



# The Cutting Edge

## Vandersteen Audio Model 7 Loudspeaker

A New Reference

Robert Harley

**R**ichard Vandersteen has accomplished many things in high-end audio, but building a loudspeaker that is competitive with the best in the world regardless of price heretofore has not been one of them. Instead Vandersteen has spent the last thirty-five years creating high-value, no-nonsense speakers that anyone can afford. For example, his Model 2 (now the 2Ce Sig.II. at \$2195) is probably the best-selling audiophile-quality loudspeaker of all time. Moreover, for the first 22 years of the company's existence, Vandersteen's most expensive loudspeaker cost just \$3695 per pair. Working at the edge of the art was clearly not in the Vandersteen playbook.

And then to everyone's astonishment, Vandersteen showed up at the 2009 Consumer Electronics Show with a loudspeaker in an entirely different league. The Model 7, priced at \$45,000 per pair, featured novel driver and enclosure technologies—and sounded stunningly great. Even under show conditions, it was apparent that the Model 7 was something special. Now that I've had the 7 in my home for the past six weeks, I can say that the great sound it produced at CES was just the tip of a fabulous iceberg. This is a world-class product that invites comparison with *any* other loudspeaker, regardless of price or technology.

The Model 7 is both avant-garde and conservative. Its

balsa-wood and carbon-fiber drivers are cutting edge, as is its carbon-fiber-clad enclosure. But these innovations are based on Vandersteen's long-held commitment to time-and-phase coherence, as well as on the physical platform and overall architecture underlying the Vandersteen Model 5 (see my review of the Model 5 in Issue 118, June/July 1999).

Both loudspeakers are four-way and share the same 12" powered push-pull woofer. Both also use a 7" mid/bass driver, a 4.5" midrange unit, and a 1" dome tweeter. The rear-firing tweeter is a .75" alloy-dome in both products. As with the Model 5, the 7 features an eleven-band fixed-frequency equalizer, accessible via a row of tiny rear-panel trim pots, that operates below 120Hz, allowing the speaker's low-frequency response to be tailored to the room. The 7 also shares with the 5 outboard passive high-pass filters (small boxes inserted between the preamplifier and power amplifier) that roll off low frequencies. This low-frequency rolloff is the inverse of a bass-boost in the built-in woofer amplifier, resulting in flat response.

But that's where the similarities end. The 7 features entirely new drivers (except the woofer and rear-firing tweeter), crossovers, and enclosure. The loudspeaker, which has a very modern look, can be painted in any automotive color—also a departure.

# Vandersteen Audio Model 7 Loudspeaker - THE CUTTING EDGE

The key development that made the 7 possible is a new driver technology that Richard Vandersteen spent the past ten years developing. All the drivers except the aluminum-cone woofer and the rear-firing tweeter are made from a sandwich of balsa wood clad with carbon fiber on both sides. In the case of two midrange units, the cone is a whopping 1/4" thick at the apex. Vandersteen claims that these drivers are the first to deliver perfect pistonic behavior throughout their passbands. The crossovers are all first-order, which maintains the time-and-phase coherence that is a hallmark of every Vandersteen design.

Sensitivity is a rather low 85dB (2.83V) with a 4-ohm impedance. The 7's simpler crossover (a benefit of the powered woofer) makes its impedance more resistive than reactive, presenting an easier load to a power amplifier. Still, you should plan on driving the 7 with a hefty amp. (See the "Technology" sidebar and my interview with Richard Vandersteen for more technical detail.)

## Listening

The Model 7 is amazingly great in so many areas that it's hard to know where to begin. This isn't a speaker that improves upon its predecessors in just one or two performance areas, but across the board.

Nonetheless, I'll start with the 7's greatest achievement, its stunning purity and clarity through the midrange and treble. Even in an era in which significant advances in dynamic-driver

technology have produced greater transparency, higher resolution, and lower coloration, the Model 7 stands out for its complete lack of dynamic-driver "sound." The 7 strips away a layer of coloration and artifacts, revealing an absolutely glorious purity of timbre that must be heard to be believed. These speakers seem to disappear as a source, not just spatially, but in their freedom from a type of sound we've become inured to from dynamic loudspeakers. You simply don't hear the cones when listening to music through the Model 7. In fact, this loudspeaker is electrostatic-like in its clarity, transparency, and complete absence of boxiness.

The result of this technical achievement is a musical presentation that is simply breathtaking in its beauty. In choosing an example to illustrate my point, I could literally name any one of the hundreds of recordings I've played through the Model 7. I say this because every single CD, SACD, or LP I heard bowled me over. No matter what the instrument, voice, or ensemble, the 7's special quality was unmistakable. Sonny Rollins' sax on *Sonny Rollins* (the fabulous Music Matters 45rpm reissue of Blue Note 1542) had a burnished warmth, presence, and expressiveness that were startling. Or take the Bill Evans LP *Quintessence* that showcases Evans in a rare quintet format. His piano had lifelike immediacy yet without a hint of forwardness; Ray Brown's bass was a tangible image perfectly and precisely located between the loudspeakers, with a sense of body that conveyed the impression of being in the room with the instrument; and Philly Joe Jones' understated brush work had an uncanny realism. I had the distinct impression not of listening to a recording, but of experiencing a live musical event. I've heard this record on quite a few systems, but never reproduced with the same degree of almost spooky "you-are-there" realism.

Not surprisingly, the 7 was stunning in its reproduction of voice. It created the most lifelike rendering of vocals I've heard from a hi-fi system. The 7 achieved this through its totally uncolored tonal balance, seemingly perfect spatial perspective (not too forward, not too laidback), precise image focus, and, most importantly, a stripping away of any sense of the sound being created by a mechanical contrivance. Try the acoustic guitar and vocal track "Done Got Old" from Buddy Guy's great disc *Sweet Tea*; the sense of immediacy, presence, and realism of his voice is goosebump-raising. These speakers completely disappear, leaving the powerful impression of listening to music itself rather than a recreation of it.

The 7's treble was as revelatory as its midrange. The top end was as clean and pure as the mids, with no trace of dome-tweeter hardness, glare, grit, or artifice. In fact, the top end sounded as though it were reproduced by a ribbon tweeter, but without a ribbon tweeter's dynamic limitations. Cymbals played *fortissimo* and mixed in prominently had the same level of energy you hear from the instrument in life, but were totally devoid of the hardness that makes you feel assaulted. In fact, I reveled in hearing this much treble energy reproduced with such liquidity—it was as though my ears relaxed and opened up to the performance.

This treble performance on its own would be remarkable, but what really vaulted the Model 7 into new territory was the sonic and musical synergy between the pristine midrange and glare-free treble. The 7 had a sense of seamlessness in which the harmonics of instrumental timbres seemed like integral and natural extensions of the fundamentals—more "of a piece" than I've heard from any other multiway dynamic loudspeaker. The way the harmonics and

## SPECS & PRICING

### Vandersteen Audio Model 7 Loudspeaker

Type: Four-way dynamic loudspeaker

Frequency response: 22Hz-40kHz +/- 2dB

Sensitivity: 85dB, 1M/2.83V

Impedance: 4 ohms nominal (+4, -0.5 ohms)

Crossover: 100Hz, 600Hz, 5kHz, 6dB/octave

Driver complement: 12" powered push-pull woofer; 7" mid/bass unit, 4.5" midrange, 1" tweeter (front-firing), .75" tweeter (rear firing)

Integral amplifier power: 400W

Dimensions: 14" x 44" x 20"

Weight: 170 lbs. net (each)

Price: \$45,000 per pair

### VANDERSTEEN AUDIO

116 W. Fourth Street  
Hanford, CA 93230  
(559) 582-0324  
vandersteen.com

### ASSOCIATED COMPONENTS

BALabo BC-1 Mk.II and Audio Research Anniversary Reference preamplifiers; BALabo BP-1 Mk.II and Audio Research Reference 210 power amplifiers; dCS Puccini/U-Clock and Meridian 808.3 CD players; Meridian Sooloos music server; custom PC-based music server; Basis Inspiration turntable/Vector 4 tonearm with Air Tight PC-1 Supreme cartridge; Aesthetix Rhea Signature phonostage; Shunyata Hydra-8 Mk.II and V-Ray Mk.II AC conditioners, Shunyata CX-series power cords; AudioQuest Wild Blue Yonder, and WEL Signature interconnects and bi-wired AudioQuest Meteor cables; Billy Bags equipment racks

## THE CUTTING EDGE - Vandersteen Audio Model 7 Loudspeaker

fundamentals integrated within the musical fabric was very much like what I hear from full-range ribbon and electrostatic systems. You simply don't hear the tweeter as a tweeter with the Model 7. The complete absence of an audible transition between the midrange and treble—that unnatural sense of the treble “riding on top” of the music (which never occurs in life)—was a key component of what made the Model 7 so immersive musically. It wasn't just that the transition was seamless, but also that the midrange and treble had the same lack of color, contributing to the powerful illusion of hearing music rather than its recreation. As a result, the 7's reproduction of strings, whether massed or solo, was revelatory. The beautiful recording of Arturo Demoni playing the Bach Partita No. 2 in D-minor on Water Lily exemplifies all I've written about the 7's reproduction of timbre and seamlessness from top to bottom. The instrument was vividly brought to life with a full measure of high-frequency energy, but with zero grain, stridency, or hardness. This lack of abrasive edge fostered a more relaxed and intimate feeling during listening sessions. The only other multiway dynamic loudspeaker I've heard that's in the same league as the Model 7 in this midrange-to-treble transition is the Revel Salon2, although the Salon2 doesn't quite match the Vandersteen in timbral purity.

The midrange and treble were massively resolved, yet not in a hi-fi sense of the term “resolution.” The 7 presented a finely filigreed rendering of detail that revealed the subtlest of sounds and musical nuances in a way that was utterly natural and musical. It wasn't the kind of detail that calls attention to itself as “high resolution,” but rather the antithesis: The 7's high resolution contributed to the sense of not listening to a hi-fi system. The 7 excelled at revealing music's micro-dynamic structure in a vivid, though not aggressive way. Subtle cymbal and brush work by great drummers sounded alive and real by virtue of the 7's dynamic agility and its ability to reach way down to present even the finest detail with precision. This is the level of detail that CD-quality digital audio misses, and can only be appreciated with LP as a source or high-res digital that's done right.

These qualities combined to make listening to music through the Model 7 so compelling. I had the sense of complete immersion in the musical performances rather than of hearing a sonic presentation in front of me. I could listen at high playback levels with no sense of being assaulted, and long sessions produced no fatigue. Part of this quality is due to the extraordinary BALabo preamplifier and amplifier reviewed by Jonathan Valin in Issue 201 (the best electronics I've yet heard), about which I'll have more to say in a future issue. But with any electronics and sources, the 7's combination of clarity, lack of color, resolution, and ease was unmistakable. I should point out that the 7 has a very narrow sweet spot over which this presentation occurs. Sit too high, or off to the side, and the sound is still wonderful, but not as captivating.

The Model 7's soundstaging was as impressive as its tonality. The 7s, which were positioned slightly wider than I thought would have worked, produced not just a huge and well defined soundstage, but portrayed image size more accurately than I've heard before. Small instruments sounded small, and large instruments sounded large. Image focus was extraordinary. I had the impression of hearing instruments as three-dimensional objects, not as flat cutouts. Acoustic bass had a “roundness” that conveyed the instrument's dimensions, along with a vivid impression of strings attached to a large wooden body. Once again, this precise focus was confined to

a relatively small area on the listening couch; small head movements changed the soundstage focus.

The 7 was also significant in the way in which it portrayed the decays of notes, and the musical effect this had on the listening experience. Sounds seemed to hang in space longer, resulting in a “fuller” and “denser” presentation. This wasn't just reverberation decay, but the notes themselves, even in fast-paced, closely miked recordings. Rim shots were revelatory in their transient quickness and the way the sound hung in the air after the attack.

After seeing (and hearing) Richard Vandersteen dial in the Model 7's bass with the eleven-band equalizer, woofer level control, and woofer “Q” adjustment, it struck me just how useful adjustable bass is in a loudspeaker. The bass was good just using proper loudspeaker placement, but the adjustments took it to another level. The equalizer smoothed the response, and the level and “Q” controls dialed in the bottom end for just the right bass balance and tautness. (See the “Setting Up The Model 7” sidebar for more detail.) The powered 12" woofer plays low and loud (if asked to) with a complete sense of ease. The 7 will even reproduce organ pedal points with authority. Kick drum had the requisite amount of heft and impact, and transient response was surprisingly taut.

As a side note, the 7 seemed to magnify the differences between recordings, between analog and digital (immensely), and between the associated components that were rotated through the system. This is a loudspeaker that is very sensitive to the signal you feed it, and is not out of place in a system of reference-grade electronics such as the BALabo.

Although the 7 played loudly enough for me, it doesn't match six-figure speakers in large-scale dynamics or in the ability to fill a large room with high-sound-pressure levels. Above a certain SPL, the magic diminishes. If you want to play Reference Recordings HRx high-resolution orchestral spectaculars at pant-leg-flapping levels, the Model 7 probably isn't for you. I must reiterate, however, that I discovered the Model 7's macro-dynamic limitations not during normal music listening, but only when pushing the system to find its upper comfort boundary.

### Conclusion

The Vandersteen 7 is a stunning achievement that must be regarded as one of the world's great loudspeakers, regardless of price. The lack of color and artifacts through the midband and treble are simply breathtaking—the state of the art in my experience. It is impossible to overemphasize the impact this ineffable beauty of timbre had on music listening. It's the kind of sound that makes you melt into the listening seat and not want to leave it.

In light of the 7's overall performance, I feel churlish bringing up three minor caveats: 1) the 7's need for a substantial power amplifier (the power meters on the ARC Reference 210s suggested that the 7s drank up all these amps could put out); 2) the 7's inability to play extremely loudly in a large room; and 3) the need to sit in the sweet spot for the best focus, although the 7's gorgeous tonal balance is evident from another room.

I feel even more churlish bringing up these points considering the 7's bargain price of \$45,000. Save your letters of outrage (“How can a \$45k speaker be a bargain!”); the 7 is exactly that. One could spend six figures and not get the 7's magic. And compared with many other loudspeakers in its price range, the 7 is simply a runaway.

If I had to choose, right now, a single loudspeaker to spend the rest of my life with, it would be the Vandersteen Model 7. **tas**

## Setting Up The Model 7

The Vandersteen Model 7 was the first loudspeaker set up in my new listening room. The new room looked like it had good sonic potential, but you never know until you set up a pair of speakers and listen. I was apprehensive before Vandersteen's arrival, and greatly relieved after hearing the 7 sound so good.

The way in which Richard Vandersteen set up the Model 7 in my room was unlike that of any other loudspeaker designer I've encountered. He measured the room's dimensions, calculated where he wanted to put the speakers (a third of the way into the room, with the listening couch a third of the room's length from the back wall), and once positioned in the calculated location, didn't move them again. Usually, loudspeaker placement involves dozens of "listen/move" cycles to dial-in the sound, sometimes over a period of two days. Vandersteen's setup could have taken just an hour.

Once the speakers were in position, Vandersteen put a custom jig on the front baffle that had a laser attached to it. With a piece of cardboard on the listening couch to substitute for the listener, Vandersteen precisely adjusted the toe-in and rake angle for each speaker by watching the laser's position on the cardboard. Rake angle is particularly important with time-and-phase-coherent loudspeakers; there's only one correct rake angle for a given listening distance and height that results in all the drivers' outputs arriving simultaneously at the listener's ears. Although some of the Model 7's qualities are apparent when listening off-axis or standing up, it's really a different experience when you sit exactly in the sweet spot. This is truer of the Model 7 than of other loudspeakers, in my experience.

Once the speakers were positioned, Vandersteen used an SPL meter and a CD with test tones to measure the 7's bass response as modified by my room. The test tones' frequency corresponded with the center frequencies of the eleven-band equalizer. Vandersteen wrote down the amplitude of each frequency (one speaker at a time), and used this information to increase or attenuate the level at that frequency, via the tiny trim pots on the rear panel, to achieve flatter response. Note that Vandersteen doesn't try to eliminate room-induced colorations with the equalizer, just reduce their severity.

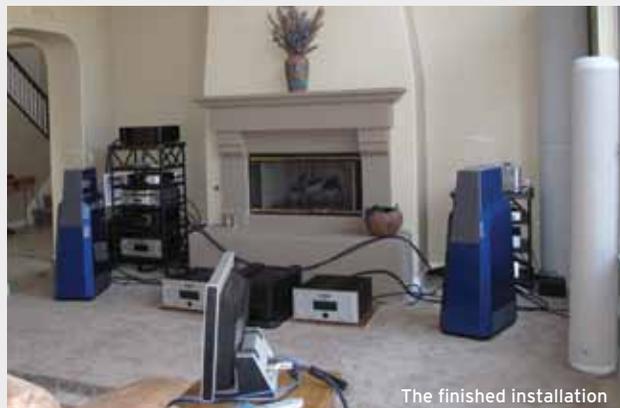
After setting the equalizer on each speaker, Vandersteen measured the response again and tweaked a couple of the equalizer bands. The difference in smoothness of response before and after the equalizer was worth the effort, but cleaning up the bass also conferred an increase in midrange openness and clarity. Incidentally, my new room measures quite flat in the bass, which bodes well for future reviews of loudspeakers without bass equalization.

With the equalizer dialed-in, Vandersteen had me play a recording that I knew was right on the edge of being excessively bass heavy. We used this recording to set the woofer level (a knob on the 7's rear panel). Next, we listened to a number of acoustic bass recordings and set the woofer's "Q" for the best combination of weight and articulation. If the "Q" is set too low,

Richard Vandersteen adjusts rake angle with the help of AudioQuest's Joe Harley. Note the laser alignment device attached to the baffle



BAIabo distributor Fred Nael helps Richard Vandersteen during set up



The finished installation

the bass is highly articulate but lacking body and extension. If set too high, the bass loses its agility and precision, and the presentation is overly thick.

As expected, this tremendous flexibility in adjusting the 7's bass to the room in which it plays greatly contributed to the bass performance but it also contributed to the overall impression of listening to music rather than to a recreation of it. I didn't hear bass bloat or colorations that would have been a constant reminder that the sound was being reproduced by loudspeakers. **RH**

# Technology

The Model 7 represents the culmination of a ten-year development effort. The core technology is the "Perfect Piston" drivers made from a sandwich of carbon-fiber skins around thick balsa wood (1/4" thick in the case of the two midrange drivers). These drivers, which have very high stiffness and low mass, are claimed to be the first moving-coil drivers to exhibit completely piston-like behavior in their passbands. The problem Vandersteen's cone design reportedly eliminates is flexure of the cone as it is driven by the voice coil. Think of a cone being pushed and pulled by a relatively small circle at the cone's center where it is attached to the voice coil. With enough force, or at a high enough frequency, the cone will flex under this force, with parts of the cone moving incoherently. It is this incoherent movement that introduces distortion. It would be simple to make a cone that didn't flex, but making one that doesn't flex *and* is light is another matter.

The 7" mid/bass driver, the 4.5" midrange driver, and the front-firing tweeter are all made from this three-layer, carbon-fiber/balsa-wood structure. The mid/bass driver starts life as a ScanSpeak Illuminator that is then fitted with Vandersteen's cone and built on Vandersteen's magnet structure. The midrange unit features an open basket to reduce the amount of energy reflected from the basket to the back of the diaphragm. This reflected energy can cause the diaphragm to vibrate, which is obviously unwanted. The tweeter is built on the ScanSpeak Illuminator platform with Vandersteen's carbon-fiber-and-balsa-wood dome diaphragm. Each of these drivers is built one at a time by hand. Vandersteen believes that using just one type of diaphragm material over the entire range (above 100Hz, where the 7" driver crosses over to the aluminum woofer) is critical to achieving a seamless blend between drivers. The rear-firing tweeter is a conventional alloy type.

The 12" woofer was designed from scratch for the Model 5, and is used here in the Model 7. It is a push-pull design with dual voice coils driven by a 400W integral amplifier. The two magnet assemblies and voice coils, one on either side of the cone, push and pull the cone. The cone is made from two sections of spun aluminum around a honeycomb structure for greater rigidity. Among the benefits of a powered woofer are less strain on your main power amplifier (it needn't deliver current through the woofer), the removal of the series inductor between the amplifier and the woofer (a huge benefit, by the way), and a more benign load for your amplifier

(the speaker's impedance is less reactive).

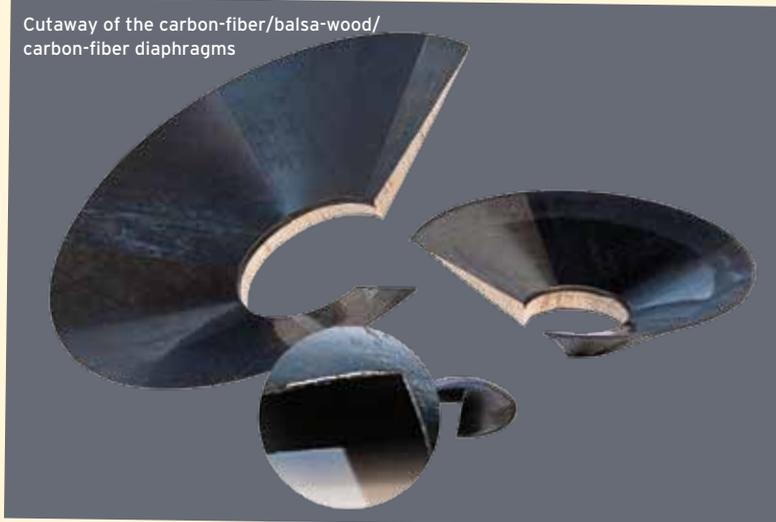
The crossovers are first-order, a requirement of loudspeakers with perfect phase coherence. If you put an impulse into a phase-coherent loudspeaker, you'll see all the drivers responding in perfect unison. This isn't true for all other loudspeakers. There is some debate, however, about the audibility of a lack of phase coherence. Indeed, many of the world's great loudspeakers are not phase coherent. The crossovers at 100Hz, 600Hz, and 5kHz are implemented with cost-no-object silver and copper-foil caps and hand-wound copper-foil air inductors. Two of the capacitors cost \$500.

When ordering a pair of 7s, you must specify whether you will use balanced or unbalanced connection between the preamplifier and power amplifier. This is because the passive high-pass filter that rolls off the bass driving the power amplifier has either balanced or unbalanced jacks, not both. Note that you don't need an additional pair of short interconnects; the filter boxes are fitted with a captive AudioQuest cable.

The "Stealth" enclosure, new for the Model 7, is made from structural panels composed of multiple layers of an unnamed "non-resonant" material in a constrained-layer damping arrangement. These panels are then clad with carbon fiber on both sides in a high-temperature autoclave. The baffle and other smaller elements are made from a molded and machined epoxy composite material. A felt-like material surrounds the tweeter and midrange drivers. The enclosure's shape is designed to minimize the baffle area and reduce diffraction.

The bi-wireable inputs are a terminal strip of nearly pure copper rather than the traditional binding posts. Vandersteen found that a strip was sonically superior to any binding post he tried. **RH**

Cutaway of the carbon-fiber/balsa-wood/  
carbon-fiber diaphragms



# Richard Vandersteen Talks with Robert Harley

**R**ichard Vandersteen literally founded one of the core companies of American high-end audio in his garage. A truck driver with a mechanical bent, he built a loudspeaker for his own enjoyment in 1975. Pleased with the results, he took it to a local high-end audio dealer for his opinion. The dealer was impressed and asked Vandersteen if he planned on showing the speaker at CES. "What's CES?" Vandersteen responded. That speaker became the Vandersteen Model 2, the largest-selling high-end speaker of all time.

The self-educated Vandersteen designed and built much of the industrial machinery in his factory. He also built, from scratch, an airplane that he routinely flies. Vandersteen is a "hands-on" kind of guy who combines out-of-the-box thinking with practical solutions.

An exchange between Vandersteen and a consumer-audio-show attendee exemplifies the man. I was moderating a panel discussion of loudspeaker designers at a show when an audience member asked the panelists what they thought about evaluating loudspeakers using double-blind, ABX, matched-level comparisons with dozens of listeners followed by extensive statistical analysis of the results. Vandersteen replied "Hell, just open a bottle of wine and spend an evening listening to 'em. You'll know if the speaker's any good or not."

After 35 years of making affordable loudspeakers, Vandersteen has entered new territory with the Model 7. I began by asking him what inspired him to develop the Model 7, and particularly, the unique balsa-wood and carbon-fiber drivers at the heart of the product.

**Richard Vandersteen:** It was my desire to have pistonic drivers for the mid/bass, midrange, and tweeter when we came out with the Model 5 in '97. In the end, it just wasn't going to happen, but we brought the 5 out anyway and I've been working on the problem ever since. We started off looking at a whole range of structural materials for the cones including metal and different composites. The structural foams just didn't have the compressive strength by weight. Everything I'm talking about now is by weight, because weight is an important factor. I ended up with the combination of balsa wood and ultra-high-modulus carbon fiber. I discovered that about four years ago and have been working since then to be able to manufacture drivers from it.

The problem is, How do you bond carbon fiber to balsa, which looks under a microscope like the end of a box of drinking straws? The straws have capillary action that tries to draw the epoxy into the straws and make it heavy.

By the time we'd solved all these problems about two years ago, I put these drivers in a speaker that had technology right out of the Model 5 and took it to CES.

## What's special about the drivers' performance?

For years we've "herded the sheep," trying to control driver breakup resonances and modes through cone profiles, different materials, doping agents, and so forth. These new drivers are the first time that I know of, using dynamic drivers, where you have critically damped true pistonic action at all frequencies, plus an octave, to where you could make the mid/bass driver, the midrange, and the tweeter out of the same material and have them all be truly pistonic in their operating ranges with an octave of margin for use in a first-order, time- and phase coherent design.

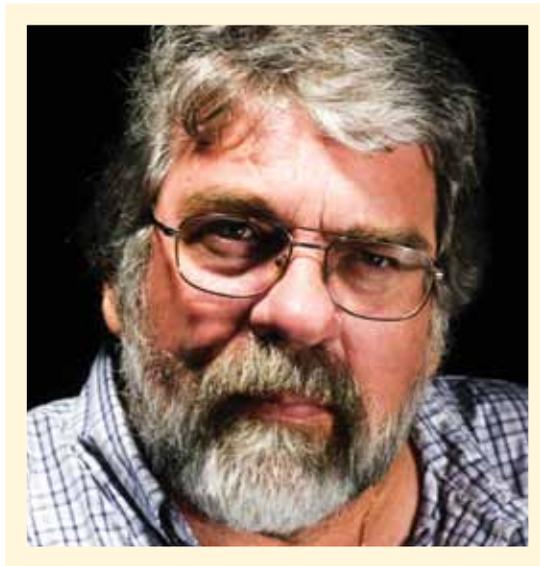
You can find a lot of midranges that have nice flat response all the way out to 10kHz. The problem is that everything above about 2kHz is just random energy that's been averaged pretty well. If you strip that away, it gives you a much clearer window on the micro-information that's in recordings.

It's really quite striking when you hear the balsa driver contrasted with a very, very high-quality midrange made out of a really good paper or poly or even some of the composite cones. You strip away all that spurious energy that's caused by this random behavior, and all of a sudden it's just strikingly clear. It's hard to describe except you know that it's right.

## What processes go into making the drivers?

Well, that's part of the patent. It's a very, very, tedious procedure. But it starts with very careful grading of the balsa. We use it in the end-grain, and you need to remove all of the moisture in a chamber that is basically like a kiln. And then it needs to be stored that way at all times because once you get the moisture down to less than one percent, it's like a magnet for any moisture that would be in the air around it. So it has to be stored in an environment that also has no moisture.

Then you need to machine the center wafer that goes between



the carbon fiber front and back skins. Our midrange, for instance, is a quarter-inch thick at the voice coil and narrows so that the front and back skins actually meet at the surround. The reason the cones are so stiff is that carbon fiber is stiff in itself, but not if it were in a single plane. The balsa functions like the webs in the truss of a home. The sandwich structure makes the cone much stiffer than you could get with just one layer of any kind of material, no matter what it's made out of.

A wonderful side benefit of all of that is when you do have an eventual breakup, instead of having a 10 or a 20dB peak before it rolls off, you end up with three or four dB—very little because it's so well damped by the fact that balsa happens to be a fantastic natural dampening agent. So it gives us the structural strength that we need, but it also damps the carbon fiber, which is very hard and stiff.

### **How did you hit on the idea of balsa wood?**

I remembered it from when I flew remote-controlled airplanes when I was much younger. We started off looking at Rohacell and other structural foams that I learned about building my [full-size] airplane from scratch. I kept wanting it stiffer and lighter. It was a constant battle. I finally decided to try balsa and found that by weight it's eight times stiffer in compression than Rohacell, which is one of the better structural foams.

### **Were you surprised by the sound quality when you first heard it, or was it what you had expected?**

I've been listening to a pair of these speakers in one way or another, now, for about two-and-a-half years, and I'm still surprised by their lack of sound, and their ability to dig things out of recordings that I never knew were there, even my own mastertapes. I don't know that I've fully experienced the full benefit of this technology yet. When you listen to music as much as my wife and I do, and you're two years into them, and you're still discovering new things, and you haven't changed the product—I've never had that happen in my 35 years of making speakers.

One of the things that really struck me somewhere around the middle of this process, where I was beginning to experience what this was doing from a distortion and a clarity standpoint, was that older cone technologies are going to have a tough time. We've had piston tweeters for some time, but once you get used to hearing drivers made from the same material from 100Hz on up—it's addictive.

### **What was it like the first time you connected the prototype and listened?**

Well, my first impression was that it was very, very different. It caused me to go back and make sure I had done everything correctly. We have samples of every driver made on Earth and this was so different. After about a week of listening I sat there one evening with some mastertapes I'd made years ago and said: "It's different, but it's just obviously right." It put me closer to the church where I made those mastertapes than I'd been before.

### **Did you think that there'd be resistance to a \$45,000 Vandersteen product or have your customers been waiting for this level of product from you? It's a real departure.**

We made thousands and thousands and thousands of Model 2s, and a large percentage of the market wanted to go up to \$2500 a pair for our speakers. We were late coming out with the Model 3—uh, very late—probably five years later than we should have been. And we were at least a decade late coming out with the Model 5s.

That's mostly because I've never considered it a challenge to make an expensive speaker that was good. What got me up in the morning and always gave me a lot of personal satisfaction is how good a speaker you could make for how little money, because that obviously meant that you had higher volume. And we've never used off-the-shelf drivers. If you wanted to use custom drivers, especially back in those days, you had to have a reasonable amount of sales in order to get this bizarre stuff done by the vendors. So there was always the pressure to keep the volume up, and it just wasn't really a challenge to me to make an expensive speaker. But these drivers in the Model 7s have challenged me plenty.

So, again, we're probably late coming out with something after the 5, because people naturally want to graduate up. In its own way, I think the 7 will represent as good a value or even maybe a greater value than our products ever have at any price point, even though I know \$45,000 is a lot of money. I mean, you can buy a car for that.

### **You use adjustable bass and powered woofers in the 5 and the 7, but that's not a universally accepted architecture. It seems to have tremendous benefits.**

Yeah, I agree. And to be honest with you, if I had my way and if it were financially feasible, all of the full-range speakers that we make would be that way because it's such a tremendous advantage to have a dedicated amplifier that's designed with only one task in mind, and that is to drive that woofer in that enclosure. There's so much that can be optimized—let alone the actual size of the enclosure. I'm surprised that there aren't a lot more people doing that.

On the other hand, it is unconventional, and people tend to resist things that are not conventional. For instance, someone looking at a pair of Model 7s might have a \$77,000 amplifier, and there may be a reluctance to say that from 100Hz and below, he's not going to be driving that speaker with his \$77,000 amplifier; he's going to be using the one that's built in the speaker.

The way we've done it, though, is that actually that amplifier still is driving the speaker. It's just not providing the current. So the signature of whatever amplifier is driving the system—the way we do it in the Quattro, the 5 and the 7s and our 2W subwoofer series—that character and that signature is passed onto the bottom end.

You can assess anything you want about an amplifier's prowess in the bass by listening to it on a Model 7. The voltage gain is provided by the customer's amplifier. It's only the current gain that we provide in the amplifier module.

And being able to adjust for a room—how many of us haven't had difficulties getting the bass right in our sound rooms? This system does not correct for a bad room, because the treatments are still necessary sometimes. But it certainly can minimize the problems. **tas**