stereophile

EQUIPMENT REPORT

ELECTRONICALLY REPRINTED FROM JANUARY 2007

Vandersteen

2Ce Signature II

LOUDSPEAKER

Art Dudley

The Vandersteen 2Ce Signature II, naked in the morning light.

DESCRIPTION Four-way, floorstanding loudspeaker. Drive-units: 1" ceramic-coated aluminum-alloy–dome tweeter, 4.5" plastic-cone midrange unit, 8" plastic-cone woofer, 10" fiber-cone "supplemental" woofer. Crossover frequencies: 600Hz, 5kHz. Crossover slopes: first-order. Frequency response: 29Hz–29kHz, ±3dB. Impedance: 4 ohms minimum, 7 ohms nominal. Sensitivity: 86dB/W/m.
DIMENSIONS 39.75" (1020mm) H by 16" (410mm) W by 10.25" (260mm) D. Weight: 60 lbs (27.3kg).
FINISH None. Black fabric sock.
SERIAL NUMBERS OF UNITS REVIEWED 58274, 58275.
PRICE $1995/pair, plus $150/pair for recommended stands. Approximate number of dealers: 60.
MANUFACTURER Vandersteen Audio, 116 West Fourth Street, Hanford, CA 93230. Tel: (559) 582-0324. Web: www.vandersteen.com.

There are three requirements: You must invent a very good loudspeaker that sells for between $1000 and $2000/pair. You have to make enough of them, over a long enough time, to achieve a certain level of brand recognition and market penetration. And you must create a dealer network of reasonable size, with an emphasis on well-promoted specialty shops.

Even so, you're not out of the woods. Average consumers will think your product is too expensive. Hardcore enthusiasts will consider it too cheap. And since your loudspeaker has been on the market for more than a few years—fundamentally unchanged, howsoever refined—you can be sure that no one will ever think of it as *sexy*. Like God and Popeye before it, your product simply is what it is.

Think you can do it? Good. Richard Vandersteen could use a little competition. His company, Vandersteen Audio, has been in business almost 30 years, and for most of that time a loudspeaker known as the Vandersteen Model 2 has been his Toyota Camry, his Apple iMac, his Linn LP12. Today, the Model 2 and its variants endure as the most successful American loudspeakers in high-end audio, with close to 200,000 sold.

Description

The Vandersteen 2Ce Signature II of 2007 shows little in the way of outward change: its fabric exterior conceals the same sort of segmented, minimal baffle structure that distinguished early Vandersteens from most of the competition of their day.[1] Now as then, the

spare, carefully shaped enclosure is used to time-align the outputs of the three front-firing drivers by ensuring that their wavefronts are launched from the same vertical plane. (The design also prevents potentially sound-smearing diffraction effects by eliminating unnecessary surfaces and rounding off sharp edges, thus minimizing early soundwave reflections.) It was with that in mind—not the opportunity for physical time alignment—that Richard Vandersteen experimented with limited-baffle designs in the first place.

Alongside time alignment, the Model 2's other calling card is phase coherence: that quality whereby a loudspeaker preserves not just the relative amplitudes of tones within a complex wave, but also the correct phase relationships between those tones. Just as watts ain't watts and bits ain't bits, tones ain't tones—and Richard Vandersteen has put a great deal of effort over the years into demonstrating, under test conditions, the audibility of phase distortion in loudspeakers where that design aspect has been neglected, howsoever accurate those products may be in other regards.

Although time alignment and phase coherence are interrelated,[2] the two qualities can be realized in different ways. In the 2Ce Signature II, as in all of his speakers, Richard Vandersteen accomplished phase coherence by means of careful crossover design—specifically, by relying on first-order (6dB/octave) filter slopes. Strictly speaking, outside the digital domain there's no such thing as a phase-perfect filter; they all draw the signal out to some extent, first-order being merely the least offensive of the bunch, with its 90° of phase shift at the frequency where one unit hands over to the other. But through judicious use of signal attenuation and extreme care in choosing drivers, a clever designer can combine two or

1 In the late 1970s, a handful of other designers, especially Jim Thiel of Thiel Audio and John Fuselier, paralleled Richard Vandersteen in pioneering the use of minimal, stepped baffles. Today, such things are as common as tattoos.

2 It's nevertheless possible for a loudspeaker with physically time-aligned drivers to produce a complex waveform that is phase-incorrect.

MEASUREMENTS

My estimate of the Vandersteen 2Ce Signature II's voltage sensitivity was 84dB(B)/2.83V/m, which is significantly below average. Its impedance, however, remained between 6 and 8 ohms over almost the entire audioband (fig.1), the only exception being the mid-treble with the treble control set its maximum position, when the impedance dropped to 5 ohms at 6.2kHz and 9kHz. The electrical phase angle is also close to 0° over most of the audioband, meaning that the Vandersteen will be an easy load for an amplifier to drive. This will compensate, to some extent, for its low sensitivity.

The cloth-covered design of the 2Ce made it impossible for me to fasten my usual accelerometer to the cabinet to search for panel resonances. Listening to it with a stethoscope, however, revealed nothing untoward.

I usually measure a loudspeaker's frequency response on its tweeter axis, which is almost always where the designer has intended the individual drive-unit outputs to sum in-phase. Measuring the Vandersteen on this axis, however, produced a significant suckout centered around 4kHz, which I suspect is the frequency at which the tweeter crosses over to the midrange unit. The speaker's plot of vertical dispersion (fig.2) showed that this suckout filled in below the tweeter axis, so I performed almost all the remaining measurements on the midrange axis, which is also where the speaker produced the most time-coherent step response (see later). However, unless the Vandersteen is used on its bases, this axis is just 31" from the

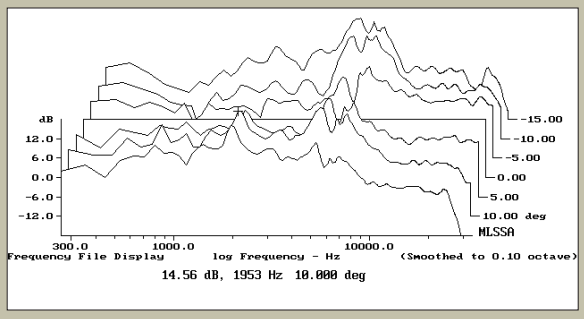

Fig.2 Vandersteen 2Ce Signature II, vertical response family at 50", normalized to response on tweeter axis, from back to front: differences in response 15–5° above axis, reference response, differences in response 5–15° below axis.

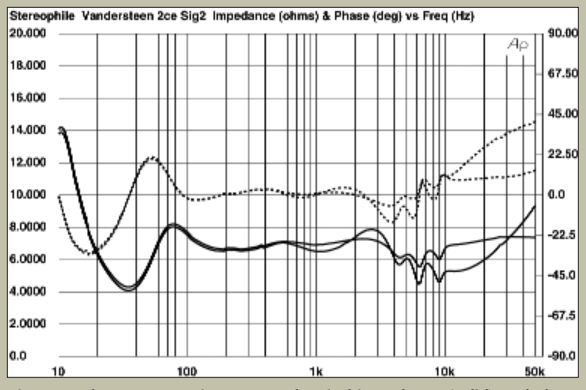

Fig.1 Vandersteen 2Ce Signature II, electrical impedance (solid) and phase (dashed) with tone controls set to their maximum (bottom traces) and minimum (top traces) positions (2 ohms/vertical div.).

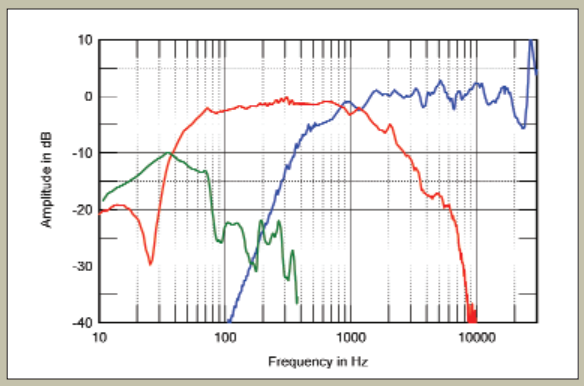

Fig.3 Vandersteen 2Ce Signature II, acoustic crossover on midrange axis at 50" with tone controls set to "0," corrected for microphone response, with the nearfield responses of the supplemental woofer (green), primary woofer (red), and midrange unit (green).

more first-order filters into a crossover network that is phase-correct overall—and that's precisely what Richard Vandersteen has set out to do.

Over the years, the Vandersteen 2 has most evolved in terms of driver design, and the 2Ce SigII continues that trend. Compared with its immediate predecessor, the 2Ce Signature ($1549/pair), the new version's most significant refinement is its use of the same proprietary midrange driver that Vandersteen developed for his Model 3A: a 4.5" plastic-cone model with a cast-alloy frame, whose English alnico magnet structure is sized and shaped to prevent backwave reflections from impinging on the polymer cone itself. The result is said to be a less colored, more open sound.

The other drivers are similarly purposeful. The tweeter uses a 1" aluminum-alloy dome covered with a thin coat of ceramic; a molded waveguide is hand-fitted to the front, its position adjusted to suppress the dome's first breakup mode. The woofer is an 8" Vifa molded cone with a 2" dustcap and a double-wound voice-coil. Its free-air resonant frequency is 28Hz, and while the sealed woofer enclosure can be expected to raise that number somewhat, the effect is tempered by the presence of an additional bass driver in the same enclosure: an actively driven, rear-firing 10" cone whose effect on the speaker's bass system is similar to that of a passive radiator. The supplemental woofer's upper-end response is limited to 55Hz, largely because its long-fiber cone is damped by the addition of a disc of MDF some 5.5" in diameter. I've always believed that if a big piece of wood can't be counted on to slow a fiber woofer cone, nothing can.

The construction quality of the 2Ce Signature II is remarkably good for the price. Driver enclosures are made of 0.75"-thick pieces of MDF, shaped on a CNC milling machine and assembled using a combination of fasteners and adhesives. MDF bracing is abundant, as are strategically placed bits of wool felt, to further tame sound diffraction. Except for the drivers and the felt, all of the interior surfaces are sprayed flat black, to keep them more or less invisible through the grille—shades of the Quad ESL—yet the level of finish is decent enough that the inner cabinets, stripped of their grilles and loosed from their moorings, wouldn't look out of place in certain rooms. Such as mine.

But you needn't. Instead, the essential cab-

measurements, *continued*

floor—a little low for most chairs, which place the average listener's ears at a height of 36".

The impedance characteristic is a little unusual at low frequencies, being typical of neither a sealed box nor a normal reflex design. The woofer's response (fig.3, red trace) did show the minimum-motion notch of a reflex design, this centered on a low 26Hz, but the output of the rear-facing, mass-loaded "supplementary" woofer (fig.3, green) both peaked a little higher in frequency and rolled off rapidly above 70Hz. The absence of the usual nearfield "bump" in the woofer's upper-bass response suggests that it is tuned to be rather overdamped. The woofer can be seen to cover a very wide passband, its upper –6dB point not occurring until around 2kHz. This results in a broad region of overlap with the midrange unit (fig.3, blue) of almost two octaves. The 2Ce's upper-frequency output is flat, but with a number of small peaks and dips apparent. The usual metal-dome tweeter resonance occurs at a high 27kHz, well above audibility.

The traces in fig.3 were taken with the midrange and treble controls set to their central, "0" positions, as was the Vandersteen's overall response, averaged across a 30° horizontal window on the midrange axis (fig.4). The treble in this graph seems balanced to be a couple of dB higher in level than the midrange and bass, this accentuated by a slight lack of energy in the middle of the midrange. The speaker offers respectable bass extension, with useful output apparent down to the high 20Hz. Again, however, the absence of the usual upper-bass hump that results from the nearfield measurement technique implies an overdamped woofer alignment that is optimized for clarity and transient attack rather than for weight per se.

Fig.5 shows the effect of the two tone controls set to their maximum (red trace) and minimum (blue) positions. Both traces are normalized to the tweeter-axis response, so that the differences made by the tone controls stand revealed. The treble control provides a maximum of 6dB cut or boost at 8kHz and a little less at higher frequencies, while the midrange control offers a similar degree of adjustment centered on 3kHz, which is technically in the "presence" region. Perversely, backing off the midrange control actually increases the true midrange level, but by a maximum of only 1dB.

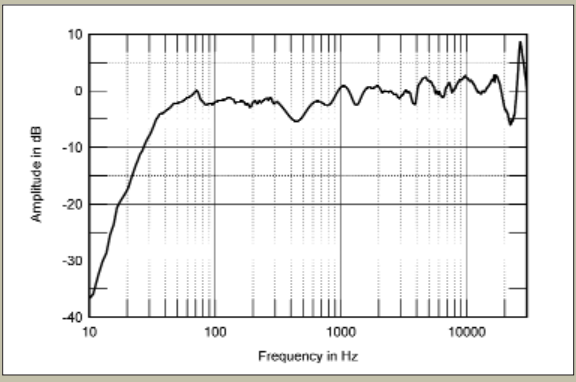

Fig.4 Vandersteen 2Ce Signature II, anechoic response on listening axis at 50" with tone controls set to "0," averaged across 30° horizontal window and corrected for microphone response, with the complex sum of the nearfield responses plotted below 350Hz.

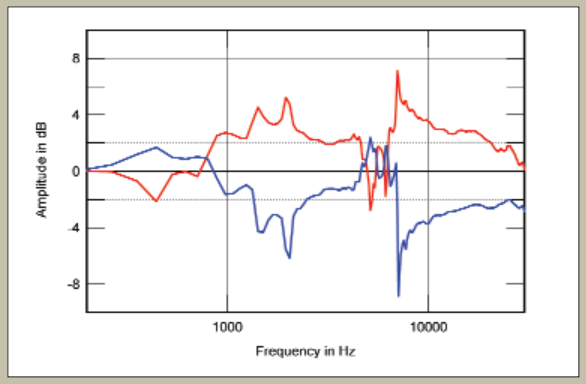

Fig.5 Vandersteen 2Ce Signature II, effect on tweeter-axis response of midrange and treble controls set to their maximum (red) and minimum (blue) positions (2dB/vertical div.).

inetry of the Vandersteen 2Ce Signature II is topped and bottomed with MDF plinths, themselves capped with nicely oiled veneers. The plinths are joined with four wooden dowels, 1.25" in diameter and just over 37" long. The dowels comprise the frame around which a black double-knit grille sack is wrapped, tightly and permanently: Like a shear bolt or a deer tick, you can't remove it without destroying it. But you needn't.

Installation and setup

Vandersteen Audio supplemented my 2Ce Signature II review pair with their sand-filled bases, a $150/pair option whose primary purpose is to stabilize each shallow enclosure with two thick, spiked feet at the front and a third one at the rear, about 5" beyond the enclosure's rear edge. The rather long, threaded spikes also provide some small measure of tilt, where needed; I took advantage of that, to compensate for the fact that my ears are slightly farther from the floor than average. I did it with Richard Vandersteen's blessing—and, for that matter, with Richard Vandersteen's assistance, when he dropped by for a visit in September of 2006.

While he was here, Vandersteen agreed that my review speakers performed best when placed about 56" from the wall behind them and about 16" from their respective sidewalls: Unlike my Quads, the Vandersteen 2Ce Signature II needs to be kept away from all room boundaries. We used my Audio Control Industrial SA3050A spectrum analyzer to get it right—Vandersteen uses the same model himself, as it turned out—and while deep-bass response was a bit weaker than specified at 6dB down at 31.5Hz in my room, there was useful output in the bottom octave. It's important to note that the deep-bass response of the 2Ce Signature II rolled off very gradually, not with the steep, now-you-hear-it-now-you-don't dropoff associated with other bass-loading schemes.

During their stay here, I used the Vandersteens with a variety of amplifiers, ranging from my 21W Lamm ML2.1 monoblocks (it was Vandersteen's idea—honest—and we were both surprised at how fine the combination sounded on 98% of the material we played) to the 200Wpc i-7 integrated amplifier from Simaudio (review to come). I also used a variety of cables, and discovered two things of no

I haven't shown the 2Ce Signature II's horizontal-dispersion plot because it is very difficult to interpret. It does suggest that the crossover-region suckout on the tweeter-axis response tends to fill in to the speaker's sides, which means that the listener can experiment with toe-in, tilt-back, and the tone controls to get a flat, even balance of the treble and upper midrange. However, the lack of on-axis energy in the middle of the midrange persists off axis. To examine this further, I used Christopher Liscio's FuzzMeasure 2.0 program (SMUG Software, www.supermegaultragroovy.com) running on my Mac PowerBook to produce a spatially averaged response curve for the 2Ce Signature in my room. FuzzMeasure uses a one-second "chirp" and FFT analysis instead of the continuous pink noise and ⅓-octave spectrum analysis I've used in the past. This is a very much faster means of capturing an in-room response. I captured 20 individual spectra for the left and right speakers individually in a rectangular window centered on the position of my ears in the listening seat; the resulting ⅛-octave–smoothed, FFT-derived spectrum is shown in fig.6.

The bass region in fig.6 offers good extension but is shelved down somewhat. I did have to place the speakers a little farther out in the room for this measurement than would be optimal, which deprived them of some of the usual boundary reinforcement. Even so, the overdamped nature of the woofer alignment will make the Vandersteen sound a bit lean unless care is taken in placement. The upper midrange and treble in this graph are very smooth, with the slight downward tilt of the curve reflecting both the increased amount of room absorption at high frequencies and the tweeter's increasing directivity. The midrange is disturbed by two troughs. The lower-frequency one is, I suspect, due to the Allison Effect, in which the direct sound of the speaker interferes with the reflections from the nearest room boundaries. The upper-frequency trough is a little too high in frequency to be due to the Allison Effect; it is also suspiciously close to the lack of energy seen in the quasi-anechoic response (fig.4).

In the time domain, despite the Vandersteen's multiway design, its impulse response (fig.7) is as time-coherent as that of the single-driver, crossoverless Fujitsu Ten Eclipse TD712z, reviewed elsewhere in this issue. The tail of the impulse also seems very clean, up to the visible glitch just before the 8ms mark, which is the first reflection of the speaker's sound from the area of floor

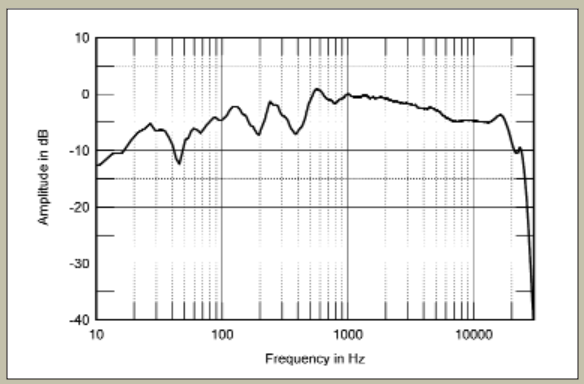

Fig.6 Vandersteen 2Ce Signature II, spatially averaged, ⅛-octave response in JA's listening room.

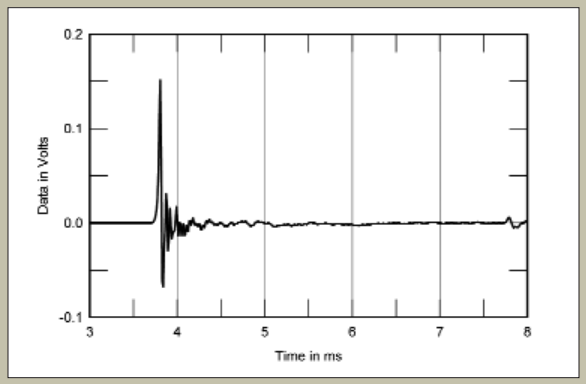

Fig.7 Vandersteen 2Ce Signature II, impulse response on midrange axis at 50" (5ms time window, 30kHz bandwidth).

small importance.

First, the 2Ce SigII is equipped with separate low- and high-frequency inputs, to facilitate biwiring or even biamping. That in itself doesn't seem extraordinary, but the prospective owner should know that Vandersteen recommends single-wiring only as a temporary measure—and so much so that low-to-high-frequency jumpers aren't even included (although the excellent owner's manual contains instructions for making your own).

Second, in upgrading the 2Ce to Signature status a while back, Vandersteen dispensed with the usual oversized speaker connectors, for their susceptibility to skin effects and eddy currents (see "Listening" columns *passim*) and their overall high levels of ridiculousness. Instead, he opted for a single barrier strip of small, gold-plated screw terminals. I share his point of view—even as the limited connection option forced me to scramble a bit and modify a few of my own cables to fit.

But one cable option deserves special mention: I had excellent results with a pair of Alpha-Core AG-1 speaker cables that were sent to me a couple of weeks into the review period. These flat-conductor silver cables were set up for biwiring, with large spade connectors at the amplifier end and sensibly small ones at the speaker end, the latter cleverly stamped from the conductor material itself. It was a short (4') pair intended for use with monoblock amplifiers scooted as close to the speakers as possible, and the level of system synergy was stunning, with leading-edge transients that were sharp but not too sharp, and tremendous tunefulness, texture, and presence overall. What a great match!

On another front: Some hobbyists will be surprised by two features of the 2Ce SigII that aren't generally associated with high-performance loudspeakers: rear-mounted level controls for the tweeter and midrange driver, for use in contouring the sound to suit dull or bright rooms; and, for the 8" woofer, temperature-sensing protection circuits, whose job it is to reduce the signal and alert the user with a front-mounted LED during moments of sonic duress. During the review period I did not use the former—they were set to their central "0" positions—and I don't think I used the latter.

measurements, *continued*

between it and the microphone. The step response (fig.8) also features a time-coherent, right-triangle shape, though there is a rather faster decay than I expected.

I investigated this further by looking at the step responses of the individual drive-unit sections on the midrange axis. These are shown in fig.9: the woofer section's positive step (blue trace) actually overlaps the negative-going overshoot of the tweeter/midrange section's step (red). The latter will tend to cancel the former, leading, I suspect, to the suckout in the middle of the midrange seen in figs.4 and 6. Measuring and listening higher than the midrange axis will move the woofer output back in time with respect to that of the midrange, but then a treble suckout develops between the outputs of the tweeter and the midrange unit. An enigma. I note that AD was not bothered by any midrange response anomalies; it is possible that this behavior looks worse than it sounds.

Finally, the 2Ce Signature II's cumulative spectral-decay plot on its midrange axis (fig.10) shows an extremely clean initial decay, confirming the speaker's time-coherent nature in the upper midrange and treble, though with some delayed hash evident in the mid-treble. This may well be the result of early reflections from the trim above the tweeter.

The Vandersteen 2Ce is one of the best-selling high-end speakers of all time, and most of the measured performance of its Signature II iteration is beyond reproach. I am loath, therefore, to make too much of the lack of integration I noted between its low-frequency and midrange units. But it puzzles me, nevertheless. *—John Atkinson*

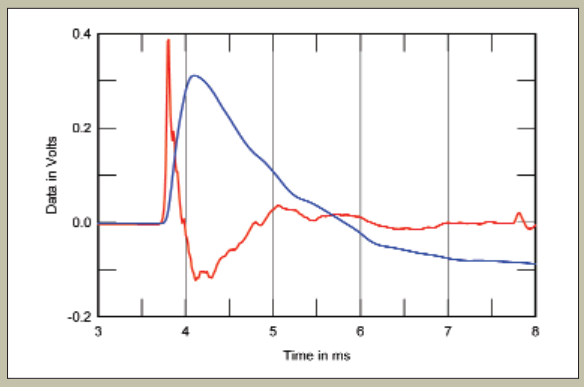

Fig.9 Vandersteen 2Ce Signature II, step responses of tweeter/midrange section (red) and woofer section (blue) on midrange axis at 50" (5ms time window, 30kHz bandwidth).

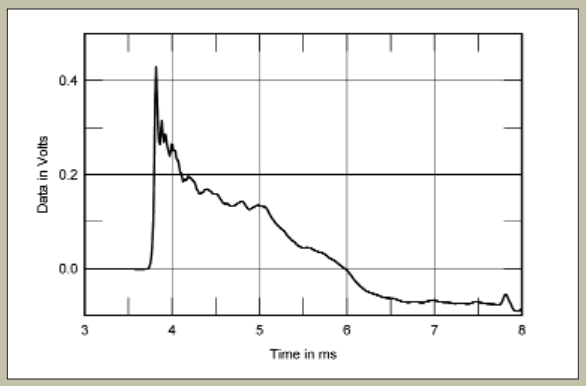

Fig.8 Vandersteen 2Ce Signature II, step response on midrange axis at 50" (5ms time window, 30kHz bandwidth).

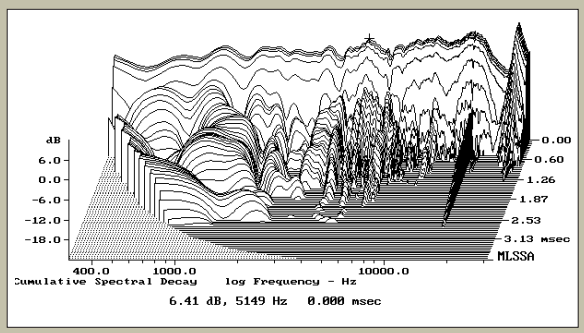

Fig.10 Vandersteen 2Ce Signature II, cumulative spectral-decay plot on midrange axis at 50" (0.15ms risetime).

Listening

The Vandersteen 2Ce Signature II made itself at home from the word go. It liked my records, my room, and the rest of my system. The speaker was superbly balanced from bottom to top. It didn't have quite the transparent, hear-through quality of a Quad ESL—I'll come back to that aspect in a moment—but the Vandersteen's tonal proportions, for want of a better term, were very much the same. Its treble range was soft but substantial, and perfectly suited to its bottom-octave response. The 2Ce SigII was neither bright nor dull; it was simply right, and consistently listenable.

Earlier, I described the bass loading chosen for the 2Ce SigII and how it resulted in an especially gentle rolloff, with audible response into the music's lowest octave. Whether by design or coincidence, the speaker's high-frequency response rolled off at the same apparent rate: a perfect complement. The effect was like looking out through a window of reasonable size: Even though the landscape curled off into the distance, my attention was drawn to the things within view, rather than wondering why I couldn't see the next state over.

That analogy may be appropriate in another way. In terms of the sense of space between the listener and the music, the 2Ce SigII gave a perspective more distant than average. I enjoyed that for the most part, although the sense of distance was a bit too much for me with orchestral recordings that themselves sound less than intimate—such as the recent Mahler Symphony 5 with Temirkanov and the St. Petersburg Philharmonic (SACD, Water Lily Acoustics WLA-WS-76-SACD). Anything on Deutsche Grammophon, such as the fine Mahler Symphony 6 by Pierre Boulez and the Vienna Philharmonic (CD, DG 445 835-2), was a safer bet. Those and other more "modern"-sounding classical records were great through the Vandersteens: immediate and clear but not overcooked.

Mated to the Vandersteens' likable perspective was a really good sense of scale. The 2Ce Signature II wasn't as capable of portraying hugeness as, say, a large horn—but it did an excellent job of suggesting differences in size among various instrumental sounds. One of the experiences that most impressed me in that regard—and one that I came back to many times while the Vandersteens were here—was listening to the Tony Rice Unit's version of Jimmy Martin's "Hold Whatcha Got," on Manzanita (LP, Rounder 0092), and hearing the sheer size of Todd Phillips' upright bass, in comparison with everything else.

Another nice thing about living with the Vandersteens—and I do mean living with them, as opposed to sitting down one hour a month and concentrating on them with my chin in my hands, audiophile style—was the way they portrayed the sounds of cymbals in pop music, even when heard from off to one side: As their individual sounds decayed, the sound spread out in all directions, as it tends to do in real life. Especially with well-made live recordings, the effect was one of unusual realism.

Alpha-Core AG-1 cables on the Vandersteen's back panel.

It didn't hurt that the Vandersteens had an excellent sense of depth and weight with kick drums, floor toms, and other such instruments. Referring back to that Mahler Symphony 6, orchestral drums had fine depth, and much more of a sense of force than I'm used to hearing with my Quads. Yet the 2Ce SigII was similarly capable of describing timbral subtleties with clarity and, I think, accuracy—such as the differences among various brass and woodwind instruments in the first occurrence of the opening Allegro's very strange chorale, surely the most distinctive eight measures in 20th-century music.

Voices came across well: There was no exaggeration of sibilants, plosives, or the like, and the sorts of gross frequency-response aberrations that plague other loudspeakers were completely absent. I've heard other, more expensive speakers reproduce singers with somewhat greater immediacy and realism; compared with various electrostatic panels, for instance, the Vandersteens were a bit veiled. Nor did voices—or, for that matter, solo violins and the like—have that amazing, pop-out-of-the-mix presence that I've heard with various Lowthers.

But it's rare to find such extreme qualities in a package as well balanced as this one—the 2Ce Signature II was musically satisfying in every way. It was also consistently clean, uncolored, and enjoyable—in those regards, it stood comparison to virtually anything I've heard—and for $1995/pair and almost no setup work, it was amazing: a loudspeaker with no musical shortcomings or obvious sonic faults.

ASSOCIATED EQUIPMENT

ANALOG SOURCES Linn LP12 turntable with Naim Armageddon power supply, Naim Aro tonearm; Linn LP12 turntable with Funk Firm Vector kit, Naim Aro tonearm; Rega Planar 3 turntable with Rega RB300 tonearm; Linn Akiva, Lyra Helikon Mono cartridges.
DIGITAL SOURCE Sony SCD-777ES SACD player, shipped incognito.
PREAMPLIFICATION EAR 834P, Linn Linto phono preamplifiers; Lamm LL2 preamplifier.
POWER AMPLIFIERS Lamm ML2.1, Hyperion HT-88 (both monoblocks).
INTEGRATED AMPLIFIER Simaudio Moon i-7.
LOUDSPEAKERS Quad ESL.
CABLES Interconnect: Audio Note AN-Vx, Nordost Valhalla. Speaker: Nordost Valhalla & Flatline Gold, Alpha-Core AG-1. AC: JPS Labs The Digital (CD players), Cardas Golden Reference (some other components).
ACCESSORIES Mana Reference Table & Reference Wall Shelf (turntables); Ayre Myrtle Blocks (various other components).
—Art Dudley

Conclusions

Today, as 20 years ago, the current Vandersteen Model 2 is an easier recommendation than most of its similarly priced competitors: How can you not like something that sounds this good, plays music this convincingly, isn't at all fussy, and sells for just under $2000/pair?

With effort and luck, you might find a similarly priced loudspeaker that does certain things a bit better. So be it. The Vandersteen's greatest strength was an aggregate strength: It was better than average at virtually everything one expects from a loudspeaker. It was the consummate all-arounder. Knowing that Vandersteen Audio has done so well, and that the Model 2 has come this far, is comforting in a way.

So we're back to where we came in. Today's 2Ce Signature II is an unambiguously fine loudspeaker, and from what I recall of its forebears, the latest refinements have endowed it with even more openness and clarity. When friends came by to visit, I didn't drag them into the hi-fi room to show off the Vandersteens, as I sometimes do with my homemade Lowthers or rebuilt Quads. But while the speakers were here, every time I brought home a new record or remembered an old one, regardless of style, I played it without worry and loved it without measure.