *flowiness* to the recording (I know that's not a word; work with me here). The notes emerged without strain or effort. Drummer Jo Jones's kit appeared palpably several feet behind Edison.

In search of more jazz bliss, I cued up Arturo Sandoval's Latin-flavored version of "A Night in Tunisia," off his Dizzy Gillespie tribute *Dear Diz* (16/44.1 FLAC, Concord/Qobuz). The track features two trumpets that are close to each other in the mix. With the Estelons, it was a cinch to tell them apart. The instrument that's slightly more to the right sounded rich and dark and a bit more closed-in (Sandoval); the one next to it was brighter and less "cuppy" (that's Wayne Bergeron⁴).



"Walking on Air," off THRAK by King Crimson (16/44.1 FLAC, Discipline Global Mobile/Qobuz), could be a Paul McCartney composition but avoids death-by-cloying-sweetness, a fate that often befalls Macca's own songs. The recording is as lovely and understated as Robert Fripp's usually frenetic band has ever been, but it's also a standout for its engineering and production artistry. Vocal clarity was fab on the Estelons, and the width of the presentation hinted at soundstaging possibilities that were realized on the album's next track, "B'Boom," on which Pat Mastelotto unleashes a wickedly grooving tom-tom exercise. His drum kit sounded as wide as my room. Was such a picture strictly accurate? I suppose not. Was it impressive and exhilarating? Most definitely. With apologies to Rodgers and Hammerstein, the skins came alive with the sound of music.

During one listening session, Roon Radio started playing "I Was Made for Loving You," a recording off chanteuse Maria Mena's Cause and Effect album (16/44.1 FLAC, Columbia/Qobuz). I was

⁴ Bergeron is also the lead trumpeter in Gordon Goodwin's Big Phat Band. The track "Years of Therapy" from the terrific *Life in the Bubble* album is a five-star showcase of his abilities. Check it out.

struck by the sound of the beautifully woody double bass, and came to believe that a sharp-eared hermit who's never seen the instrument could guess its size, material, and approximate shape if he heard it through speakers as sonically and artistically aloft as the X Diamond Mk IIs.

Crucially, the Estelons are versatile to a T. The delicate dream pop that is Beck's "Morning" and Billie Eilish's "Wildflower" was as satisfying to listen to as "Down on the Street" by the Stooges, from 1970's *Fun House* album (16/44.1 FLAC, Rhino/Electra, Qobuz). Like the trumpets in Arturo Sandoval's band, the two punktastic guitar solos, played simultaneously, were well-separated and easy to distinguish.

More wild musical swings were ahead. Thanks to a shuffled play-list, the gauzy "Dreamland" by Glass Animals gave way to Control Machete's "Si Señor," an uproarious Mexican rap that I've loved since it was featured in *Amores Perros*, the Alejandro González Iñárritu movie. Next up was David Poe's spare, devastating ballad "You're the Bomb," followed by the electrifying EDM slam of Hedegaard's "Ratchets," a pile-driving pleasure in its own right as well as my most-played test track of 2024 on account of its brutal, infectious bass notes. The Estelons, protean shapeshifters that they are, rendered every musical part and every dynamic change with admirable ease and composure.

On the subject of deep bass: Yello's "Takla Makan," off *Touch* (16/44.1 FLAC, Polydor/Tidal), starts with an ominous, subterranean synthesizer note that's felt more than heard. When I finally disconnected the REL No.31 subwoofers I'd been auditioning, it was still there, powerful and menacing. That's how low the Estelons go: down to 22Hz, says the company's spec sheet, but it may just reach a little deeper outside the lab, in a real-world room.

Promise not to laugh? I'll confess that I probably played more air drums during my time with the Estelons than with any other audio product I've had in my room. As I gave the speakers a workout, they often worked *me* out at the same time.

I think they were good for my *mental* health, too: They promoted mindfulness, subtly prodding me to focus on the music. I'm admittedly a bit of a fidgety listener, with an attention span that has



ASSOCIATED EQUIPMENT

Digital sources 15" MacBook Air M2 Max running Roon 2.0, Roon ROCK (Lenovo ThinkCentre), Eversolo DMP-A8, Grimm Audio MU1, Aurender A20.

Preamplifiers Benchmark HPA4 line stage, Eversolo DMP-A8. Power amplifier Krell FPB-200c (recapped).

Integrated amplifiers Audia Flight FLS10, Pathos InPol Legacy. **Loudspeakers** Focal Utopia Scala EVO, REL No.31 subwoofer x2. **Cables** Speaker: AudioQuest Thunderbird Zero and Bass. Power cables and interconnects: RSX and Clarus Crimson pure copper OCC power cables. AudioQuest WEL Signature (AES3), Audio-Quest Coffee (coaxial S/PDIF), AudioQuest Vodka (TosLink). Clarus Crimson (XLR).

Accessories Townshend Seismic Podiums. AudioQuest Power-Quest PQ-707 power conditioner. Puron and Nordost plug-in AC enhancers.

Listening room Custom-built dedicated 21' x 15' room with 10'-tall walls and a 16'-tall gabled ceiling, total volume around 4000ft3. Extra-thick drywall over Rockwool and mass-loaded vinyl. Hardwood floor over plywood, rubber, gravel, and concrete. 12' x 15' wool rug on a thick felt pad. Acoustic treatments include four bass traps, two skyline diffusers, and 12 absorption panels including four clouds.—**Rogier van Bakel**

suffered over the years. The X Diamonds seemed to convince me to just sit and concentrate and enjoy what was playing.

He roller coaster

Balanced, engaging, and multifaceted, the Estelons took me through many moods. I felt not just in *sync* with the music but blessedly affected by it too. It's true that sonically, in my room, the X Diamond Mk IIs were a notch past the midpoint between earthy and analytical. They have a slightly more pronounced mid-treble region than my Focal Scalas do. That means that they

paired well with the Aurender A20 and the Grimm Audio MU1, and not as successfully with the otherwise excellent Eversolo DMP-A8 (which doesn't sound sharp or strident per se but can't boast perfect fluidity either). The A20 and the MU1 are both a touch mellower, less forward, more "analog" perhaps. That suits the Estelons.

In a historic account of a love triangle that I read recently, the femme fatale seduced her lover with a suggestive dance. The sentence that stood out was "When she danced, the concealed was revealed." That's also a very fitting description of the X Diamond Mk IIs. For speakers at this price level, you'd expect impeccable beauty inside and out, visually and sonically, and that's what you get with these comely Estonians. They ooze detail and resolution and naturalness, unveiling what remains hidden—or is sloppily sketched through lesser contenders. It's hard to think of higher praise.