



the absolute sound

BUYER'S GUIDE TO LOUDSPEAKERS 2018



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MartinLogan excels at doing things that have never been done, like integrating exotic Folded Motion™ driver technology, inspired by our legendary high-end electrostatic designs, into the affordable Motion® Series and reference Stealth™ Architectural Series. Smooth, refined sonic performance with stunning dynamic range and jaw-dropping clarity – MartinLogan magic in an application to suit every lifestyle.



EM-ESL X



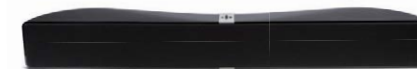
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Julie Mullins welcomes you to our 2018 Buyer's Guide to Loudspeakers.



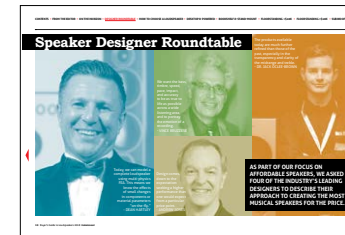
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Neil Gader has the news on new and recent loudspeakers hitting the market.

“The loudspeaker should be matched to the rest of your system electrically and musically... A speaker that works in one system may not be ideal for another setup—or listener.”

HOW TO CHOOSE A LOUDSPEAKER

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FLOORSTANDING >\$10K

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Larsen Model 6.2
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MartinLogan Impression ESL 11A
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Our Top Picks in Floorstanding <\$10k

SECTION SPONSOR
LEGACY



“... ONE OF THE BEST
SPEAKER SYSTEMS I HAVE
EVER HAD THE OPPORTUNITY
TO LISTEN TO OR REVIEW.”

Anthony Cordesman, *The Absolute Sound*



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Buyer's Guide to Loudspeakers 2018

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 (Loudspeakers >\$10K)



From the **Editor**

Welcome to the 2018 Edition of *The Absolute Sound's* Buyer's Guide to Loudspeakers!

Whether you're ready to buy your first pair of high-performance speakers, or are a longtime audiophile looking for transducers to take your system to the next level, this Guide is for you.

Herein you'll find TAS editors' insights and recommendations, along with 32 full-length loudspeaker reviews that span a broad range of prices and types. This new 2018 edition also features:

On the Horizon – Peruse the newest and most noteworthy recent loudspeakers to hit the high-end audio market.

Sneak Preview – Check out KEF's new LS50 Nocturne limited-edition wireless speaker.

Designer Roundtable – We talk to four of the industry's most innovative designers about creating affordable loudspeakers and more.

How to Choose Loudspeakers – Find out from Robert Harley all you need to know before you buy those speakers.

Top Picks – See our favorite loudspeakers by category.

Happy listening!
Julie Mullins, Editor

We All Love an Interesting Character ... Except When No-Character is Better



Odds are that your best friends or your significant-other are interesting people — otherwise, they wouldn't be interesting to you. However, in a hi-fi system, one of the highest values, maybe the most important characteristic — is to have no character at all.

But, we're human, and in as much as the purpose of music is to be emotionally stimulating, we often have an internal conflict as we choose our audio gear: we want honesty, neutrality, and truth — but we also crave emotional engagement.

As AudioQuest's chief designer, I try to put as much emotional provocation into the visual presence of AQ cables as possible (I love designing the braids and organizing them into a sort of quality code), but of absolute primary importance for me is designing cables that have **as close to no-character and no-voice as possible**.

Further confusing the process, because no hi-fi gear is perfect, we usually have no choice but to choose as consciously and carefully as possible the nature or character of a product. Conscious and careful compromises are the hallmark of the very best designs. If a designer thinks that their merde doesn't stink, they don't carefully manage the nature and effect of a product's inevitable imperfections.

No audio component is as seriously compromised as is a speaker even before the design process begins. In having to choose between point-source, planar, line-source, omnidirectional, etc., the designer has already accepted an extremely significant form of voice or character as being the best compromise and the best path to sonic immersion.

Arguably, the single most important personality trait found in a good designer of any audio product is their ability to be aware of everything that is imperfect, and to work to minimize those problems — their willingness and ability to balance and manage those challenges into a holistic whole that we as listeners are as unaware of as possible.

My point is that cable is unlike other parts of an audio system in that there truly is a perfect reference — “no cable”! A simple bypass comparison always shows any cable to be flawed but also allows for a complete understanding of how the cable is damaging the sound.

Cables are in a sense the only components (other than AC power products) that can be evaluated and chosen based on their *lack* of character. No cable can fix what goes wrong elsewhere in the system. “Balancing” a bright speaker with a dull cable, or a dull speaker with a bright cable, will never create as effective and immersive a musical experience as choosing each component to be as good as possible on its own. As the saying goes, “two wrongs do not make a right.”

Please, as you wrestle with optimizing your system and your speakers, know that you must carefully choose the “voice” of most components — but also please know and act on the fact that a cable can and should be chosen for its lack of a voice.

I am proud of the fact that as one steps up or down in the AudioQuest range of cables, the voice is always minimal and unchanging — though of course the resolution, dynamics, and focus are greater as one steps up the line.

Happy listening!

 William E. Low

audioquest

On the Horizon

Neil Gader



Wharfedale Diamond 11 Series

The new Diamond 11 Series features bass drivers with massive magnet designs for increased sensitivity and control of cone movement, plus a specially shaped top plate with a copper cap to control magnetic flux and ensure low distortion throughout the mids. Additionally, a light-weight, progressive foamed surround with a super-long-throw voice coil motor system enhances linearity and accuracy throughout the Diamond lineup of speakers across all price points. The high-frequency drivers also employ oversized ceramic magnets and the same copper cap found in the bass drivers, as well as a pole piece that is vented through a specially shaped rear chamber to decrease resonance. Curved cabinet walls are made from a refined multi-layer sandwich of various woods. The slot-loaded distributed port improves low-frequency output and allows for speaker placement close to a rear wall. The nine-model lineup is available in black ash and rosewood finishes.

Prices: \$349 to \$1698. mofdistribution.com



Starke Sound Halo Series IC-H2

At first glance you may conclude that Starke Sound's new IC-H2 is simply a floorstanding version of its bookshelf counterpart, the Halo Series IC-H1 Elite. But there's more than meets the eye with this three-way. A newly revamped 4" carbon-fiber cone midrange driver with Starke's patented LMF driver technology is said to provide a more lively sound while the speaker's bass has been designed to achieve 35Hz with the same 5.25" woofer as found in the IC-H1. The idea to create the IC-H2 arose when the company's design team began developing a stand for the IC-H1. Starke Sound's CTO Dan Wiggins instead proposed just making the IC-H1 into a floorstanding model thereby eliminating the need for a stand. In addition, the tall cabinet would provide more volume for bass and improve the performance of the speaker. No convincing was necessary. The new 38.5"-tall IC-H2 is a true full-range speaker that delivers better bass, Starke's signature aluminum faceplate, and the sound quality found in all of Starke's Halo Series products.

Price: \$4800. starkesound.com

On the Horizon



Emotiva Audio Airmotiv T2

Emotiva Audio's T2 three-way tower loudspeaker combines accuracy, precision and detail retrieval, and smoothness. At 42" tall the T2 features a 32mm Airmotiv folded-ribbon tweeter, a 5.25" woven-fiber midrange, dual 8" woven-fiber woofers, and a ported cabinet. Airmotiv high-frequency transducers are reported to deliver flat frequency response, low distortion, minimal signal compression, and smooth off-axis response. Carefully designed precision crossovers, crafted with audiophile-quality film capacitors, air core inductors, and precision resistors in critical locations tie it all together. The custom cabinets are crafted from thick, heavily braced, acoustically inert HDF with a front panel machined from a solid slab of 25mm HDF. The faceted front-panel design, which is borrowed from Emotiva's studio monitors, also serves a practical purpose: to minimize diffraction effects and room interactions. The T2 would be at home in either two-channel or surround-sound systems. **Price: \$999. [emotiva.com](#)**



Muraudio SP1

Muraudio is announcing the launch of its all-new SP1, a design based on the award-winning Domain Omni series of loudspeakers and the company's patented, high-output, continuous-curve electrostatic technology. The SP1 incorporates many of the components found in Muraudio's flagship PX series of loudspeakers into a smaller, lighter, more contemporary design with luxurious finish. Each SP1 speaker integrates Muraudio's continuous-curve ESL panel with four custom-designed six-inch aluminum-cone drivers to create what's said to be an immersive, panoramic soundstage. With its full-range, 120-degree horizontal listening window, the SP1 promises to deliver Muraudio's signature "Sound is Everywhere" experience. **Price: \$14,700/pr. [muraudio.com](#)**



Spondor A4

The Spondor A4 is a completely new two-way, rear-ported design featuring Spondor's acclaimed 22mm wide-surround tweeter and a seven-inch main drive unit. Created for music lovers on a budget, the A4s deliver the most versatile and affordable loudspeakers Spondor has yet made. The 31.3"-tall A4 contains trickle-down technology from the award-winning Spondor D7. The main drive units have been designed with Spondor's new EP77 Polymer cones, allowing the loudspeakers to partner with most amplifiers and sources, regardless of price. The result is reported to be a dynamic, open, and balanced sound with deep, articulate bass. Unfussy about in-room placement, you can expect the A4s to fill your listening room with high-performance sound, while Spondor's latest technology helps the A4 loudspeakers get the most from whatever equipment you have. **Price: \$3495/pr. [bluebirdmusic.com](#)**

On the Horizon



YG Acoustics Sonja 2 Series

The Sonja 2 series of loudspeakers are direct descendants of the extreme four-tower Sonja XV speaker and feature two of that flagship's key technologies. The first is the BilletDome tweeter, YG Acoustics' most complex mechanical invention to date: a resonance-free soft dome supported by a stiff, light airframe. The airframe weighs a mere thousandth of an ounce, but its critical sections are up to 14 times thicker than a typical hard dome, providing far more strength compared to domes made of exotic hard materials. In short, BilletDome is said to combine the best of hard and soft domes. The second unique technology is known as ViseCoil: CNC-wound bass inductors encased in vise-like milled structures that eliminate vibration and tighten tolerances. Residual loss is reduced by 24% and linearity is improved by 60%, according to the manufacturer. Sonja 2 comes in four modular configurations. (See the Sonja 2.2 review on p. 118 of this Guide.)

Prices: Sonja 2.2, \$76,800/pr.; Sonja 2.3, \$112,800/pr.
yg-acoustics.com



KEF Kube Subwoofers

Employing a minimalistic look and bombastic, *über*-precise bass response, the new line of KEF Kube subwoofers—the Kube 8b, 10b, and 12b—promise to deliver high performance at an affordable price. All three Kube subwoofers contain custom drivers and 300W amplifiers specifically designed for their sleek black cabinets. The subwoofers feature KEF Smart Compression Limiting, a technology that allows the in-house-developed IBX DSP to analyze the input signal and then compress that signal's dynamic range to prevent amplifier clipping. The subwoofers also feature KEF Smart Connect, which detects whether an LFE or stereo input is connected and adjusts volume accordingly. Each Kube comes with three pre-programmed EQ settings designed for specific room placements. You can customize your Kube by switching to speaker-level input for use with whole-house networked music systems, or adjust the gain, phase, low-pass filter, and crossovers to your liking.

Prices: Kube 8b, \$500; Kube 10b, \$600; Kube 12b, \$700. kef.com



McIntosh XRT2.1K

The XRT2.1K represents the next evolution of McIntosh home-audio speakers. Standing 7 feet tall, the four-way speaker uses a total of 81 drivers including six 8" woofers, two 6.5" lower-frequency midranges, twenty-eight 2" upper-frequency midranges, and forty-five 3/4" tweeters. The woofer and low-frequency midrange drivers are new designs specifically created for the XRT2.1K composed of nanocarbon fiber and Nomex honeycomb. Their extremely stiff yet lightweight diaphragms combined with a very-long-throw design extend low frequencies. The line array contains aluminum/magnesium upper-frequency midrange drivers and metal tweeters specially customized for the XRT2.1K. The reinforced bass cabinet is made of brushed aluminum and finished with seven layers of high-gloss piano-black paint. The driver configuration's appearance is a nod to the timeless McIntosh front-panel look with a glossy black center section and two silver aluminum end caps. Separate pairs of binding posts allow for bi- or even tri-amping. Sensitivity: 90dB.

Price: \$130,000/pr. mcintoshlabs.com

On the Horizon



Elac Debut 2.0

The Elac Debut 2.0 line of home speakers and subwoofers builds upon the success of the first-generation Debut family by incorporating a variety of new features and technologies. Some of the updated lineup's notable features include a new silk-dome tweeter with a wide-roll surround that takes frequency response up to 35kHz for even more lifelike high frequencies. The refashioned waveguide improves directivity control and reduces the diffraction inherent in traditional box enclosures. The revised design of the aramid cone woofer offers improved stiffness and damping, which when combined with the new dust-cap reportedly results in a smoother response and greater transparency. The MDF cabinets are braced for greater stiffness and reduced vibration. The bass port has moved to the front of the cabinet for more flexibility in speaker placement, allowing them to be positioned closer to the wall or in bookshelves.

Prices: nine models, from \$249/pr. to \$798/pr.



Legacy Audio Valor

Legacy's new Valor system relies on graceful styling to conceal a significant arsenal of new technology. At almost six feet tall with heft approaching 300 pounds, Valor employs 2750 watts of internal power per side and a 56-bit processor to reproduce even the most dynamic performances with detail. The Valor system employs an "acoustic steering" circuit that reportedly better renders accurate horizontal and vertical spatial clues. The advancements are the combined efforts of Legacy's Chief Engineer, Bill Dudleyston, and Bernt Böhmer of Böhmer Audio of Sweden. Together they have developed the Wavelet processor that helps tackle the problems of room resonances and digital harshness while the new trademarked Stereo Unfold technology is said to advance music reproduction by restoring the natural timing and level relationships. The results are reported to be clearer sound with more front-to-back depth, and a more open, spacious soundstage, in addition to more precise image placement.

Price: \$80,000/pr. legacyaudio.com



Magico A3

The new A series of loudspeakers brings together at a dramatically lower price point a bevy of Magico technologies: a fully braced and anodized aluminum enclosure, beryllium tweeter, carbon nanographene cones, neodymium-based motor systems, and the company's renowned proprietary elliptical crossover. Magico's newly designed, pure beryllium-diaphragm tweeter with an optimized 28mm dome surface is based on the fundamental design platform and geometry of the M-Project tweeter. The 6" midrange employs a multi-wall carbon-fiber cone with a layer of XG nanographene to provide optimal stiffness and an ideal damping factor. Dual 7" woofers incorporate a version of the new Gen 8 Magico Nano-Tec cone. The same properties and materials that allow for the proper combination of stiffness, mass, and damping are carried through to the lowest frequencies. The three-way network features a 24dB-per-octave Linkwitz-Riley filter. With a sensitivity of 88dB, the A3 has a frequency response range from 22Hz–50kHz. The A3's massive, 44"-tall, sealed enclosure is a *tour de force* of engineering. Made entirely from 6061 T6 aircraft-grade aluminum, it is materially identical to the enclosure developed for the Q Series.

Price: \$9800/pr. magico.net

On the Horizon



Paradigm Monitor SE Series

The attractive and affordable Monitor SE Series of loudspeakers is designed to serve as an introduction to the world of high-performance audio. Filled with advanced technology usually only found in speakers that cost much more, the four models in the Monitor SE lineup benefit from Paradigm's fundamental research into the science of sound. This research, conducted by Paradigm in conjunction with the Canadian National Research Council, has resulted in many of the innovative materials and patented audio technologies found throughout Paradigm speakers, including the trademarked S-PAL Satin-Anodized Pure-Aluminum dome tweeters and exclusive Perforated Phase-Aligning (PPA) lenses; this patent-pending design acts as a refined phase plug, blocking a wide range of out-of-phase frequencies to increase and smooth output without coloring the sound.

Prices: \$419–\$449/each. paradigm.com



Monitor Audio Studio

The Studio speaker was created to deliver high-quality audio performance from a compact bookshelf design. With a sleek silhouette, striking design features, and technology from Monitor Audio's flagship Platinum Series II, the new Studio is meant to represent a fresh approach to audio. Studio is a grille-less design with two eye-catching 4" RDT II driver cones and an MPD Air Motion Ribbon transducer. According to Monitor Audio, the RDT II drivers have been modified to produce high-performance bass, as well as midrange detail, and the MPD (Micro Pleated Diaphragm) has been engineered to provide smooth, wide, and natural high frequencies. The combination is said to result in sound that's more lifelike and musical, producing the harmonics of notes without distortion. The Studio is offered in a satin black, white, or grey finish and can be placed on optional, dedicated stands to improve speaker performance.

Price: \$1400/pr. monitoraudio.com



MartinLogan Motion 2i, 4i, 6i, and 8i

Inspired by MartinLogan's ultra-high-end electrostatic loudspeakers, the four-model Motion Series was created to provide top-tier sound commensurate with high-performance home theaters and stereos. MartinLogan's in-house engineers carefully crafted the Motion Series to create an affordable and compact product line that seamlessly blends Folded Motion thin-film transducers with powerful, compact bass technology. The result is a smooth, refined sound with stunning dynamic range and clarity. The signature Folded Motion tweeters utilize extremely low-mass diaphragms that "squeeze" air—and require significantly less excursion than the typical 1" dome tweeter—which minimizes distortion while providing a lightning-fast response. The increased surface area also provides a wide, yet controlled dispersion to create a realistic and carefully etched soundstage.

Prices: \$179–\$399/each. martinlogan.com

On the Horizon



GoldenEar Technology Invisa Signature Point Source

The Invisa Signature Point Source is a unique new in-wall loudspeaker created to meet the needs of critical listeners who want the sound qualities of floorstanders, such as GoldenEar's Triton Towers, but are limited to in-wall speakers due to lifestyle and decorator-driven parameters. The SPS incorporates four 5.25" cast-basket bass/midrange drivers with focused-field-technology magnet structures based on the drivers developed for the Triton Reference. These are arrayed around a folded-ribbon tweeter identical to that used in the T Ref. The two on either side of the tweeter are reported to run up to 3000kHz to meet the tweeter, while the other two are rolled off at 500Hz, and said to be accurately voiced by the precision crossover. The SPS is suited for music as well as movies, and can be used either with or without a subwoofer in two-channel or multi-channel installations. **Price: \$999/each. goldenear.com**



Wilson Audio Alexia Series 2

When Dave Wilson created the original Alexia, he was able to consolidate his formidable experience and knowledge into its design. Specifically, Dave drew much of his inspiration and a fair amount of the technology from the Alexandria XLF, Wilson's flagship at the time. The result was the Alexia, a relatively compact loudspeaker that's said to possess much of the musicality, accuracy, and resolution of its much larger sibling in a more domestic-friendly form factor. When it came to the Alexia's redesign—the Alexia 2—Dave's son Daryl Wilson was eager to incorporate some of the advances in technology from the Alexx and WAMM Master Chronosonic flagship speakers. The Alexia Series 2 reportedly improves on the original in every musically relevant way: transparency, tonal beauty, transient speed, dynamic contrast, soundstage resolution, and more.


Price: \$57,500. wilsonaudio.com



The biggest small music system

LS50 Wireless – Immerse yourself in power and finesse

Prepare to be swept away. Never before have bookshelf speakers produced such scale and detail. The KEF LS50 Wireless is a complete system that delivers audiophile-grade sound in real stereo. Five minutes from unboxing, just add your music and enjoy. No wonder respected reviewers call it the future of Hi-Fi. Listen for yourself.

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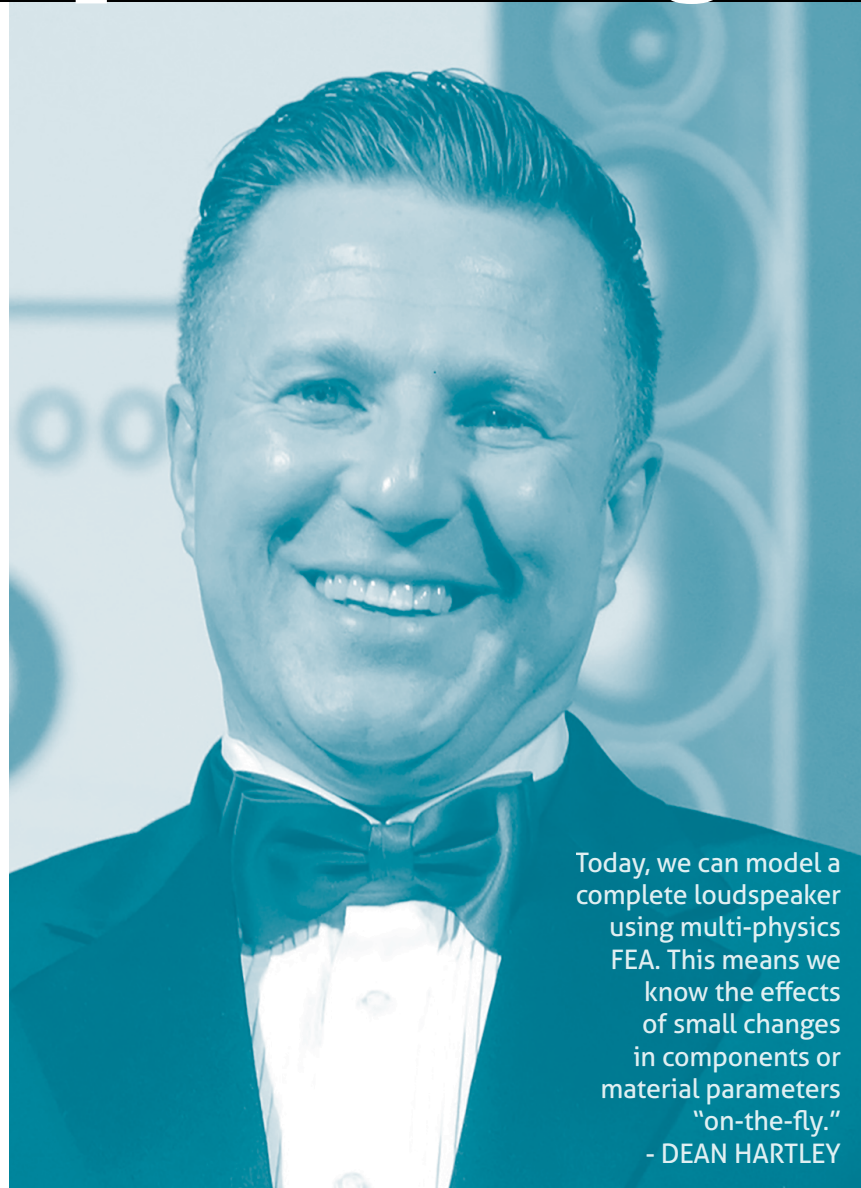
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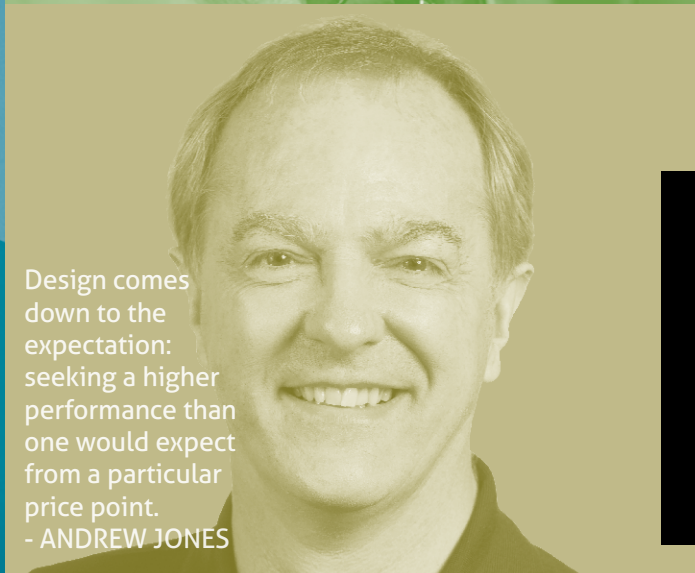
Speaker Designer Roundtable



Today, we can model a complete loudspeaker using multi-physics FEA. This means we know the effects of small changes in components or material parameters "on-the-fly."
- DEAN HARTLEY



We want the bass, timbre, speed, pace, impact, and accuracy to be as true to life as possible across a wide listening area, and to portray the emotion of a recording.
- VINCE BRUZZESE



Design comes down to the expectation: seeking a higher performance than one would expect from a particular price point.
- ANDREW JONES

The products available today are much further refined than those of the past, especially in the transparency and clarity of the midrange and treble.
- DR. JACK OCLEE-BROWN



AS PART OF OUR FOCUS ON AFFORDABLE SPEAKERS, WE ASKED FOUR OF THE INDUSTRY'S LEADING DESIGNERS TO DESCRIBE THEIR APPROACH TO CREATING THE MOST MUSICAL SPEAKERS FOR THE PRICE.

Speaker Designer Roundtable

Dean Hartley

Technical Director, Monitor Audio

Dean Hartley joined Monitor Audio twenty years ago as head of product development. Over this period, he has been responsible for introducing new technologies, innovations, and numerous patents for the company as well as continuing to serve as the company's "golden ears." Today, Dean directs a team of twenty acoustic, electronic, and mechanical designers at Monitor Audio's research and development facility in England.

Dean is a trained electronic engineer with a career spanning 30 years in loudspeaker design, working for well-known hi-fi and professional audio brands. As a musician, audio enthusiast, and technologist, he continues to be excited by the challenge of re-invention.

Is designing an inexpensive speaker easier or more challenging than creating a larger and more elaborate model? Why?

The goals for a new speaker design may be focused in many ways. With a lower-priced speaker, the common denominator always comes down to cost. This involves considering much finer details earlier in the design phase, where we would be looking for greater gains in a more

expensive speaker, as cost is less of a concern. So, the design window of a more expensive speaker can be broader and more flexible.

The designer of an inexpensive speaker obviously has to make compromises and trade-offs. What musical qualities are you unwilling to give up, and which qualities can be sacrificed for the most satisfying overall performance?

We never consider compromises in musicality, or in the key ingredients that determine musical enjoyment. Any trade-offs are usually related to structural integrity of cabinet construction, driver magnetics, and crossover components. With a high-end loudspeaker our aim is to create a faithful (often referred to as neutral) sound balance, while retaining the desired musical qualities. We always aim to ensure our speakers are enjoyable to hear and to not "doctor" the balance to make the speaker sound "enhanced" in certain areas. This is perhaps the trickiest part of designing a lower-cost model, as the cabinet and other components can impart their effects on the speaker's character.

We also need to consider the typical quality of equipment being partnered with the speaker. An example would be with a two-way stand-mount

speaker (like our entry-level Bronze 2), where the design must yield a more efficient output and easier load to get the best from an amplifier that may not have high current delivery. With a high-end design (like our Platinum II PL100), we can consider lower efficiency and resulting lower LF response.

How much better are today's speakers of a given price than those of ten years ago? Why?

I can only comment on developments we have made in our design with the investment in advanced FEA, simulation, and 3-D prototyping over the last ten years. I know people will have heard these words so many times now that they have lost meaning or ability to create a glimmer of interest. But let's look at how this has made speakers better. Ten years ago (after the design of our first Platinum Series), we only had basic simulation tools for magnetics. Today, we can model a complete loudspeaker using multi-physics FEA. This means we know the effects of small changes in components or material parameters "on-the-fly." We get closer to our target the first time, with subsequent prototyping feeding actual measured data back into the model to close the loop. Let's use an



example: We encounter an undesirable break-up mode in a new speaker cone design. Ten years ago, we would have made practical prototypes, measured them, and found this problem. At that point we would not know what part of the geometry or material issues to deal with to correct it. So, guesswork would lead us to perform many iterations of prototypes. We may stumble upon one that works, but still not be sure why. This has been the case for most driver designs in the past. Today, we can get closer to

Speaker Designer Roundtable

Dean Hartley

eradicating these issues long before any physical prototyping begins. The advancements in speaker design over the last ten years are primarily down to applying our trade using new technology, with smaller gains in the new materials available to us.

Do you think that designing very inexpensive speakers confers advantages to the designer when he's creating upper-end models?

I am not sure there is a great correlation between high-end and price-driven designs, as the thought process and focus are quite different. We use the words "trickle down" a lot, and they've perhaps been overused when a component from a higher-level range finds its way into the range below. Making lower-cost speakers usually means higher production volumes, and to ensure efficiency the design must be close tolerance with (close to) zero rejections. Applying these volume-production engineering techniques and processes to the high end is

something that we are very keen on. So, you could say that in some ways high-end designs benefit from the application, knowledge, and experience of designing lower-cost speakers. While this may not be evident to the customer, we may, for example, have found a new assembly technique that resulted in the closer tweeter tolerances required for a low-cost/high-efficiency design. So rather than affecting the fundamental design parameters of drivers and system, the benefits are more related to gains in production engineering and assembly.

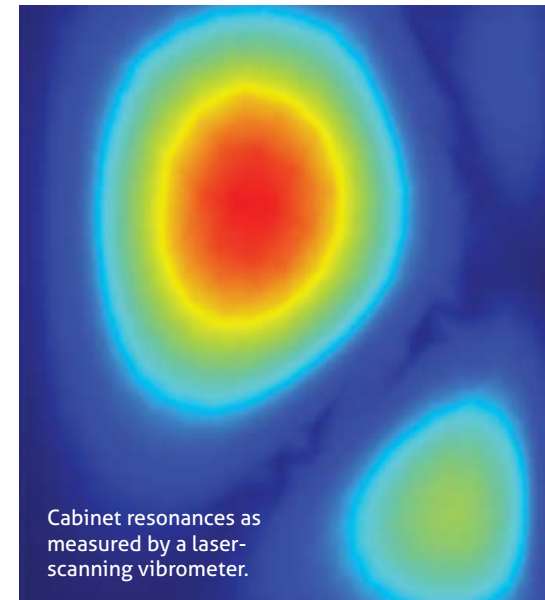
How much of the design is done in a computer and how much in real-world experimentation and listening? Describe the process.

The design is an iterative process with gated decision points, like most logical developments. From a concept we will determine what is required for a new design; how much of the design is being re-used and improved, or completely re-thought. We will commence simulation of the parts in question, which may be suspension, cones, magnetics, and the like. Once we have the individual parts to an acceptable level, we will simulate a whole driver and adjust parameters to match our target design.

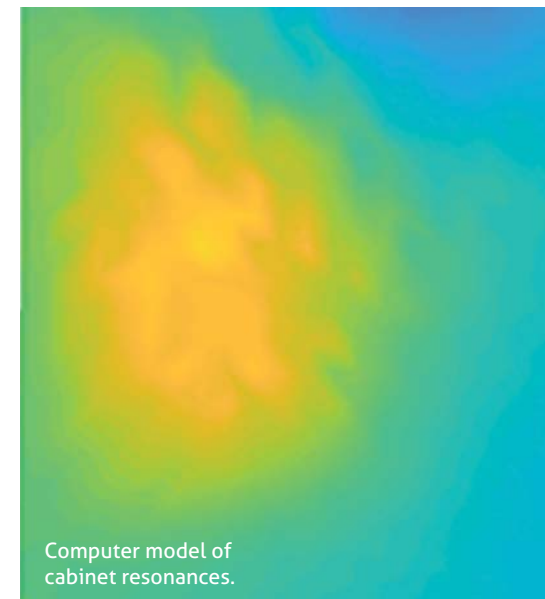
From there we will make a first prototype. If we are confident, then we may tool actual production-spec parts, and in some cases the requirements of tooling mean we must do this anyway. Once we have a driver, then we will run a series of measurements (LSI and LPM) to determine if it meets our target and simulation. If it does, then we will put this together in the system and start the listening/initial-voicing process to give us a starting point. If not, then

"Applying these volume-production engineering techniques and processes to the high end is something that we are very keen on."

we will closely analyze the physical prototype and simulation to try and find out why they fell short. This may result in a second, third, fourth prototype, as required. I have just referred to the driver design, as this is the heart of any speaker. However, in parallel we may be developing system and crossover design ideas. Or DSP and filter blocks, if it's an active design. Our voicing/listening process can vary in time and number of sessions, depending on how happy we are with the results. A typical single speaker design will involve around 50 hours of listening and refining throughout the design stages. In our case the design stages are Prototype, Engineering Stage 1, Engineering Stage 2, Pre-Production, and Mass Production. My acoustic team (including myself) maintain design responsibility, listen, and provide approvals all the way through to Mass Production. We don't hand this part over to a production team as we want to ensure complete consistency and integrity in all our designs.



Cabinet resonances as measured by a laser-scanning vibrometer.



Computer model of cabinet resonances.



Speaker Designer Roundtable

Dr. Jack Ocleo-Brown

Head of Acoustics, KEF

Dr. Jack Ocleo-Brown received an MEng degree in acoustical engineering from the Institute of Sound and Vibration Research (ISVR), University of Southampton, UK, in 2004. Since then he has been with KEF Audio, where he now holds the position of Head of Acoustics. In 2012, he received his PhD from the ISVR for a thesis on the acoustic design of compression driver phase plugs. He is interested in all aspects of loudspeaker engineering and design. His work for KEF is currently focused on loudspeaker modeling, the development of software tools to aid loudspeaker design, and transducer design.

Is designing an inexpensive speaker easier or more challenging than creating a larger and more elaborate model? Why?

There is certainly less room for error when designing an inexpensive loudspeaker, since you're often asking more from each aspect of the loudspeaker. If one area falls shorter than your expectations, this can really let down the overall performance.

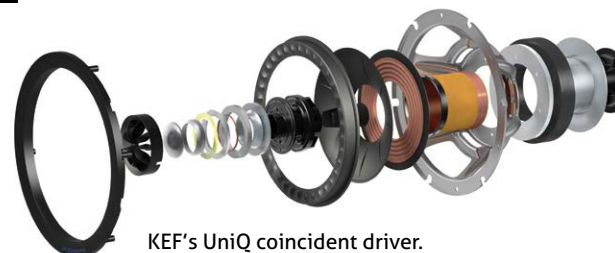
The designer of an inexpensive speaker obviously has to make compromises and tradeoffs. What musical qualities are you unwilling to

give up, and which qualities can be sacrificed for the most satisfying overall performance?

We always try and deliver both measured accuracy and musicality, but for an inexpensive or compact product it sometimes is not possible to do both. A classic example would be choosing between a flatter frequency response at crossover, or a higher crossover frequency that gives the tweeter an easier ride. We'd always aim to be able to do the former, but if in the listening this sounds strained or fatiguing we'd compromise the measured performance a little to give better musicality. Our best products are those where everything comes together nicely and there are fewer tough compromises in the listening room.

How much better are today's speakers of a given price than those of ten years ago? Why?

Loudspeaker technology is very mature, and the fundamental behavior has been understood for more than fifty years. Consequently, the speaker has not changed whatsoever in some aspects, so a small bookshelf from ten years ago will likely have more or less the same sensitivity and bass extension as one you could buy today. However, computer simulation, materials, and manufacturing have improved significantly in this time. The products available today are much further



KEF's UniQ coincident driver.

refined than those of the past, and this is most obvious in the transparency and clarity of the midrange and treble.

Do you think that designing very inexpensive speakers confers advantages to the designer when he's creating upper-end models?

There are areas where the engineering techniques for an inexpensive and expensive product are quite dissimilar. However, in general the experience of designing inexpensive products can really help with upper-end models. For example, getting cabinet vibration under control in an inexpensive speaker is very challenging and means you have to really study and understand the behavior so you can have the biggest impact possible. This knowledge can be very usefully applied when you come to a higher-end design, too. The most useful aspect is doing a variety of work on many speakers of different shapes and sizes, as this gives you new challenges, keeps your skills sharp, and gets you familiar with the compromises of different approaches.

How much of the design is done in a computer and how much in real-world experimentation and listening? Describe the process.

A great deal of computer simulation is done in



KEF

the early stages of the product design, particularly to develop the drivers for a loudspeaker. Using the computer it is possible to create hundreds of "virtual prototypes" and fine-tune the performance very intensively. This means that when we get first driver prototypes we already have a very mature design that performs far better than we could achieve by prototyping alone. It also means that we can normally put the first driver prototypes directly into prototype cabinets and start working on the crossover and listening to the product. In general, computer simulation is a huge advantage because it means you have a very clear idea of how each component should perform before you prototype it, and this means that you have fewer surprises and can focus on getting a speaker that performs really well in both measurement and listening.

Speaker Designer Roundtable

Andrew Jones

VP of Engineering, ELAC

Andrew Jones' near lifelong passion for audio began in his early teens and quickly became focused on loudspeakers. This led to him to study physics with a special interest in acoustics, followed by six years of postgraduate research in the fields of crossover design and active noise cancellation. Subsequently he joined KEF, becoming Chief Engineer, followed by a move to the U.S. to work for Infinity, Pioneer, and TAD. He is currently VP of Engineering at Elac.

Is designing an inexpensive speaker easier or more challenging than creating a larger and more elaborate model? Why?

Overall, I believe it is more difficult. The cost constraints are so tight, with no allowance to increase the final selling price, that one has to be very clear on component part design and selection in order to meet those constraints. Knowing the cost of each part is critical so that one can make the needed trade-offs, and the control of design of all those parts is key to helping with cost optimization. The design also has to appeal to a much wider audience. Additionally, the speaker is going to be used with lesser quality amplification and source, so the likely sound

capability of these ancillary components has to be taken into account, along with the sound quality of the recording.

The designer of an inexpensive speaker obviously has to make compromises and tradeoffs. What musical qualities are you unwilling to give up, and which qualities can be sacrificed for the most satisfying overall performance?

One of the compromises I always go for is to trade extended low-frequency response for higher sensitivity/maximum dynamic output from the speaker. Going for higher sensitivity gains you the ability to play louder for any given amount of input power, but how often is this required compared to how often will you miss hearing the bass in the music? I'm not, of course, advocating for hyped-up bass, but if we are to attract listeners that are more used to hearing music over headphones or in cars,

where extended powerful bass is much easier to generate, then the budget speaker should be capable of offering some semblance of this bass performance.

How much better are today's speakers of a given price than those of ten years ago? Why?

At first glance, today's affordable speakers seem to be very little changed from those of yesteryear: typically a two-way system with most commonly a soft-dome tweeter and a plastic/woven/metal cone woofer in a closed or vented box. But they are definitely better. I would describe these differences as a greater degree of refinement. The reason is a mixture of materials science and manufacturing costs. Advanced materials for cones and domes have become available at much lower prices, with a wider range of sources and choices of variants. This allows for much greater ability to experiment and find the best material for the particular design in-hand. At the same time, as onshore manufacturing



ELAC The life of sound.

costs have risen and the manufacturing base has shrunk, offshore costs remain much lower yet quality of manufacturing has improved dramatically. Consistency of performance on even entry-level drive units is now at a point that even high-end manufacturers struggle to match. This has changed the price/performance ratio drastically.

Do you think that designing very inexpensive speakers confers advantages to the designer when he's creating upper-end models?

For me it's the other way around. Designing



Speaker Designer Roundtable

Andrew Jones

"Consistency of performance on even entry-level drive units is now at a point that even high-end manufacturers struggle to match. This has changed the price/performance ratio drastically."

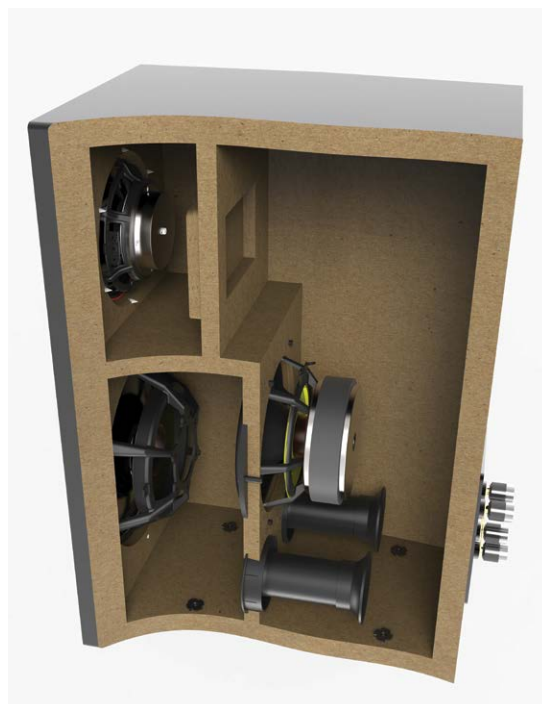
upper-end speakers and systems gives me the knowledge of what really good sound can be; it serves as a reference point. The goal in the affordable speaker is to distill the essence of that sound in such a way that the listener is still drawn into the enjoyment of the music, and not distracted from it by what the speaker is doing wrong. It comes down to the expectation of performance: seeking a higher performance than one would expect from a particular price point, and not being persuaded by arguments of "it's good enough; what do you expect at this price point?"

How much of the design is done in a computer and how much in real-world experimentation and listening? Describe the process.

A lot of the design work is done on the computer these days. Modeling and CAD and measurement are so much more cost effective and widely available nowadays that much of the early design process is done this way. But the questions become what to model, and how accurate is the modeling. Widespread availability means that such techniques are used without a full understanding of their applicability or accuracy in the design under consideration, especially when it comes to measuring. It seems

that there are more inaccurate measurements made than accurate ones! Therefore, real-world experimentation and real-world experience are musts for guiding one to the best uses of computer modeling.

The process, therefore, becomes model, build, test, listen, then cycle back to the beginning to adjust the model. The great thing about designing initially with computer modeling is that a greater number of iterations can be performed prior to building, thus either saving development time or allowing greater refinement within the allowed development time. Of course, most engineers are never going to finish early, but will keep on refining until the end!



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Speaker Designer Roundtable

Vince Bruzzese

Founder, Totem Acoustic

Vince Bruzzese spent six years at McGill University where he earned a degree in science. After a wonderful and fruitful 19-year career teaching science and math in both English and French, he founded Totem Acoustic in Montreal in 1987. From humble beginnings with a single model (the Model One), Totem has grown into a creator of a wide range of high-performance loudspeakers, with more than 50 models for every type of application. The company has specialized in small-volume enclosures that deliver large imaging and dynamics. Vince continues the principal design work for Totem Acoustic. His acoustic ethos has led to the development of Torrent technology and the creation of flexible real-world products that ring true on all axes.

Is designing an inexpensive speaker easier or more challenging than creating a larger and more elaborate model? Why?

The challenge is exacting for both expensive and modest designs. But it is actually harder to extract the absolute maximum in performance from less expensive models. Many of our speakers may look fairly simple from the outside, but they take many years of R&D to develop. For

example, it took over two years of continuous development to finalize the 5¼" driver used in the Sky, which has a 3" voice coil. And although it's not intuitive, not using a crossover in the woofer path is much more difficult than using a conventional crossover. The final tuning with the tweeter and its associated first-order crossover in a specialized cabinet requires hundreds if not thousands of hours of listening in choosing the absolutely few and correct parts necessary. Every driver is purpose-built for the particular application no matter what the price level. When Totem introduces a new model we want it to have a lifespan measured in decades rather than in years.

The designer of an inexpensive speaker obviously has to make compromises and tradeoffs. What musical qualities are you unwilling to give up, and which qualities can be sacrificed for the most satisfying overall performance?

Our objective is to create speakers that are "balanced" in performance. By this we mean that the overall presentation is "complete" so that the listening experience is stimulating, engaging, and rewarding over a very long time frame. The deepest "measurable" bass extension can be sac-

rificed in less costly models, but not in a way that detracts from the overall complete picture the speaker presents.

Our history has been one of continuous development. We want the bass, timbre, speed, pace, impact, and accuracy to be as true to life as possible across a wide listening area, and to portray the emotion of a recording. To realize these objectives we developed our own mathematical tables, not just the Thiele/Small parameters, but our own approach that we have fine-tuned over time as technology has evolved.

How much better are today's speakers of a given price than those of ten years ago? Why?

I can't really comment on other speakers on the market but I can expand on what we are doing. Flexibility and ease of integration are key. The altar of sound that existed in the past (a stereo system properly set up in the living room) does not really apply in today's homes. Multi-functional rooms have replaced to a great extent the single-seat audiophile setup of a decade ago. This gives us an opportunity to create products that fit into people's lifestyles. We want to include listeners who may have only experienced music through thin TVs, or earbuds, or smartphones.



TOTEM 

Ten years ago we envisioned a thin and compact full-range speaker that would provide off-axis intelligibility with no phase shift, and that would also provide true bass extension, in a unit that would fit on a wall. That product, the Tribe series, was made possible by our "Torrent" technology. Torrent is a driver design that is magnetically and electrically engineered to allow the woofer to be operated with no crossover in its signal path. The chassis and internal parts are all machined to high precision from high-tech alloys. The chassis provides a totally controlled foundation for the rest of the advanced components to perform optimally. Torrent provides remarkable on- and off-axis response along with phase correctness that results in a more genuine musical experience no matter where the speakers are positioned or where the listener is located. Before Torrent we couldn't have achieved what we have

Speaker Designer Roundtable

Vince Bruzese

with the Tribe series. People buy it for its looks and ease of integration but end up falling in love with the sound. We think it's an important innovation in our industry. We also think that cost or placement limitations shouldn't lower expectations for intrinsic performance.

Do you think that designing very inexpensive speakers confers advantages to the designer when he's creating upper-end models?

No other aspect of audio design marries science, art, and emotion as much as speaker design. The speaker is an inanimate object that makes air molecules vibrate, but its function is felt on many dimensions of our sensory systems. Our hearing has evolved over millions of years, and that exquisite stimulation of our senses shouldn't be limited to the exclusive few who can afford more costly speakers. Totem has a quest to extract the maximum performance, and to deliver the greatest emotional impact and connection, from *all* our designs. We've pursued technologies (such as Torrent) that have allowed us to do this.

How much of the design is done in a computer and how much in real-world experimentation and listening? Describe the process.

In Totem's 30-year history we've seen an evolution in computer design that has certainly helped with modeling and simulations, as well as in the design work for our custom-installation and architectural products. However, that work on the computer is a small fraction of the time spent developing a new model's function, aesthetic design, and capabilities. We approach speaker design as one would approach creating a musical instrument. It's as much artisanal as



Drivers using Totem's Torrent Technology.

technical. For example, our Sky and Signature One models each have more than 2750 hours of experimentation and listening, but only a few hours of computer modeling. This isn't a statement on the efficiency of computer-aided design, but rather on our real-world, hands-on approach. We have accumulated perhaps the largest array of crossover parts anywhere in the world. We listen to countless permutations of these parts until we achieve the result we're looking for. Computer simulations and measurement can show us only a very small glimpse of our goal of making the most musical speaker possible. We're fortunate to have Lucy Lentini, our VP, who has a fine artistic and aesthetic perspective. She constantly challenges and inspires us to realize the highest ideals for our products. **t&S**

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Andrew Jones

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LP - Magazine Germany 2015

...much more dynamic, with more detail. Trumpets had more vitality, and more of the brassy timbre the instrument has in person. The soundstage was wide and deep, with good differentiation of instruments.
Audiotechnique-Hongkong



Andrew Jones

Andrew Jones

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"took everything to a much higher level of wonderfulness. The bass became John Henry-like. Images grew hypercrystalline. Midrange textures were enhanced. Forward momentum was unstoppable."
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Feature

How to Choose a Loudspeaker

Robert Harley

*Excerpted and adapted from The Complete Guide to High-End Audio. Copyright © 1994–2018 by Robert Harley. hifibooks.com
To order call (800) 841-4741.*

Of all the components in your audio system, the loudspeaker's job is by far the most difficult. The loudspeaker is expected to reproduce the sound of a pipe organ, the human voice, and a violin through the same electromechanical device—all at the same levels of believability, and all at the same time. The tonal range of virtually every instrument in the orchestra is to be reproduced from a relatively tiny box. This frequency span of 10 octaves represents a sound-wavelength difference of 60 feet in the bass to about half an inch in the treble.

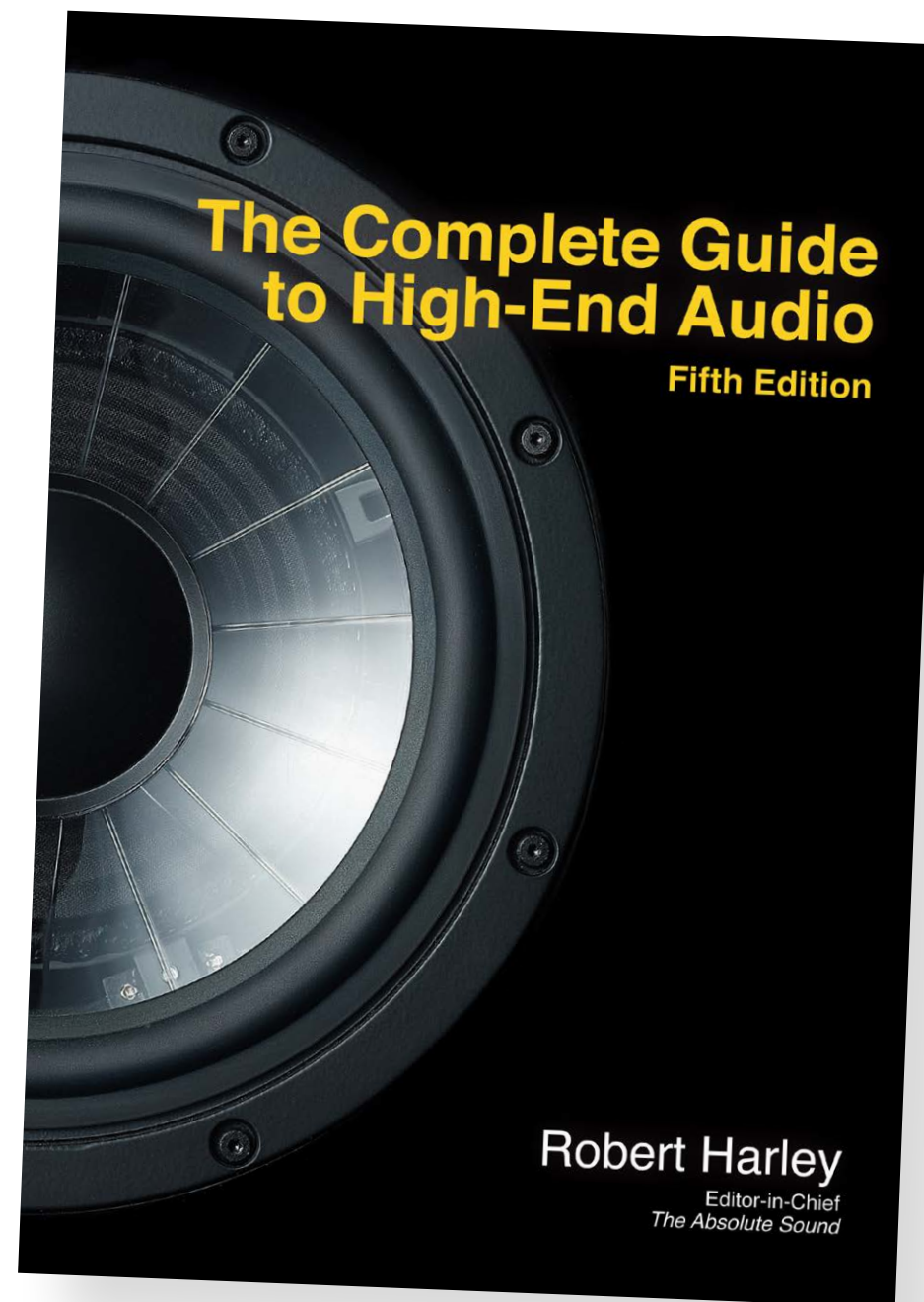
It's no wonder that loudspeaker designers spend their lives battling the laws of physics to produce musical and practical loudspeakers. Unlike other high-end designers who create a variety of products, the loudspeaker designer is singular in focus, dedicated in intent, and deeply committed to the unique blend of science and art that is loudspeaker design.

Although even the best loudspeakers can't convince us that we're hearing live music, they nonetheless are miraculous in what they can do. Think about this: a pair of loudspeakers converts two two-dimensional electrical signals into a three-dimensional "soundspace" spread out before the listener. Instruments seem to exist as objects in space; we hear the violin here, the brass over there, and the percussion behind the other instruments. A vocalist appears as a palpable, tangible image exactly between the two loudspeakers. The front of the listening room seems to disappear, replaced by the music. It's so easy to close your eyes and be transported into the musical event.

To achieve this experience in your home, however, you must carefully choose the best loudspeakers from among the literally thousands of models on the market. As we'll see, choosing loudspeakers is a challenging job.

How to Choose a Loudspeaker

The world abounds in poor-quality, even dreadful, loudspeakers. What's more, some very bad loudspeakers are expensive, while superlative models may sell for a fraction of an inferior model's price.



Feature How to Choose a Loudspeaker

There is sometimes little relationship between price and musical performance.

This situation offers the loudspeaker shopper both promise and peril. The promise is of finding an excellent loudspeaker for a reasonable price. The peril is of sorting through mediocre models to find the rare gems that offer either high absolute performance, or sound quality far above what their price would indicate.

This is where reviews come in handy. Reviewers who write for audio magazines hear lots of loudspeakers (at dealers, trade shows, and consumer shows), but review only those that sound promising. This weeds out the vast majority of underachievers. Of the loudspeakers that are reviewed, some are found to be unacceptably flawed, others are good for the money, while a select few are star overachievers that clearly outperform their similarly priced rivals.

The place to start loudspeaker shopping, therefore, is in the pages of a reputable magazine with high standards for what constitutes good loudspeaker performance. Be wary of magazines that end every review with a “competent for the money” recommendation. Not all loudspeakers are good; therefore, not all reviews should be positive. The tone of the reviews—positive or negative—should reflect the wide variation in performance and value found in the marketplace.

After you’ve read lots of loudspeaker reviews, make up your short list of products to audition from the crème de la crème. There are several criteria to apply in making this short list to ensure that you get the best loudspeaker for your individual needs. As you apply each criterion described, the list of candidate loudspeakers will get shorter and shorter, thus easing your de-

cision-making process. If you find yourself with too few choices at the end of the process, go back and revise your criteria. For example, if you find a loudspeaker that’s perfect in all ways but size, you may want to find the extra space in your living room. Similarly, an ideal loudspeaker costing a little more than you planned to spend may suggest a budget revision. As you go through this selection process, remember that the perfect loudspeaker for you is probably out there. Be selective and have high standards. You’ll be rewarded by a much higher level of musical performance than you thought you could afford.

1) Size, Appearance, and Integration in the Home

After you’ve designated a place for your loudspeakers, determine the optimum loudspeaker size for your room—the urban apartment dweller will likely have tighter size constraints than the suburban audiophile. Some listeners will want the loudspeakers to discreetly blend into the room; others will make the hi-fi system the room’s center of activity and won’t mind large, imposing loudspeakers. When choosing a place for your loudspeakers, keep in mind that their placement is a crucial factor in how your system will sound. (Chapter 14 includes an in-depth treatment of loudspeaker positioning.)

The loudspeaker’s appearance is also a factor to consider. An inexpensive, vinyl-covered box would be out of place in an elegantly furnished home. Many high-end loudspeakers are finished in beautiful cabinetry or automotive paint finishes that will complement any decor. This level of finish can, however, add greatly to the loudspeaker’s price.

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It’s about time™.

Watch the story unfold in a new video at wilsonaudio.com. Click on the YouTube icon.

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Feature How to Choose a Loudspeaker

If you don't have room for full-range, floor-standing speakers, consider a separate subwoofer/satellite system. This is a loudspeaker system that puts the bass-reproducing driver in an enclosure you can put nearly anywhere, and the midrange- and treble-reproducing elements in a small, unobtrusive cabinet. You'll still get a full sound, but without the visual domination of your living room that often goes with floorstanding speakers. Moreover, the satellite speakers' small cabinets often help them achieve great soundstaging.

Although the term "bookshelf" is often applied to small speakers, you can't get optimum performance from a speaker mounted in a bookshelf. Small speakers need to be mounted on stands, and placed out in the room. Small loudspeakers mounted on stands, sometimes called minimonitors, often provide terrific imaging, great clarity in midband and treble, and can easily "disappear" into the music. On the down side, small loudspeakers used without a subwoofer have restricted dynamics, limited bass extension, and won't play as loudly as their floorstanding counterparts.

2) Match the Loudspeaker to Your Electronics

The loudspeaker should be matched to the rest of your system, both electrically and musically. A loudspeaker that may work well in one system may not be ideal for another system—or another listener.

Let's start with the loudspeaker's electrical characteristics. The power amplifier and loudspeaker should be thought of as an interactive combination; the power amplifier will behave differently when driving different loudspeakers.

Consequently, the loudspeaker should be chosen for the amplifier that will drive it.

The first electrical consideration is a loudspeaker's sensitivity—how much sound it will produce for a given amount of amplifier power. Loudspeakers are rated for sensitivity by measuring their sound-pressure level (SPL) from one meter away while they are being fed one watt (1W) of power. For example, a sensitivity specification of "88dB/1W/1m" indicates that this particular loudspeaker will produce a sound-pressure level of 88dB when driven with an input power of 1W, measured at a distance of 1m. High-end loudspeakers vary in sensitivity between 80dB/1W/1m and 106dB/1W/1m.

A loudspeaker's sensitivity is a significant factor in determining how well it will work with a given power-amplifier output wattage. To produce a loud sound (100dB), a loudspeaker rated at 80dB sensitivity would require 100W. A loudspeaker with a sensitivity of 95dB would require only 3W to produce the same sound-pressure level. Each 3dB decrease in sensitivity requires double the amplifier power to produce the same SPL. (This is discussed in greater technical detail in Chapter 5, "Power Amplifiers.")

Another electrical factor to consider is the loudspeaker's load impedance. This is the electrical resistance the power amp meets when driving the loudspeaker. The lower the loudspeaker's impedance, the more demand is placed on the power amp. If you choose low-impedance loudspeakers, be certain the power amp will drive them adequately. (See Chapter 5 for a full technical discussion of loudspeaker impedance as it relates to amplifier power.)

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Feature How to Choose a Loudspeaker

On a musical level, you should select as sonically neutral a loudspeaker as possible. If you have a bright-sounding CD player or power amp, it's a mistake to buy a loudspeaker that sounds soft or dull in the treble to compensate. Instead, change your CD player or amplifier.

Another mistake is to drive high-quality loudspeakers with poor amplification or source components. The high-quality loudspeakers will resolve much more information than lesser loudspeakers—including imperfections in the electronics and source components. All too many audiophiles drive great loudspeakers with mediocre source components and never realize their loudspeakers' potential. Match the loudspeakers' quality to that of the rest of your system. (Use the guidelines in Chapter 2 to set a loudspeaker budget within the context of the cost of your entire system.)

3) Musical Preferences and Listening Habits

If the perfect loudspeaker existed, it would work equally well for chamber music and heavy metal. But because the perfect loudspeaker remains a mythical beast, musical preferences must play a part in choosing a loudspeaker. If you listen mostly to small-scale classical music, choral works, or classical guitar, a minimonitor would probably be your best choice. Conversely, rock listeners need the dynamics, low-frequency extension, and bass power of a large full-range system. Different loudspeakers have strengths and weaknesses in different areas; by matching the loudspeaker to your listening tastes, you'll get the best performance in the areas that matter most to you.

Other Guidelines in Choosing Loudspeakers

In addition to these specific recommendations, there are some general guidelines you should follow in order to get the most loudspeaker for your money.

First, buy from a specialty audio retailer who can properly demonstrate the loudspeaker, advise you on system matching, and tell you the pros and cons of each candidate. Many high-end audio dealers will let you try the loudspeaker in your home with your own electronics and music before you buy.

Take advantage of the dealer's knowledge—and reward him with the sale. It's not only unfair to the dealer to use his or her expensive showroom and knowledgeable salespeople to find out which product to buy, and then look for the loudspeaker elsewhere at a lower price; it also prevents you from establishing a mutually beneficial relationship with him or her.

In general, loudspeakers made by companies that make only loudspeakers are better than those from companies who also make a full line of electronics. Loudspeaker design may be an afterthought to the electronics manufacturer—something to fill out the line. Conversely, many high-end loudspeaker companies have an almost obsessive dedication to the art of loudspeaker design. Their products' superior performance often reflects this commitment. There are, however, a few companies that produce a full line of products, including loudspeakers, that work well with each other.

Don't buy a loudspeaker based on technical claims. Some products claiming superiority in one aspect of their performance may overlook other, more important aspects. Loudspeaker de-

When a Speaker Gets Out of Its Way

"It is the sense of being there. It is embracing the familiar shuffle of Bernard Purdie on the drums, basking in the warmth of the Guarneri strings or being dazzled by Oscar Peterson at the keys. It is *you* - transported to *and participating* in the recorded space of living, breathing musicians; riding out the rhythm and sharing the emotional exuberance expressed in every note.

There are familiar parameters when one evaluates a loudspeaker. Neutrality of tone, dynamic range, room adaptability, imaging precision, soundstage layering, frequency spectrum - all are valid metrics to judge sound quality.

And while you'd be doing well to find a speaker that can match a Legacy speaker in *more than one* of these categories, these attributes alone are not enough. It is *realism* that matters most."



Bill Dudleston
Legacy Founder
Chief Designer



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35 Years of Excellence



Feature **How to Choose a Loudspeaker**

sign requires a balanced approach, not reliance on some new “wonder” technology that may have been invented by the loudspeaker manufacturer’s marketing department. Forget about the technical hype and listen to how the loudspeaker reproduces music. You’ll hear whether or not the loudspeaker is any good.

Don’t base your loudspeaker purchases on brand loyalty or longevity. Many well-known and respected names in loudspeaker design of 20 years ago are no longer competitive. Such a company may still produce loudspeakers, but its recent products’ inferior performance only throws into relief the extent of the manufacturer’s decline. The brands the general public thinks represent the state of the art are actually among the worst-sounding loudspeakers available. These companies were either bought by multinational business conglomerates who didn’t care about quality and just wanted to exploit the brand name, or the company has forsaken high performance for mass-market sales.

The general public also believes that the larger the loudspeaker and the more drivers it has, the better it is. Given the same retail price, there is often an inverse relationship between size/driver count and sonic performance. A good two-way loudspeaker—one that splits the frequency spectrum into two parts for reproduction by a woofer and a tweeter—with a 6” woofer/midrange and a tweeter in a small cabinet is likely to be vastly better than a similarly priced four-way in a large, floorstanding enclosure. Two high-quality drivers are much better than four mediocre ones. Further, the larger the cabinet, the more difficult and expensive it is to make it free from vibrations that degrade

the sound. The four-way speaker’s more extensive crossover will require more parts; the two-way can use just a few higher-quality crossover parts. The large loudspeaker will probably be unlistenable; the small two-way may be superbly musical.

If both of these loudspeakers were shown in a catalog and offered at the same price, however, the large, inferior system would outsell the high-quality two-way by at least 10 times. The perceived value of more hardware for the same money is much higher.

The bottom line: You can’t tell anything about a loudspeaker until you listen to it. In the next section, we’ll examine common problems in loudspeakers and how to choose one that provides the highest level of musical performance.

Finding the Right Loudspeaker— Before You Buy

You’ve done your homework, read reviews, and narrowed down your list of candidate loudspeakers based on the criteria described earlier—you know what you want. Now it’s time to go out and listen. This is a crucial part of shopping for a loudspeaker, and one that should be approached carefully. Rather than buying a pair of speakers on your first visit to a dealer, consider this initial audition to be simply the next step. Don’t be in a hurry to buy the first loudspeaker you like. Even if it sounds very good to you, you won’t know how good it is until you’ve auditioned several products.

Audition the loudspeaker with a wide range of familiar recordings of your own choosing. Remember that a dealer’s strategic selection of music can highlight a loudspeaker’s best qual-

ities and conceal its weaknesses—after all, his job is to present his products in the best light. Further, auditioning with only audiophile-quality recordings won’t tell you much about how the loudspeaker will perform with the music you’ll be playing at home, most of which was likely not recorded to high audiophile standards. Still, audiophile recordings are excellent for discovering specific performance aspects of a loudspeaker. The music selected for auditioning should therefore be a combination of your favorite music, and diagnostic recordings chosen to reveal different aspects of the loudspeaker’s performance. When listening to your favorite music, forget about specific sonic characteristics and pay attention to how much you’re enjoying the sound. Shift into the analytical mode only when playing the diagnostic recordings.

Visit the dealer when business is slow so you can spend at least an hour with the loudspeaker. Some loudspeakers are appealing at first, and then lose their luster as their flaws begin to emerge over time. The time to lose patience with the speakers is in the dealer’s showroom, not a week after you’ve bought them. And don’t try to audition more than two sets of loudspeakers in a single dealer visit. If you must choose between three models, select between the first two on one visit, then return to compare the winner of the first audition with the third contender. You should listen to each candidate as long as you want (within reason) to be sure you’re making the right purchasing decision.

Some loudspeakers have different tonal balances at different listening heights. Be sure to audition the loudspeaker at the same listening

height as your listening chair at home. A typical listening height is 36”, measured from the floor to your ears. Further, some loudspeakers with first-order crossovers sound different if you sit too close to them. When in the showroom, move back and forth a few feet to be certain the loudspeaker will sound the same as it should at your listening distance at home.

Make sure the loudspeakers are driven by electronics and source components of comparable quality to your components. It’s easy to become infatuated with a delicious sound in a dealer’s showroom, only to be disappointed when you connect the loudspeakers to less good electronics. Ideally, you should drive the loudspeakers under audition with the same level of power amp as you have at home, or as you intend to buy with the loudspeakers.

Of course, the best way to audition loudspeakers is in your own home—you’re under no pressure, you can listen for as long as you like, and you can hear how the loudspeaker performs with your electronics and in your listening room. Home audition removes much of the guesswork from choosing a loudspeaker. But because it’s impractical to take every contender home, and because many dealers will not allow this, save your home auditioning for only those loudspeakers you are seriously considering.

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DESKTOP AND POWERED

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Sneak Preview

KEF LS50 Wireless Nocturne Active Loudspeaker System

\$2500

Julie Mullins

The innovative minds at KEF have reinvented the company's iconic LS50 compact loudspeaker by making it wireless and active—and this special edition Nocturne designed by Marcel Wanders has an unexpected visual element that might amuse late-night listeners: There are intricate geometric patterns and textures on the front of the black speaker cabinets that glow in the dark! But don't let this sleek, smallish speaker system fool you into thinking it isn't serious audio gear.

First off, the LS50 Wireless contains KEF's patented Uni-Q driver array that consists of a vented aluminum tweeter dome positioned in the center of the midrange/bass cone with a long-throw radiator for low-end extension. In addition to pumping out some healthy bass, this unique concentric Uni-Q driver helps deliver wider dispersion and improve dimensionality. Another advanced tech feature is time-correcting DSP crossover in the LS50 Wireless. Based on my listening this far, my hunch is that this not only offers greater coherence, but also makes speaker placement less tricky; tiny EQ buttons with settings for four mounting options also help.

As befits a modern active speaker system, the 230Wpc LS50 Wireless has a DAC per channel and doesn't skimp on connectivity: 2.4GHz/5GHz dual-band Wi-Fi, Bluetooth 4.0 with aptX (up to eight devices), asynchronous USB Type B, Tos-Link optical, and RCA line-level analog inputs. Interestingly, all these connections are found only on the back of the right-channel speaker; the speakers are tethered to each other in a master-slave arrangement via an included RJ45 Ethernet interconnect (so "wireless" is kind of a misnomer). For your streaming delight, you can use Roon, Tidal, and Spotify. Naturally there's an app for iOS and Android, in addition to a slim remote-control. The top of the right speaker displays a series of touch-screen-style controls designed to look like push-buttons—a nice touch (and they're nice to touch). Their symbols for each function/source and overall ergonomics are clean, elegant, and intuitive.

On the topic of user-friendliness, if you're like many audiophiles, the words "plug and play" might give you pause, if not outright doubts about a speaker's sonic prowess. In other words, there can be (often incorrect) assumptions about its sound quality being directly proportional to the degree of difficulty in setup. Not so



here. I went from unboxing to listening in a matter of mere minutes. The LS50 Wireless system was hands-down the fastest and simplest setup I've ever experienced (including the KEF Muo wireless speaker system I reviewed). Of course I did adjust speaker placement more to my liking, but the LS50s sounded remarkably good out of the gate, placed on KEF Performance speaker stands about five-and-a-half feet apart and slightly toed-in.

Although this is a preview (in advance of a full review), I'll share some of my initial sonic impressions of the LS50 Wireless speaker system. Right away I was struck by its high degree of detail and overall naturalness of timbre—particularly throughout the midrange—though you can also expect a touch of sweetness and warmth

on some recordings. Also, these smallish speakers aren't shy; they pump out punchy bass that delves deeper than expected while still maintaining composure. They're quick-stepping and snappy, and relentlessly musical across genres. Dispersion and dimensionality proved to be other strong suits.

In my hasty excitement to hear these LS50 Wireless speakers I began with the closest source at hand—the one *in* my hand: an iPhone 8 Plus. Via the Tidal app and Bluetooth connection, I queued up Andrew Bird's *Are You Serious*. The speakers seem to present just the right mix of detail balanced with substance—a pleasing sense of weight and body. The quite realistic tone and timbre of his vocals and violin wowed me on "Puma." Imaging, including the place-

Sneak Preview KEF LS50



a good sign that I was only going to listen to a track or two but found myself so engaged in the music that the album played on.

A listen to LCD Soundsystem's "Dance Yrself Clean" delivered expansive dispersion and some impressive lower-octave oomph. We're not talking nightclub-level, cage-rattling bass handling here but still far more than expected, especially from compacts. And when I turned up the volume a few notches, some edges and aspects softened slightly—bass, natch—but the big picture held up well and didn't fall apart. Per the specs, SPL maxes out at 106dB but I didn't push that far. The LS50s conveyed this track's broad-spectrum layers—and gave it all a great sense of groove and potent energy.

The LS50 Wireless speaker system packs big sound—along with plenty of technology and cool style—in a little box. And yes, this Nocturne edition brings extra fun to late-night listening in a dark room. Judging from my listening so far, a glowing review may be on the way. international.kef.com Julie Mullins, review forthcoming **tas**

ment of the singers and their string instruments within the soundstage, displayed compelling presence and immediacy on guitar strums and violin bowing on the more stripped-down track "Left Handed Kisses." Chimes and other percussion were rendered with quick attacks with sustains and decays ringing out beautifully. It's also

er system packs big sound—along with plenty of technology and cool style—in a little box. And yes, this Nocturne edition brings extra fun to late-night listening in a dark room. Judging from my listening so far, a glowing review may be on the way. international.kef.com Julie Mullins, review forthcoming **tas**



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Equipment Report

Audience ClairAudient 1+1 V2+

Not Just for Desktops

Robert Harley

As enthusiastic as I've been about Audience's tiny ClairAudient 1+1 V2+ speaker, I'm afraid that I've done the product a disservice. All my references to it have described it as a "desktop" speaker, and that's where it's been categorized in the Editors' Choice Awards and our annual Buyer's Guide. I think of the 1+1 V2+ that way because a pair of them is right in front of me every day, one on either side of my computer monitor. In

SPECS & PRICING

Impedance: 8 ohms

Sensitivity: 84dB/1W

Maximum RMS continuous output per pair: 104dB

Maximum RMS continuous power per speaker: 45 watts

Price: \$2345

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fact, I spend more time listening to the 1+1 V2+ than I do to my main system (ah, the downside of being the editor).

But the 1+1 V2+ is much more than a desktop speaker, as I recently discovered on a visit to the home of Audience co-founder John McDonald (he's a ten-minute drive from me). I also got a chance to hear a new revision to the speaker, made as a running update without a change in the product name. We first listened briefly to my pair of 1+1 V2s that I had brought with me, but now mounted on stands in a medium-sized living room. We then listened to the updated version at length. This new version removes an internal baffle that had isolated each of the two active drivers. The updated model also incorporates a circuit that corrects for the baffle-step function, a phenomenon that caused a steep drop in output level at 450Hz in the first-generation speaker.

The improvement to the revised speaker was immediately apparent as more weight and body in the mid and upper bass. On Brad Mehldau's piano on the superb *Blues and Ballads*, the new speaker had greater solidity to left-hand lines, and the piano lost its thin "tinkly" quality. The bass was fuller and richer, better conveying



rhythmic drive. The improved bass performance created a more solid tonal foundation for the music. This impression was even more apparent when I got the 1+1 V2+ back to my desktop where the desk's surface helped reinforce the bottom end. The bass is full enough that I wouldn't consider adding a subwoofer.

As interesting as these differences were, however, the real revelation was listening to this intimately familiar speaker in a completely different setting. Out in the room on stands

rather than on my desktop, the 1+1 V2+ shone. It had the same coherence, conferred by the crossoverless single-driver design, that made me fall in love with this speaker in the first place. But on the stands in the open room the soundstage became immense, with images fully fleshed out spatially. The stage was deep, expansive, and richly portrayed. I experienced a bit of cognitive dissonance when I opened my eyes after each piece of music and saw the tiny speakers that threw such a billowing soundstage.

Equipment Report Audience ClairAudient 1+1 V2+



Resolution was remarkable; the Audience speakers revealed very fine nuances in the sound of instruments and in the musicians' inflections, beautifully conveying musical meaning. The speakers did this in a completely natural and organic fashion, much the same way you hear detail in live music. There was a distinct impression of hearing nothing between me and the music—something you don't expect from a \$2345 speaker.

Although the bass response is understandably limited, the entire range from the lower mids through the uppermost treble was extremely clean, transparent, and pure. Vocals were particularly well served by the crossoverless design, seeming to hang in space with life and

palpability. Many five-figure speakers aren't this transparent and immediate through the mids. Surprisingly for a one-way speaker, the top treble had plenty of energy and sparkle. Incidentally, I know someone who sold his Quad 57s and now listens to the 1+1 V2+ as his main speaker.

The Audience 1+1 V2+ is an unusual and very special product. Although it's the ultimate desktop speaker, it works equally well in a small to medium-sized room, provided that you have realistic expectations about the bass extension and playback level. But that aside, I don't think that you'll find greater musicality for the price—whether on a desktop or on stands. **tas**

A Most Unusual Design

There's no other speaker that I know of that's designed like the 1+1 V2+—or that sounds like it. The small, handsome, wedge-shaped enclosure houses two identical active drivers, one front-facing and one rear-facing. That driver is a full-range 3" transducer developed by Audience and refined over the past 15 years. The stiff and lightweight cone is made from titanium alloy, and driven by an unusual motor structure. The neodymium magnets, oversized voice coil, open basket, vented pole pieces, spider, and even the shape of the surround are all proprietary. The goal was to create a driver with a wide frequency response that was rugged enough to handle high excursions and produce high sound-pressure levels without compression. Audience first deployed this driver in a giant line array of 16 drivers, then adapted it to The One speaker, and later to the 1+1 and its variants. The newest version has a single 16-ohm voice coil in place of dual eight-ohm voice coils. Bass response is extended in the 1+1 by a pair of side-firing passive radiators. The V2 and V2+ designations indicate various levels of tweaky upgrades. The full-blown V2+ version reviewed here features Audience's top Au24SX internal wiring and solder-free tellurium binding posts. The wire and posts are cryogenically treated in Audience's own cryo tank, which I saw during my visit to the company's nearby shop.

Equipment Report

Micromega MySpeaker with MyAmp Inside

MyLittle...MyEverything

Neil Gader

Micromega's ever-expanding "My Range" of compact and affordable electronics has in just a few short years grown to encompass the MyDac (TAS' 2012 Product of the Year), MyAmp, MyGroov (you guessed it, a phonostage), and a head-phone amp, the MyZic. Still, the French company, known for its full-fledged electronics, realized there was something missing from the overall picture, and created the MySpeaker. Or, for those who desire to bundle the entire, er, MyCaboodle, there's the MySpeaker/MyAmp Inside—the subject of this review.

At its core the MySpeaker is a conventional compact two-way in a bass-reflex configuration. It's outfitted with a one-inch soft-dome tweeter sporting an anti-reflective surround and a 5.25" mid/bass driver. The molded composite cabinet is available in a black satin or white finish. It appears durable to the touch and nicely finished to the eye. Some may look askance at the apparent economy of these enclosure materials but it's really all about the implementation. Micromega knows this territory. The fact is, there is no consensus on what material necessarily guarantees the best sonic and functional results. I've heard great

results from materials ranging from marine plywood, MDF, and solid woods to aircraft aluminum and Formula One exotics. They can all work to varying degrees of success.

The reflex port is downward-firing rather than the more typical front- or back-firing. Micromega believes that this not only aids placement options but also offers the smoothest and most linear launch of bass reinforcement into the listening space. To give the port room to breathe, each speaker is fitted with chrome footers that elevate the ported bottom panel. This makes the MySpeaker ideal for bookshelf or tabletop placement, but the user will need to carefully consider speaker stands to ensure the stands' top plates are big enough to accommodate the woofers. To take the guesswork out of choosing stands, Micromega offers a dedicated stand.

Today's wireless speakers are available in a wide array of configurations. For example, Dynaudio's Xeo series (see the Xeo 2 review in Issue 270) represents the fully wireless/actively powered school whereby only a pair of power cords are required. On the other hand Audioengine's HD6 (Issue 262) installs most of the wireless connection electronics and amplification in one speaker that connects to



Equipment Report Micromega MySpeaker with MyAmp



SPECS & PRICING

Type: Two-way, powered compact, bass-reflex enclosure

Drivers: 1" tweeter, 5.25" driver

Frequency response: 50Hz–20kHz +/- 3dB
Sensitivity (at 1W/1m): 90dB

Impedance: 4 ohms

Dimensions: 12.4" x 7.5" x 12.5"

Weight: 25 lbs./pr.

Power output: 30Wpc into 8 ohms

Price: \$999

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micromega.com

the passive speaker with an umbilical cable. This latter approach, taken by Micromega with the MySpeaker, is less costly but has its own virtues including simplicity of set up. Another of these virtues is a rear-panel switch that allows you to choose left or right placement of the amplified speaker. This is a *huge* benefit during setup, making it easier to connect source components, or when there's only one awkwardly located AC outlet.

The active channel contains "the brains of the operation" (the wireless electronics, decoders, and DACs) as well as the MyAmp amplifiers. The MyAmp section is built around a Class AB output stage that delivers 30Wpc into 8 ohms, a figure that commendably doubles into 4 ohms. The amplifier is powered by an advanced resonant-mode power supply, a variation of switch-mode technology that reduces switching losses common to traditional switching supplies. The communication section accepts streams via the ubiquitous aptX Bluetooth module. MySpeaker offers one stereo pair of analog inputs along with coaxial and optical digital inputs. These two digital inputs can accept sampling rates up to 192kHz. The USB input is limited to 96kHz sample rate. A subwoofer output rounds out the connection jacks.

Convenience is a must with speakers of this segment, and the Micromega didn't disappoint. MySpeaker arrives packaged with a pre-stripped bare wire speaker umbilical to run between the multi-way terminals of the active and passive speakers. Once connected, double-check to make the sure the correct voltage (110V/220V) is selected. Then using the remote control, "pair" your phone or tablet via Bluetooth with

Audiophiles demanded it.



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Equipment Report **Micromega MySpeaker with MyAmp**

MySpeaker. A blue LED flashes to indicate that MySpeaker is pairing with your device. Up to eight devices can be paired. Another nice feature: a rear-panel USB port for recharging handheld devices.

Sonically, MySpeaker put on quite a display of solid midbass/midrange dynamics and output. In balance it had a slight forward lean but possessed an openness that was arresting in this price class. Images were depicted with physical weight and dimension rather than as mere cardboard cutouts. Unusual for a speaker of this size, I could discern the actual physical presence of musicians behind the music—a greater realization of the live performance.

Vocals were smooth, and revealed a nice degree of air and lift that enhanced their expressiveness. I would have preferred a hint more chestiness with male singers, baritone sax, or cello, but you'll hear no real complaints from me on that score. There were traces of vocal sibilance during Holly Cole's cover of "I Can See Clearly" but in general the tweeter was nicely integrated into the frequency spectrum with only minor hints of localization. This slight discontinuity was most likely due to a small energy dip near the crossover point.

Bass response extended confidently into the fifty-cycle range with little apparent effort. As I listened to tracks from Ray Brown's *Soular Energy* and Jen Chapin's *ReVisions* I was able to follow acoustic bass lines with notable timbral accuracy, a tightly controlled attack, and a feeling of room-filling weight. Even big fanfare music like the National Symphonic Winds *Winds of War and Peace* didn't ruffle this game little speaker. Still, size matters. Although MySpeaker

never shied away from higher sound-pressure levels, it ultimately revealed its econo-roots nature with a little bit of port overhang—a sensation of looseness and over-bloom in the midbass that could mask high-frequency detail. In most smaller settings however, MySpeaker could deliver more than enough low-end impact to satisfy all but the most sadistic head-bangers.

One thing I've got to say for the MySpeaker: It's got guts. While it has limits, it doesn't shrink from orchestral crescendos. It dug into the crunch-groove of Michael Jackson's "Billie Jean" with plenty of gusto. During the Manhattan Jazz Quintet's rendition of "Autumn Leaves," brass transients were swift, and solo piano was reproduced with good note-to-note articulation, although some of the finer elements of ambient information and harmonic air seemed a little squeezed. As one would expect with a loudspeaker of this spec, there was some dynamic compression. But with a few exceptions MySpeaker adeptly handled just about every example of sonic fireworks I could throw at it, from Dire Straits' "Telegraph Road" to the histrionics of Tchaikovsky's *1812 Overture* courtesy of André Previn and the London Symphony Orchestra.

Versatility and convenience define the wireless game. Whether it's a small den, dorm or desktop, music or TV, Micromega's MySpeaker/MyAmp excels in this role—happy to perform for one person or an entire *Eight Is Enough* family. The fact that it's also a superior sonic performer makes it a complete musical bundle. Micromega's wireless wonder is a one-outlet winner. **tas**



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Equipment Report

Audioengine HDP6

Who Are You Calling Passive?

Neil Gader

In Issue 272 I left little doubt about how much I enjoyed the flexibility and musicality of Audioengine's HD6 powered loudspeaker system. For a compact barely a foot tall, this plucky bundle had it all—it was self-amplified, DAC-equipped, and Bluetooth-enabled. All that was needed was a source component. And for its target audience—the smartphone, tech-savvy millennial—it was just what the audio doctor ordered.

So what's left when Audioengine strips away the power and connectivity? Actually, a lot. You get the HDP6, where the "P" stands for passive or unamplified—the type of loudspeaker that most audiophiles are familiar with. Cosmetically this stout little compact suggests a cozy and classic British monitor, a look suitable for a small den or study. It's a bass-reflex configuration that uses a cleverly installed, rear-mounted, horizontally slotted port. It uses a silk-dome tweeter, ferrofluid-cooled, with a neodymium magnet. The woofer is a 5.5" Kevlar woven-glass/Aramid composite with a rubber surround that's housed in a cast aluminum frame for rigidity and increased heat dispersion. The crossover is unchanged from the HD6. The stiff MDF cabinets are available in several finishes,

including walnut and cherry veneers, as well as satin-black paint. The front baffle is free of unsightly exposed woodscrews, and the detachable grilles affix to magnets hidden in the enclosure.

Lacking the built-in amplification of the HD6, HDP6 owners have the freedom to use the amp and cabling of their choice. In this instance I employed the excellent Simaudio Moon Neo ACE 50Wpc music player (review forthcoming) with Audience's remarkable entry-level Ohno cabling. In my opinion, this represented gear that prospective Audioengine owners would reasonably consider pairing with these speakers.

The HD6's sonic character wasn't turned on its head with the Moon ACE amp, either. And that's a good thing. The HDP6 retained the same forgiving, ear-coddling midrange that I noted in the original review, a richer voicing allied with a level of bass response that suggested orchestral scale beyond what its petite enclosure implies. Still, the change in amplification revealed positive differences. Transparency was improved; transient attack was quicker off the mark; and image focus and detail were better. Dynamic liveliness in the midrange had more rhythmic jump. Pitch control and grip in the midbass were



also better managed than the powered version.

As I noted in my original review, neither the HD6 nor HDP6 is ruler-flat across the frequency spectrum. There's still a rise in the mid/upper bass that creates more of a general impression of bass rather than genuine low-end response. And with female vocals the HDP6 has some added emphasis in the lower treble that imparts a whiter coloration in these octaves. To be perfectly fair, however, sonic tradeoffs are part and parcel of loudspeakers in this range—the Audioengine keeps the colorations to a minimum. The Audioengine HDP6 is a handsome, high-level performer for the traditionalist—the high-ender who still enjoys the rough-and-tumble mixing and matching of components. But keep



in mind, the under-\$1000 speaker segment is one tough neighborhood. It's hotly competitive and populated by the likes of Elac, Revel, Magnepan, and PSB, just for starters. Joining these ranks is the HDP6, a worthy inductee that can hold its head high in such company. And that spells even more great news for the budget-minded audiophile. **tas**

SPECS & PRICING

Type: Two-way, bass-reflex compact

Drivers: 1" silk-dome tweeter, 5.5" Kevlar mid/bass

Frequency response: 50Hz–22kHz ±1.5dB

Dimensions: 11.75" x 7.25" x 10"

Weight: 12.5 lbs. each

Price: \$499

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Equipment Report

KEF Muo Wireless Desktop System

Honey, I Shrunk the Speaker

Julie Mullins

Demand for personal, wireless, and on-the-go audio has never been higher—certainly among Gen Xers, Gen Yers, and Millennials—but audiophiles of any age, or anyone else who wants a portable or desktop system shouldn't have to settle for substandard sonics. Enter the KEF Muo, a wonderful little wireless loudspeaker that delivers the sonic goods well beyond expectations, especially given its petite dimensions. Intended for those who want quality listening on the go, it's a tiny two-way that pumps out big, full, and expansive sound with respectable resolution—and even reproduces some sense of soundstaging on many recordings.

Achieving both great sound and portability is a tall order. Even in this crowded market segment, it's not easy to find that combination in a small, sleek, and smartly designed package. Producing big sound from a small speaker also presents big engineering challenges. Fortunately the UK-based loudspeaker manufacturer KEF has industrial designer Ross Lovegrove in its corner. Lovegrove, who designed the company's acclaimed Muon flagship floorstander, also

conceived the Muo, which represents the opposite end of the speaker spectrum size-wise and price-wise. Yet the two have plenty in common: Many of the Muon's key design elements have been reproduced in the Muo, though obviously on a smaller scale. The Muo's smooth, modern exterior is made from the Muon's same acoustically inert, solid, brushed aluminum that minimizes resonances (though with the Muo you can feel some slight vibration in the lower octaves). The Muo has a substantial weight and feel; at just shy of two pounds, it's heavier than it looks. (A pair could almost double as hand weights for arm curls.) It's available in six striking matte color options: Light Silver, Neptune Blue, Sunset Orange, Storm Grey, Horizon Gold, and a limited-edition Brilliant Rose. The form factor is vaguely cylindrical, only with three sides and gently curved edges. A pair of soft, rubberized stoppers on the bottom prevents rolling when the speaker is in its horizontal position. It can also be positioned vertically on its side/end and, when paired with a second Muo, played in two-channel stereo mode. When both speakers are positioned horizontally they're said to be in

"party mode." More on this flexible usage later.

Yes, the tiny two-way Muo is elegant looking, cute even, but don't let its stylishness belie some serious proprietary technologies inside that have been "trickled down" from the Muon. (If you shine a light and look through the grille holes on the front panel you can actually see the drivers.) Let's start with the unique Uni-Q "point-source" driver array, a miniaturized version of the Muon's. There are two identical 50mm/2-inch full-range Uni-Q drivers, each with a decoupled central dome tweeter and midrange, in addition to one auxiliary long-throw radiator in between for better bass extension. When two drivers are placed closely together in a small enclosure, stereo imaging becomes difficult to extend beyond a limited sweet spot close to and directly in front of the speaker. High-frequency interference can distort and color the sound outside this area. In the Muo, only one Uni-Q driver handles the full frequency range, while the other driver plays only low and midrange frequencies. This configuration enables a "gentle" crossover for wider overlap and better sonic dispersion. Indeed, the Muo not only sounds like a larger speaker than it



is, but its sound can fill a small-to-midsized room quite capably. In addition, either one (or a pair) is handy for desktop use, offers portability for travel, and paired most easily with my iPhone. (On practical note, I'd suggest that a slipcover case might be a worthy addition for a future model to help protect against marks and small surface scratches on the aluminum.) You can stream via Bluetooth 4.0 aptX from your computer or mobile device, or listen via an auxiliary input (DAC, NAS, etc.); plus there's a micro-USB input, which can be used for charging and firmware updates.

The Muo comes with a mini-USB (3.5) cable and a selection of international plug-in chargers (which vary by region) for its Li-ion battery; KEF has also just introduced an optional pocket-sized portable charger (\$50) shaped like a mini Muo (which can also be used to juice up your smartphone or other devices)—not that you constantly have to worry about that: A full charge lasts for up to 10–12 hours of listening time, depending on playback SPLs. Also included is a small quick-start guide booklet (available as a PDF download on KEF's website as well) with mostly pictorial-based explanations and less text. Better still, there's a free KEF Muo app for both Android and iPhone (available via the Google Play Store and the Apple App Store). It contains clearer wireless setup instructions than the quick-start guide

SPECS & PRICING

Drivers: 2 x 2" tweeter/midbass, 1 x bass radiator

Inputs: Bluetooth 4.0 aptX codec, 3.5mm aux

Dimensions: 8.3" x 3.1" x 2.3"

Weight: 1.8 lbs.

Price: \$350 each
kefdirect.com

Equipment Report KEF Muo Wireless Desktop System

and offers handy access to your phone's iTunes library.

Setup and Synchronization

Basic setup when paired with my iPhone 6 was quite user-friendly, but connecting with my Mac computers proved more challenging (as I'll describe shortly). You can pair the Muos in their vertical position for stereo use, or place them horizontally for "party mode" listening (that is, two speakers each playing in mono for increased volume potential); an internal DSP sensor automatically shifts the output based on the speaker's orientation. The smart little Muo even remembers up to seven devices and can prioritize pairings based on their initial chronological order.

The Muo has four buttons on one end: the main power and multi-function button (round one in the center), a smaller round one for synchronizing one speaker with another (via Bluetooth) for stereo mode, and a button each for volume up and down. Various chime tones indicate power on and off, as well as Bluetooth connection, disconnection, and synchronization.

To connect one speaker to your iPhone, turn the speaker on by pressing the center button for about three seconds, make sure your Bluetooth is on (under Settings native app), then select "KEF MUO" from "My Devices." You're all set. Connecting a pair of Muos in stereo mode (vertical position) requires another couple of button-presses (plus a little patience). First connect one—and only one—Muo to your phone via Bluetooth, then turn on the second Muo. On the first speaker, press and hold down both the main button and the smaller round one at the same time for

two or three seconds. Repeat this on the second speaker (right channel). Sit tight while the Muos synchronize—about ten to thirty seconds or so, depending on the strength of the Bluetooth connection. You're ready for two-channel playback. You can also shift the speakers into horizontal position while they're playing, and they automatically reset from stereo to dual-mono or "party mode." Various combinations of two or three tones and a small ring of LED light (that switches colors) around the main button indicate changes in connection, disconnection, and power.

I experimented some with placement for stereo playback, varying distances between the speakers. Distances of up to 6 or 8 feet between the Muos with just a little toe-in seemed to work well for stereo, but I found I did as much nearfield listening at just a few feet. Though I listened less in dual-mono or party mode, up to 10 feet apart seemed do-able there.

Setup is quite similar with computer sources. As I'm a Mac gal, I used both a MacBook Pro (mid-2012) running OS X 10.9.5 and a MacBook Air (2015) running OS X 10.10.5. (The folks at KEF informed me that the connection process is quite similar for PCs—as expected.) In contrast with my iPhone source, I encountered a couple of minor glitches along the way—hardware-related as it turns out. I found I needed to reboot the laptops once or twice for the Bluetooth to "find" the Muo. In stereo mode, the Bluetooth connection was dropped in the right channel a couple of times but only very briefly. My MacBook Pro was running an older OS that didn't support Bluetooth aptX, but I was able to find a workaround. If possible, I'd recommended updating to El Capitan or Yosemite, which both seemed to work fine.

Sonically Speaking

How does the Muo sound? What struck me most was how engaging the presentation was; I didn't expect the degree of detail, coherence, and immediacy. How they packed this remarkably clean- and clear-sounding configuration into this sleek, petite form is a wonder—and a testament to the Muo's clever design.

I mostly listened to Tidal streaming (hi-res version in Chrome) and tracks from my library ranging from lousy mp3s and Red Book CD rips, to high-resolution tracks. The Muo certainly made the most of the lossy/low-res files, presenting them with better sound than they had any right to have. Cuts from Tori Amos' *Under the Pink* (2015 remastered version) streamed via Tidal (in its hi-res version) revealed excellent midrange prowess and presence. The Muos were able to convey the emotion behind her plaintive, pleading vocals. Sibilants seemed spot-on. Tori sounded like Tori, and her Bösendorfer piano also sounded quite true-to-life (though miniaturized). A listen to Miles Davis' "So What" and other cuts from *Kind of Blue* via Tidal delivered pretty quick transient attacks and delicate decays, particularly on Paul Chambers' double bass, and pacey energy throughout. Cymbal taps were quite clean and nuanced, with effortless loud-to-soft dynamics across all percussion. As one would expect of such small speakers, soundstaging in stereo mode wasn't huge; nevertheless, some sense of the musicians' distances from each other was maintained.

The Muo is light and quick in balance, which lends it a pleasing sense of effortlessness—an advantage of certain smaller speakers. But the Muos can also rock out, as I discovered on the

White Stripes' heavy-duty, brash and bluesy "Ball and Biscuit," where the speakers flexed their muscles to reproduce Jack White's growling guitar licks admirably. I was told the Muo goal was to maintain cleaner sound over louder sound, even if that means sacrificing a little dynamic headroom or bottom-end. Obviously the Muos don't sound like floorstanders, but they sound larger than they are, and their ability to image in stereo is more than respectable, albeit miniaturized. Careful placement also helps.

Priced at \$350 each, the Muo might not be the cheapest in its category, but its sound and robust build-quality would give a good many compact, portable, and wireless speakers a run for their money.

Conclusion

In the areas the Muo is designed to play in, it plays very nicely indeed. As I've described, it's a scaled-down "mini-me" version of the Muon. Though it contains many of that flagship model's materials and technologies, the little Muo could hardly be expected to deliver comparable sound. But the point here is about leveraging what can be reapplied—such as the design of the driver array—to elevate the portable and wireless speaker experience. As such, it's an overachiever in many aspects. It's no small feat to make a speaker of this size sound as big, expansive, and remarkably detailed as it does. I'd enthusiastically recommend the Muo (probably a pair) to non-audiophile friends who are music lovers. I'd even give it a thumbs-up for certain audiophile friends (those who listen to digital, that is). Further proof that great things can, and do, come in small packages. **tas**

BOOKSHELF AND STAND-MOUNT

Contents

AIR TIGHT BONSAI AL-05 • STARKE SOUND IC-H3 HALO ELITE • HARBETH MONITOR 40.2 • FOCAL SOPRA N°1 • TOTEM ACOUSTIC SKY • WHARFEDALE DIAMOND 225 •

TAD ME1 • BOWERS & WILKINS 705 S2 • JWM ACOUSTICS ALYSON AML II

OUR TOP PICKS IN BOOKSHELF AND STAND-MOUNT

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Equipment Report

Air Tight Bonsai AL-05

Tiny but Mighty

Julie Mullins

If you think mini-monitor means small sound, the Air Tight Bonsai will have you thinking again. Forget mini; the sound here is decidedly, uh, maxi. For starters, the speaker's wide dispersion and voluptuously full and rounded imaging will fool you into thinking you're listening to a far larger transducer. Plus, in the midband the Bonsai delivers an exciting sense of immediacy and a bold presence, coupled with remarkable detail, that also belie its size and single 4" driver. It's a thing of beauty to behold, to boot.

Air Tight, founded by the legendary Atsushi Miura and based outside of Osaka, Japan, is known first and foremost as a manufacturer of extraordinary handcrafted tube electronics. Indeed, the single-driver Bonsai is currently the sole loudspeaker bearing the marque's name. But it's quite a special speaker and one that's certainly a delight to have around. Before I delve into why, let's begin with a little background.

Mr. Takanori Ohmura, formerly of Luxman, designed the Bonsai's driver and enclosure. An expert on speaker diaphragms, Mr. Ohmura has focused his research on full-range drivers for more than 15 years. His connection to Mr. Miura and Air Tight dates back to their days at Luxman,

the company Mr. Miura's father-in-law founded and that Mr. Ohmura joined in 1976. (For more about Mr. Miura, see JV's Hall of Fame feature on the designer in Issue 268.) Mr. Ohmura now runs his own factory in Malaysia called AMM Laboratory where the Bonsai's driver is made and where the speaker is assembled.

The version of the Bonsai I auditioned, also known as the AL-05, marks the monitor's third iteration over a decade and a half; the previous versions are the MSM-1 and the AL-03. The "AL" designation refers to the multi-core Alnico magnet used in the driver assembly.

According to information provided by Air Tight, Mr. Ohmura's ongoing interest in full-range drivers lies in their general phase correctness. All versions of the Bonsai have had 10cm-diameter diaphragms. (Ohmura-san has never increased diaphragm size—to obtain louder volumes and deeper bass—as this would lead to a loss of phase coherence due to time delays.) To offset single-transducer disadvantages—specifically, a lack of scale, impact, and power—Ohmura-san has not only improved the enclosure through the years, but has also concentrated on finding the most suitable coating materials and multi-polymer paints to apply

to his nano-woven glass-fiber diaphragm to achieve the quickest transmission speeds. The Japanese have a long cultural tradition of polymer chemistry and lacquering techniques—and Ohmura-san's chemistry degree helps, too, as does his studies of violin finishes and piano lacquers.

Speaking of finishes, the Bonsai's wooden enclosure is available in either a high-gloss rosewood or piano-black; my review samples were the elegant rosewood. There are grilles that attach to four tiny pegs on the speaker's face, but I never really used them. The drivers are too pretty to cover up! Surrounded by a near-square panel of glossy rosewood, the gold-toned coating of the diaphragm glows with a subtle sheen.

Setup and Sound

Given their diminutive dimensions and light weight (11 pounds) the Bonsais were a snap to set up. However, you will need to consider supplying stands for them, as none are included with the speaker. I used custom ones I had on-hand, but for a time I also placed the Bonsai's atop another pair of speakers I have in house for an upcoming review. These are small guys, so just a touch of toe-in is all it takes to get them up

and running with images snapping readily into place. My listening positions ranged from about 7–12 feet away from the speakers. Up close, I heard more detail; further back, more color. My room is quite large (approximately 35 feet by 17 feet with 12-foot plaster ceilings). For my critical listening I mostly drove the monitors with the superb Air Tight ATM-1S stereo power amp—a great match. I'd heard this combo demo'd at a few audio shows, too. (See above for the rest of the system.) To keep this review to its assigned length I'm going to stick to that tube amp pairing and to LP listening. (Analog all the way!)

Broadly speaking and on most program material (especially well-recorded music), playback through these transducers resulted in a big, full, highly engaging sound. These monitors ain't no wallflowers. Thanks in part to the diaphragm's unique proprietary coating, the Bonsai's single driver offers a pacey presentation that feels evenhanded and effortless yet offers a roundness that might be described as tube-like in its dimensionality. There's also a decided mid-range emphasis (as you would expect from a single-driver speaker of these dimensions).

With jazzy material, such as Diana Krall *Live in Paris* on ORG's excellent 45rpm LP, vocals reg-



Equipment Report Air Tight Bonsai AL-05

istered as smooth, present, and quite realistic. While I wouldn't call the soundstage the deepest or widest I've heard—these are mini-monitors, after all—the sense of venue was portrayed admirably well, with instruments placed where they should have been (given the scale here). There's an openness, size, and spaciousness to the Bonsai presentation that's surprising and pleasing. Krall's piano on "Deed I Do" was reproduced with quick-footed transient attacks and good verisimilitude—ditto Jeff Hamilton's crisp snare delivery. On top I detected a slight softening on some cymbal taps, an almost lispy effect—but this was a rare occurrence. John Clayton's upright bass seemed slightly recessed at times, but I suspect this might well have been in part because of the way it was miked. There may have been a touch of brightness to the piano's upper registers, but then I'm sensitive to brightness. I'm picking nits—the Krall LP was overall a thoroughly enjoyable experience.

Next I spun Buena Vista Social Club's eponymous album; this one is also packed with mid-range delights but contains more complex layering of instruments than the Krall disc. Here, right from the "Chan Chan" opener, the snare had energetic snap and speed while the multifarious percussion instruments were distinct and well defined. Shakers and various hand-drums displayed lovely delicacy and detail. Muted cornet sounded richly lifelike, as did Ibrahim Ferrer's lively tenor. Again, the Bonsai's pacey nimbleness carried the day; the counterpoint to which is reduced power-and bass-range color and impact. (Given the inherent limits of a single-driver in a very small box, this must be considered part and parcel of the Bonsai experience. Bass

doesn't go much below 100Hz and thins down well above that point.) Yes, not all of the usual high-octane gusto of this energetic album was conveyed—it could have used a dash more hot salsa in the mix. Still, the sound was quite enjoyably realistic where the speakers played.

OK, I must admit I wasn't expecting rock 'n' roll to blow me away with the Bonsais, but my old promo copy of David Bowie's "Let's Dance" on a 12-inch single (remember those?) did just that. Wow! I almost had to turn the volume down, but it was too much fun to listen loud. The whole mix came alive—from the excitement of the initial hard-hitting drum attacks to the bold, resonant swagger of Stevie Ray Vaughan's guitar to the synth effects flickering between right and left channels, to Bowie's expressive vocals, with claves clean and crisp as you please. It was hard to believe that such huge and impactful sound was coming from these little boxes with their little drivers. (Indeed I have been fooled at shows more than once into thinking that other, larger speakers were playing when it was the li'l Bonsais sitting beside them that were doing the deed!) I just about leapt up off my couch following Bowie's lead.

I feel compelled to share one more notable listening example: Analogue Productions' superb 45rpm reissue of Muddy Waters' *Folk Singer*, which sounded terrific with the Bonsais, "Good Morning School Girl" and "You Gonna Need My Help," in particular. The rapid-fire attacks of Clifton Jones' snare were suitably snappy; Muddy's vocals were realistic and reproduced with the slight reverb I'm accustomed to hearing; the Bonsais even recovered some studio ambience, drawing me deeper into a classic taped more than

half a century ago. Imaging was also impressive, as was the resolution of the details and textures of these spare arrangements—the guitar strings' subtle squeaks, the growls of Muddy's voice.

Conclusion

The Bonsai AL-05 mini-monitors offer an extremely pleasing mix of tube-like bloom, nimble pace, snappy transients (particularly in the midband), impressively wide dispersion, and the octave-to-octave timbral and dynamic coherence that only a single-driver speaker has to this degree, coupled with higher-than-expected resolution of detail. Whatever shortcomings exist at the frequency extremes, they are more than made up for by the monitor's three-dimensionality. Transients are quite fast even if their leading edges aren't always razor-sharp.

While I wouldn't describe the Bonsais as highest-resolution speakers, they do present

a remarkable degree of detail (especially on well-recorded source material), far more than one would expect for their size and type. But, oh, their presence and dimensionality! Those combined with their big, full soundstage (and almost complete disappearing act) make them winners that exceed expectations across most criteria. Where they're intended to play, they play exceedingly well, and (not surprisingly) the midrange is their strong suit. As such, and given their petite dimensions, these might make a good choice for a secondary setup, say in a study or a bedroom.

I'd imagine that Japan's smaller-scale living quarters must have influenced the Bonsai's development. They certainly fulfill the desire for large-scale sound in a small, yet beautiful package. **tas**

SPECS & PRICING

Type: Single-driver mini-monitor

Driver complement: 10cm (4") full-range driver

Frequency response: 70Hz–20kHz (-10dB)

Impedance: 4 ohms

Dimensions: 170mm x 270mm x 220mm

Weight: 5 kg (approx. 11 lbs.)

Price: \$2500

AXISS AUDIO (U.S. Distributor)

17800 South Main St., Suite 109
Gardena, CA 90248
(310) 329-0187

Associated Equipment (specific to this review)

Amplifier: Air Tight ATM-1S stereo amplifier

Source: Acoustic Signature Challenger 3 with TA-1000 tonearm, Air Tight PC-7 cartridge

Phonostage preamplifier: Soudation 520

Power conditioner and power cords: Ansz

Cables and interconnects: Shunyata Research Venom series, AudioQuest Fire, Crystal Cable Absolute Dream

Equipment racks and amplifier stands:

Critical Mass Systems Maxxum

Acoustic treatment: Stein Music

Equipment Report

Starke Sound IC-H3 Halo Elite

Elite, Indeed

Neil Gader

I first encountered Starke Sound loudspeakers at T.H.E. Show Newport a couple of years ago. As I elbowed my way into Starke's crowded demo room, I was impressed by the buzz of excitement from the mostly younger attendees—good news as I'm always on the lookout for indicators of the high end's future. Starke's line of loudspeakers not only sounded promising; they also seemed reasonably priced, and teased the eye with splashy candy-color and metallic finishes, sparkling, thick, aluminum baffles, and copper accents. I thought to myself that this was a team trying to shake things up.

I learned that Starke Sound is a Southern California-based company founded in 2009 by a group of designers and engineers—all of them audio enthusiasts. Their goal was to create a speaker company whose products spanned the home cinema, multi-channel, and audiophile markets, and embodied top-notch technology and contemporary design. Today, Starke Sound assembles its subsystems and products in Europe, North America, and Asia. The company is vertically integrated, building its own drivers

(including beryllium transducers), cabinets, and crossovers, producing its own paints, and doing its own assembly. Its current product catalog boasts roughly sixteen models—left/right, center, and surround speakers, in-walls, and a subwoofer. Starke even offers amplification. Its lineup includes the "standard" Brio series, the Halo series, and the Elite and Signature series that include bespoke wiring and, in some instances, beryllium drivers.

There are two stand-mount three-ways in Starke Sound's Halo series. The IC-H3 Elite reviewed here is the larger of two, and it sure does know how to make an entrance. Its unique look disrupts the stand-mount-speaker social order with glossy full-color finishes set off against gently raked, brushed-aluminum front baffles that extend beyond the edges of the enclosures. These and other details lend the IC-H3 a hip look, ideal for contemporary open spaces. At nearly 26" tall, the IC-H3 is not truly a compact; it's too big to be placed on a bookshelf and too short to rest on the floor without stands. Because of the fifteen-inch depth of the speaker, the platform it sits on needs to be able

to support its 64-pound weight. To this end, Starke markets a dedicated stand—the handsome all-aluminum Stand3.

The driver complement includes a 1" soft-dome tweeter, a 4" carbon-fiber cone midrange, and twin 6.5" composite-paper woofers. The IC-H3 employs a fourth-order crossover with 300Hz and 2.9kHz hinge points. For the mid and bass drivers Starke employs its own dual-gap Linear Magnetic Field (LMF) technology—a long-coil/short-gap design where the voice coil travels through multiple gaps. The voice coil is underhung with regards to the entire magnetic structure, but overhung with regards to each individual magnetic gap. Starke says that with LMF there's no reduction in magnetic flux density in the gap. Translation: less distortion.

The sealed (acoustic-suspension) enclosure uses constrained-layer construction comprising laminated HDF and MDF boards of varying thicknesses. These are then shaped with a CNC cutter and finished with an epoxy coat to create a seamless surface for the application of piano-gloss paint. The sides, top, and rear are braced with a matrix of 25mm-thick MDF. The



SUBWOOFERS

Equipment Report **Starke Sound IC-H3 Halo Elite**

tweeter is housed in its own machined-aluminum chamber. Starke Sound midrange drivers are similarly isolated inside a 25mm-thick HDF enclosure. The rest of the internal volume is reserved for the woofers.

Starke uses the term “hybrid” to express the multi-dimensional mission of its speakers. The word suggests a loudspeaker that can easily span the cinemaphile/audiophile divide. Dan Wiggins (Chief Technical Officer of Starke) told me that “there are different expectations [from cinema and audiophile speakers], but both must do the same thing. A cinematic speaker is often sought out because of its dynamics. Audio typically requires exacting frequency response, a very smooth and linear off-axis response (for imaging), and low distortion (to avoid sonic coloration). As cinema and audio benefit from each other’s strengths (high dynamic range never hurts in an audio situation), we set out to make a speaker that can do both.” I think the high end has always considered wide dynamics critical to the listening experience, but I grant the notion that the HT “explosion” in the 90s brought the issue into even greater prominence.

Sonically, the IC-H3 Elite was a boisterous floorstander thinly disguised as a stand-mounted compact. From the initial percussion bursts of Copland’s *Fanfare for the Common Man*, the gusto and linearity of its dual-woofered low end quickly upended any thoughts that the Starke was going to be a paper tiger. During this showpiece the sound was explosive, with considerable grip on the bass drum/timpani concussions and clean, natural decays that didn’t smudge the adjoining fiery brass and winds sections. The IC-H3 gamely handled the full weight of this piece, taking the

measure of each rippling harmonic with tunefulness and control. Such bass precision is one of the keys virtues of sealed-box loudspeakers, with bottom octaves devoid of overhang or port effects. In this instance, the Starke found a happy medium, neither truncating the note nor (as is the case with some bass-reflex designs) letting it overstay its welcome. Additionally, in the macro-dynamic sense, there was no mistaking that I was in the presence of a three-way. The typical two-way would be inviting a hernia if it attempted to summon the low-frequency dynamic energy and sheer SPLs that the Starke effortlessly displayed.

Moving upward into the lower-mid octaves, the melancholy, expressive voice of the cello during the Bruch *Kol Nidrei* was warmly reproduced—the resonant body of the instrument was fully present, and its dark sonic radiance, which conveys the power and spirituality of this music, was powerfully affecting. With Edgar Meyer’s acoustic bass, I found that the Starke hung onto the sustain with outstanding clarity and conviction. As I listened to these large-bodied instruments it struck home that the qualities that I often miss with many loudspeaker systems is the distinctive woody timbre that separates a hollow-bodied string instrument from other members of the orchestra. With its superb performance in this area, the loudspeaker seemed to be reading my mind.

As the IC-H3 ascended into the upper middle octaves and lower treble it displayed a conservative and forgiving side that was more in keeping with audiophile values than the hot metallic approach of some of the less-than-genteel home-theater efforts I’ve experienced over the years. This was not an in-your-face,

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Equipment Report **Starke Sound IC-H3 Halo Elite**

studio-monitor type of delivery. Imaging was solid and the speaker created firm center-stage images with vocals. However, at times I felt that vocalists were a step or two recessed in the soundstage. Further, as I listened to the DSD file of Dave Brubeck's "Take Five," Paul Desmond's alto sax struck me as sweeter than I typically hear it sound—that some of the sax's reedy attack was reduced. During Evgeny Kissin's performance of Glinka's *The Lark*, the concert grand also lost some of its note-to-note clarity and intensity during lightning-fast trills. Was the IC-H3 slightly overdamped in the upper mids and lower treble? Perhaps a bit, but I don't want to exaggerate this impression. While you won't mistake the Starke for an electrostat, the losses of transparency and speed are minor reduc-

SPECS & PRICING

Type: Three-way, acoustic-suspension, stand-mount loudspeaker

Drivers: 1" tweeter, 4" carbon-fiber mid, (2) 6.5" aluminum woofer

Frequency response: 38Hz–22kHz

Nominal impedance: 4 ohms

Sensitivity: 90dB

Dimensions: 11.8" x 25.6" x 15.4"

Weight: 64 lbs.

Price: \$6495

STARKE SOUND, LLC

17810 S Main Street,
Suite B
Carson, CA 90248
(213) 291-9484
starkesound.com

tions that most listeners will easily factor out of the overall listening experience. I found that the Starke more than made up for these losses thanks to its tremendous soundboard weight and sustain in the lower registers.

What about movies? It's a dirty little secret but there are more than a few audiophiles who, on occasion, are also looking to satisfy that home-theater sweet tooth—and I admit to being one of them. In my modest listening room, a pair of H3s all by its lonesome (no sub or center channel) was in its element. Soundtracks heavy with dialogue, like the film *Fences*, were articulate but not overly assertive. Movies that featured pyrotechnics and assorted special effects, such as *Star Wars: The Force Awakens*, were a showcase for the Starkes. During battle sequences, and even in lieu of surround channels, they twisted the air in the listening room with an authority and fury that created an atmosphere of intergalactic immersion. Their wide dynamic range unleashed the energy of the John Williams-conducted, ninety-piece symphony orchestra with almost casual ease.

My first encounter with Starke Sound and its IC-H3 was one of the more memorable blends of style and substance I've come across lately. With its combination of two-way delicacy and thrilling low-frequency slam, it carves a unique niche for stand-mounted speakers in today's market. When you add its bold, eye-catching, contemporary design, you get the kind of speaker that creates a stir in a hobby that is often a little too conservative and insular.

An auspicious debut, and an enthusiastic thumbs-up to a company that I will be watching with anticipation in the coming years. **tas**



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Alan Shaw's Masterpiece

Paul Seydor

A few days after I took delivery of the Monitor 40.2, the third version of Harbeth's flagship loudspeaker, a close friend fell by for a listen. He's a Los Angeles studio musician (a violinist who's played many high-profile film scores, often serving as concert master), who is also a long-time audiophile, a member of my informal listening group, and an extremely discerning listener. Within about a minute or two of listening, he asked, "Aren't you tempted?" He had no idea. I had a sinking feeling from the moment the speakers were delivered—they were already well broken-in—and I started listening that it was going to be extremely difficult to part with them. Several months later I gave into temptation and bought the review pair. This is the sort of admission we reviewers typically reserve for the climax of a highly enthusiastic review, the *coup de grace* that drives home the full measure of our enthusiasm for those special products we elect to buy for ourselves. But under the circumstances I thought it might be prudent to declare it from the outset, because this *is* going to be a rave review. In the grand scheme of things, one man's opinion doesn't matter much more than the next's. But if actions really do speak louder

than words, then in the strictly personal sense my action is a pretty large statement in view of my history, because for the last quarter-century not only have my reference speakers been Quad ESLs, beginning with the 63, then the 988, and since 2005, the 2805 (in my view still the finest speaker Quad has ever made, though I also have a fully restored vintage pair of original Quads), Quads have also been the *only* speakers during this time that I've purchased for personal use as my main speakers—until now.

In order to keep this piece within a manageable length, I'm going to skip the usual detailed product description and design history because much of this is covered in the accompanying interview with Alan Shaw, the owner of Harbeth and the designer of its products; and for a fuller discussion of his methods, his philosophy, and his roots in the great tradition of loudspeaker research and development pioneered by the British Broadcasting Corporation, I refer you to my review last year of Harbeth's SuperHL5*plus* at theabsolutesound.com and to my articles on the BBC Monitor and Harbeth in TAS's *Illustrated History of High-End Audio, Volume 1: Loudspeakers*.

The .2 suffix indicates the new model is the third iteration of the original. Physically, it's a

large rectangular box, approximately 30" x 17" by 15", with a 12" double-ported bass driver that crosses over at 500Hz to an 8" midrange that in turn crosses over at 2.5kHz to a 1" soft-dome tweeter (these figures are rounded-off), front-mounted behind a removable grille cloth (that's intended to be left on), with a single pair of heavy-duty binding posts on the back. The speaker in fact looks rather larger than it actually is mostly because, apart from the beautiful (and perfectly matched) wood veneer, there is no attempt to make it look like anything other than what it is: a large rectangular box whose only purpose is to reproduce sound and music. The traditional look and simplicity belie the sophistication of the design, manufacturing, and engineering, particularly as regards the crossover networks, the almost unprecedentedly low levels of coloration achieved by the RADIAL2 material in the midrange driver, and the way the cabinet, thin-walled but very solid be-

cause sturdily braced, has been constructed to control and damp resonances. (I should add that I personally find the speakers to be very attractive, but then I prefer a traditional look, while speakers that resemble globules, are painted like automobiles, or made to look like large industrial structures or *objets d'art* are rarely to my taste and often strike me as pretentious. I'd rather have an honest box, panel, or tower that knows what it's supposed to be and does it.)



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The 40.2's remarkably flat impedance curve of 6–8 ohms presents a benign load that makes for excellent results with all good quality or better amplifiers. As it happened, the evaluation period overlapped with the reviews of several amplifiers, the comparing and contrasting of which the Harbeths made child's play of, sonic differences instantly audible. They can also handle prodigious amounts of power without stress or strain yet will yield eminently satisfying results with amplifiers rated as low as 35 watts per channel.

Stand-mounting is required (17" high or enough to place the tweeters more or less at ear level), as is placement away from surfaces, while on or near on-axis listening is strongly recommended for accuracy of frequency response and precision of imaging, both of which will be compromised if you aim them straight ahead. Inspired by the BBC, Shaw has spent over three decades researching how to make loudspeakers perform optimally in real-world domestic settings, and all of that knowledge has gone into this speaker. Shaw himself regards the SuperHL5*plus* as his statement of what a domestic loudspeaker should be, but I think this new Monitor 40.2 is his masterpiece. Although designed as a studio monitor for the BBC—a professional version is available with a utilitarian finish—the sizes of the BBC's control rooms and studios are more or less equivalent to the vast majority of domestic rooms, so the speaker is as much at home at home as it is in the studio (see the accompanying interview for more on this). Despite full, deep, and powerful bass response, the Monitor 40.2, like other Harbeths, is easier to place for optimal perfor-

mance in ordinary rooms than almost any other full-range dynamic speakers in my experience. This may be one reason why they excel at trade shows. I've heard them several times at Newport, where most exhibitions do not sound particularly good, yet Harbeth's rooms are always, as I've written several times, oases of musical naturalness and relaxation.

Sound

Let's start with the midrange—that's where everyone seems to start when it comes to Harbeth speakers. Trouble is, what's left to be said? How many variations can you ring upon "beautiful," "luscious," "ravishing," "gorgeous," "drop-dead gorgeous"? Let me approach it a different way. The Monitor 40.2 is flat throughout the *entire* midrange, from the lower midrange/upper bass all the way through the upper midrange and into the presence region. This translates into an all but peerless tonal neutrality and naturalness that was evident from the moment the speakers were set up and playing.

All Harbeths shine on voices, this one such that you feel you're hearing voices the way they really sound in reality. One of my toughest acid tests is the Anonymous Four, four female singers who do their best to sound indistinguishable from one another (and whom I've heard in concert several times, most recently on their farewell tour a couple of weeks before I took delivery of the Harbeths). This is, of course, impossible, but it does take a speaker of rare resolution to allow you distinguish among them as discerningly as the 40.2 does, literally sailing through the challenge. The same applies to instruments, which are reproduced truthfully

in all their range, variety, and individuality of timbre and character. Many years ago James Levine recorded a Strauss program for DG with the Metropolitan Opera Orchestra, an ensemble that for sheer opulence of instrumental color was almost without equal at the time, featuring *Death and Transfiguration* and *Don Quixote*. Being multi-miked, the recording doesn't present the illusion of hearing an orchestra in a concert hall. However, I've been reliably informed that a great many musicians are very fond of it because the instruments actually sound like real instruments in timbre and character. I've never heard it reproduced with quite the richness and variety that the Monitor 40.2 reveals, not even by my beloved Quads, with that elusive impression of listening back through the chain to the source itself.

Perceived levels of coloration and distortion are astonishingly low on this speaker, easily rivaling those of my Quads. Two examples, both of them vocals: *The Alamo* soundtrack features two speeches by John Wayne taken directly from the movie's soundtrack. The recording was made outdoors, so there are no room acoustics as such to deal with, and it seems to have been processed with absolutely minimal control-room processing (I doubt there was any at all—these were pre-Dolby days). It will tell you a great deal about materials colorations, box resonances, and tonal anomalies. For all Wayne's bravado and physical size, his voice is surprisingly light and pitched rather higher than you might think, despite some gravel from years of drink and tobacco. There should be no false underlining to it, and no bogus nasality apart from a mild vestigial nasality (which never

approaches honkiness) in the voice itself.

The other is a fascinating recent reissue of Patricia Barber's audiophile hit *Café Blue*, released in its original mix-mastered form before the final mastering. The difference is eye (ear?) popping, and not just, or even principally, because it was mixed in the analog domain using Capitol Records' fabled analog chambers for ambience and reverb. At first you may be struck by how relatively dead it all sounds by comparison to the versions you're used to; but soon enough you realize that what you're hearing is the absence of all the usual kinds of processing that goes into most popular recordings. The resultant purity is instructive, even revelatory, and it doesn't take much comparative listening before the typical colorations and anomalies in the reproducing chain are exposed. Through the Harbeths I heard nothing that I could attribute to the speaker, and the reproduction was extraordinarily "characterless" apart from the intrinsic character of the performers.

By beginning with the midrange, please do not assume I consider the Monitor 40.2 deficient anywhere else along the frequency spectrum. On the contrary, this is one of the very few loudspeakers in existence that can without crossing your fingers behind your back be called a true full-range monitor of reference caliber. So it is hardly a surprise that the high excellence of the midrange extends all the way up through the top end and all the way down into the bottom-most octave. The transition to the dome tweeter is, to my ears, inaudible, a testament to the fanatical care Shaw has lavished upon the crossover. Long-time readers of mine will know that I find the vast majority of current speakers

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all along the price spectrum entirely too bright because their response rises in the top two octaves (5k–10kHz and 10k–20kHz). There is no equivalent to this in live music, especially music made by acoustic instruments in the usual venues where music is performed, such as recital and concert halls and opera houses. Next to the bright and vaguely glassy or mechanical-sounding tweeters I'm used to hearing even in very expensive loudspeakers, the miracle of the 40.2's soft-dome is that it is extended without sounding in the least hyped. If you play a recording that is very bright, like Bernstein's New York *Appalachian Spring* on Sony, the 40.2 reproduces it that way, but it doesn't make it any brighter or more aggressive than it already is.

Another recording that is somewhat brightly lit is Von Karajan's famous mid-Sixties *La Mer* with the Berlin Philharmonic. The orchestra plays like gods, but the strings are bright enough that I typically employ a treble cut (let's hear it once more for tone controls!) to make it sound more natural. On most contemporary speakers the treble cut can be considerable, whereas on the Harbeths it is moderate. But the key point here is that the 40.2 reproduces the brightness but doesn't accentuate it: The Harbeth won't make a bad recording sound any better than it is, but, as is not the case with speakers that are not accurate, neither will it exacerbate any of the things that make it bad. This is one reason why so many people who hear this speaker are struck by the beauty of the reproduction.

One thing I've observed of past Harbeths I've reviewed, which is related to the excellence of their high-frequency response, is how well they reproduce ambience. One of my refer-

ence recordings is *Sing We Noel*, the program of Christmas music by Joel Cohen and the Boston Camerata. There is one cut where there is a speaker in one channel, a singer in the other. When the speaker speaks and the singer sings, they remain firmly situated in their respective spots but the way their voices carry across the spectrum should be continuous and seamless, because you're hearing the characteristics of the acoustical space of the venue. In the closing piece, as the singers recede, you are clearly aware they are moving out of the microphone field and are more enveloped in the ambience of the venue (it's also evident they're moving closer to a reflective surface—the back wall, I suspect).

And so we come to the bottom end. The original Monitor 40, which remains one of Robert Greene's reference speakers, employed a twelve-inch driver that Harbeth outsourced. Without warning, the manufacturer informed Shaw the driver would no longer be available, hence the reason for the 40.1 modification. Along the way, Shaw changed some of his ideas about bass behavior in small rooms—by small rooms, I mean even large listening and living rooms, since referenced to concert halls, opera houses, stadiums, etc., all domestic rooms, even pretty large ones, are considered small, and small-room acoustics present a very different set of problems, notably in the bass. The original Monitor 40 exhibited a quite appealing sense of bloom and warmth throughout the bass region. But because its bass response was so expansive, even robust, it could prove difficult to place in some rooms. In the 40.2 Shaw judiciously reduced some of the mid-

and upper-bass response while extending the low-end a bit more, the -3dB point now 35Hz, which means that with boundary reinforcement the -3dB point will approach 30Hz in most rooms. Yet the speaker retains the warmth and overall musical balance of the original, nary a trace of that thinness in the warmth region—what friend of mine likes to call the "baritone" range—of so many current speakers that bill themselves as full-range. In other words, Sinatra, Fischer-Dieskau, and Belafonte sound like the baritones they are, not optimistic tenors.

This in turn translates into an ideal mediation among warmth, definition, extension, and power. These last few years I've taken a keen interest in the great conductor Leopold Stokowski, who favored a symphonic sound picture weighted toward the cellos and doublebasses. It's fabulously rich and voluptuous, sumptuously on display in his famous recording of *The Moldau* and Liszt and Enescu rhapsodies, not to mention his several symphonic syntheses of music from *Tristan und Isolde* and the *Ring*, which the Monitor 40.2s reproduce in all their storied glory. Indeed, there's not another speaker I'd rather listen to orchestral music on than the Monitor 40.2, so true is it to spectral balance to the real thing.

Is a subwoofer necessary? I would say that in any practical sense, no, at least for most kinds of music. Even the 32Hz organ pedal point at the beginning of *Also Sprach Zarathustra* is reproduced with as full a volume as the recording will allow (assuming the note is really *on* the recording). But that isn't to say it won't benefit from a subwoofer. Subwoofers, like equalization, are most successfully used when a speaker already

has excellent bass response, and all you're after is the reinforcement necessary to give a greater sense of weight and ultimate extension with organ recitals or augmented orchestras in music like the Berlioz and Verdi requiems or Mahler symphonies (or maybe you just want to hear the subways running under the cathedral in the St. John's Choir's Christmas recordings?). A good subwoofer that reaches into the bottom octave, especially the bottom half-octave, can also often capture a sense of the spaciousness

SPECS & PRICING

Type: Dynamic three-way vented

Drivers: 11.81" Harbeth bass unit; 7.87" RADIAL2 mid; 0.98" ferro-cooled soft dome tweeter

Frequency response: 35Hz–20kHz ±3dB free-space, grille on

Impedance: 6–8 ohms, easy to drive

Sensitivity: 86dB/1W/1m

Amplifier suggestion: 35Wpc minimum

Power handling: 650W program

Dimensions: 17" x 29.5" x 15.27"

Finish: Cherry, eucalyptus, rosewood, tiger ebony

Stands: Approx. 17", sufficient to bring tweeter to ear level

Weight: 83 lbs. each

Price: \$14,999 (cherry)

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fidelisav.com

harbeth.co.uk

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of these venues in a way nothing else can quite manage. The 40.2 is an ideal candidate for subwoofer reinforcement precisely because its bass response is *already* so excellent. But be sure you get a subwoofer that goes really deep and that allows you to set its crossover really low, at least as low as 40Hz. Otherwise you'll just mess up the 40.2's superb bass response. (Harbeths are especially well matched to REL subwoofers because RELs are designed to be less subwoofers as such than true *sub-bass* sys-

tems. For more on this, see my review of the REL Series R528SE at theabsolutesound.com.)

So far I've emphasized the 40.2's essentially flat frequency response, tonal neutrality, and natural tonal balance. But it is outstanding in several other ways as well. For one thing, it's extremely transparent, rivaling without surpassing my Quads. Its resolving capability is equaled by few speakers in my experience and surpassed by none. Its resolution is as high as the most detail-oriented speakers I've heard, but it will keep detail in its proper perspective and it is never merely analytical: To give an exhausted metaphor a little more work, it's not a missing-the-forest-for-the-trees presentation, rather a forest-*and*-the-trees presentation. Its imaging capabilities are essentially determined by the source or the source component, its perceived distortion is extremely low, and it is vanishingly low in coloration. It is also astoundingly clean and clear, obvious testimony to Shaw's masterly implementation of the BBC's philosophy of thin-walled panels, sturdy bracing and damping, and also the RADIAL compound he's developed for his midrange drivers. There is, moreover, a coherence, a tonal integrity, and the ability to speak as if of one voice that is unsurpassed in multiple-driver loudspeakers of my experience, while its dynamic range and loudness capabilities exceed anything you are likely to be able to stand in any appropriately sized room the speaker will be used in. As important, if not more so, is its ability to play at near-whisper levels without the tonal dropout typical of so many dynamic speakers when played at very low levels—getting close to my Quads in this respect (though nothing surpasses Quads for

ultra low-level listening).

Owing to its neutrality and tonal balance and because my musical tastes lean that way, I've been talking mostly about the Monitor 40.2's performance with acoustical music. But while rock 'n' roll doesn't occupy a large part of my listening, the rock I like I *really* like a lot, and the 40.2 renders it sensationally. I've never heard *Graceland* more excitingly or engagingly reproduced, with more clarified textures and dynamic range, power, and legitimate punch, the same for any number of Rolling Stones recordings. Philip O'Hanlon of *On a Higher Note* recently gave me a DSD file of "American Pie," my nomination for maybe the greatest rock 'n' roll song ever written (it's surely one of the few that transcends the genre), which over the Harbeths is stunning in its vitality and emotional affect. I've always found it a bit ironic that so many rock fans tend to like speakers that are thin in the warmth region and pitched up top because they like the way that makes the music sound punchier and aggressive. In fact, many rock musicians, notably those of my generation, have been rather vocal in expressing their preference for a lot of energy in the warmth region, as it happens precisely where symphony orchestras also have a lot of their energy. This is one reason so many rockers gravitated toward McIntosh tube amplifiers. I predict that for these musicians, the 40.2 will prove something of a revelation. (If you need further proof, try some Buddy Holly.)

In the sum, the Monitor 40.2 possesses that difficult to define but instantly apparent impression of *authority* on any and all kinds of music. From the simplest to the most demanding, from a whisper to far louder than

you can stand, you have the sense there is no kind of music that it cannot take in easy stride and reproduce as truthfully, beautifully, and faithfully to the source as the current state of the art will allow.

Incidentally, thanks is extended to Pass Labs for lending their XP-10 preamplifier and X150.8 power amplifier so that I could have a representative example of a really high-powered amplifier for the 40.2. I should add that the combination was absolutely superlative, with genuinely effortless performance even with very demanding sources.

Limitations

The Monitor 40.2 is not perfect, but in any practical sense it has no limitations that matter to me as a music lover and audio consumer. This is consistent with Shaw's design brief for this and all his speakers, which is to say that each model is designed for specific applications to reproduce music and sound as accurately as possible in rooms, whether in studios or in homes, that fall under the broad category of normal-sized. They're not intended for sound reinforcement or for use in *extremely* large rooms of the kind that you might find in baronial estates or castles. Otherwise, its ability to play loudly and cleanly exceeds any reasonable standards in any application or venue for or in which it is designed or likely to be used. If you need more loudness than that, then you must look elsewhere (though I'd be seriously concerned about hearing damage).

As with all true full-range speakers, you must be sure your room can accommodate the bass pressures they can generate. If your room is

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not large enough to allow you to keep a pair of 40.2s reasonably well away from the front- and side-walls and you still want the Harbeth sound, then the superb SuperHL5plus or Monitor 30.1 would be more sensible choices. My listening room is a little over 2500 cubic feet (8" x 15" x 21"); Robert Greene's is close to that, but differently dimensioned. Mine are about seven feet from the front wall, Robert's about five feet (I'd estimate) but only about two feet from either side-wall and aimed at the listening position in each room. The Harbeths perform superbly in both settings. (I've never heard better reproduction, and only very rarely as good, of symphony orchestras on any system anywhere than in REG's dedicated room when he's got his Harbeths really dialed in.)

If you are a fan of the best planar loudspeakers, such as Quad ESLs or the Sanders Model 10e, as I surely am, the 40.2 will not match their ultimate openness and freedom from boxiness, but it is not far behind, and its performance in these areas is nevertheless superb by any other standard. To my ears the Sanders 10e is even more tonally neutral than the 40.2, but the latter possesses an elusive quality of richness, timbral naturalness, and vitality that I have not experienced even with my beloved Quads.

Although the 40.2 is capable of reproducing a really big sound, what it will not do, if this is important to you, is reproduce the height of performers in your living room the way taller speakers like the Sanders, MartinLogans, Magnepans, Wilsons, etc. do. Mind you, the Harbeths are very good in this regard and with some instruments—like a string quartet, for example, or a piano—they can suggest life-size scale and dimension-

ality. But if you must have the impression of a six-foot singer standing six feet tall in your room, the 40.2 will come close but it will not get you there, although, like me, you may be so seduced by its reproduction of voice that you'll never miss the height factor.

Conclusion

Inasmuch as I gave away the punch line at the outset, let me finish by saying that if I were asked to recommend a loudspeaker to someone who loves a really wide variety of music and wants it reproduced accurately, naturally, and beautifully such that he or she truly can listen for hours without fatigue, my recommendation in the here and now would unhesitatingly be the Monitor 40.2. As the review period has lasted several months, during which time I've had to evaluate several other components, I've also come to appreciate the Harbeth's value as a tool for reviewing equipment and recordings. This is one speaker that really will tell you the truth about any source or any components feeding it.

As for my 2805s, no, I'm not about to sell them—once a Quad man, always a Quad man—but they must henceforth share house space with the Monitor 40.2 as my idea of how a reference loudspeaker should sound and perform. Now that the evaluations have ended and the review finished, truth in reporting requires I point out I've felt no pressing urge to bring the Quads back into the listening room, so satisfying are the Harbeths. The Monitor 40.2 is now my reference loudspeaker, and so it shall remain for a long, long time to come: I choose the speakers I buy for my personal use very carefully and I do not change them capriciously. **tas**

We All Love an Interesting Character ... Except When No-Character is Better



Odds are that your best friends or your significant-other are interesting people — otherwise, they wouldn't be interesting to you. However, in a hi-fi system, one of the highest values, maybe the most important characteristic — is to have no character at all.

But, we're human, and in as much as the purpose of music is to be emotionally stimulating, we often have an internal conflict as we choose our audio gear: we want honesty, neutrality, and truth — but we also crave emotional engagement.

As AudioQuest's chief designer, I try to put as much emotional provocation into the visual presence of AQ cables as possible (I love designing the braids and organizing them into a sort of quality code), but of absolute primary importance for me is designing cables that have **as close to no-character and no-voice as possible**.

Further confusing the process, because no hi-fi gear is perfect, we usually have no choice but to choose as consciously and carefully as possible the nature or character of a product. Conscious and careful compromises are the hallmark of the very best designs. If a designer thinks that their merde doesn't stink, they don't carefully manage the nature and effect of a product's inevitable imperfections.

No audio component is as seriously compromised as is a speaker even before the design process begins. In having to choose between point-source, planar, line-source, omnidirectional, etc., the designer has already accepted an extremely significant form of voice or character as being the best compromise and the best path to sonic immersion.

Arguably, the single most important personality trait found in a good designer of any audio product is their ability to be aware of everything that is imperfect, and to work to minimize those problems — their willingness and ability to balance and manage those challenges into a holistic whole that we as listeners are as unaware of as possible.

My point is that cable is unlike other parts of an audio system in that there truly is a perfect reference — “no cable”! A simple bypass comparison always shows any cable to be flawed but also allows for a complete understanding of how the cable is damaging the sound.

Cables are in a sense the only components (other than AC power products) that can be evaluated and chosen based on their *lack* of character. No cable can fix what goes wrong elsewhere in the system. “Balancing” a bright speaker with a dull cable, or a dull speaker with a bright cable, will never create as effective and immersive a musical experience as choosing each component to be as good as possible on its own. As the saying goes, “two wrongs do not make a right.”

Please, as you wrestle with optimizing your system and your speakers, know that you must carefully choose the “voice” of most components — but also please know and act on the fact that a cable can and should be chosen for its lack of a voice.

I am proud of the fact that as one steps up or down in the AudioQuest range of cables, the voice is always minimal and unchanging — though of course the resolution, dynamics, and focus are greater as one steps up the line.

Happy listening!

 William E. Low

audioquest

Equipment Report

Focal Sopra N°1

Hard to Say Goodbye

Andrew Quint

There's something to be said for a high-end loudspeaker manufacturer actually making its own drivers. The number of companies that do this is relatively small, though many try to obfuscate the matter by declaring that their woofers and tweeters are made to their exacting "specifications" by outside sources. In fact, many fine loudspeakers *are* produced by this latter paradigm. But having complete control over driver manufacture in-house can facilitate efforts to optimally integrate the performance of transducers, crossover, and enclosure. Since very close to its beginnings in 1979, Focal (at the time known as JMLab—Jacques Mahul started the company and remains at the helm) has produced both raw drivers and complete speaker systems. For 25 years, Mahul sold his drivers to other marques. But especially with the development of an automotive speaker line, the demand became too great and now the French company keeps all of its drivers for its own products.

The Sopra speakers—there are two currently, the \$8999 Sopra N°1 and the \$13,999 Sopra N°2—occupy a position in the Focal product range between the Electra line and the take-no-prisoners Utopia series. The Sopra N°1 is

the top half of a Sopra N°2 turned upside down and mounted on a dedicated stand. A mini-monitor? It sure doesn't perform like any other mini-monitor I've heard, and if you're thinking of employing a subwoofer along with these loudspeakers, maybe yes—but maybe no.

The two transducers in the Sopra N°1 exemplify Focal's long history of driver design. The W-sandwich cone was developed for the earliest Utopias in 1995, a Rohacell foam core covered on both sides with a thin layer of resin-impregnated glass tissue. These drivers, efficiently fabricated at Focal's St. Etienne factory, manifest the Holy Trinity of high rigidity, low mass, and excellent self-damping characteristics that translate into transparency, excellent phase response parameters, and low distortion, compared to drivers made from other commonly employed materials such as Kevlar or aramid fiber. Focal tweeters, of course, have been the standard for high-frequency reproduction for decades. Before starting JMLab/Focal, Jacques Mahul worked at Audax where he developed the first dome tweeter. At his own company, he pioneered the beryllium tweeter and, in 1981, introduced the inverted dome topology, which leverages the advantages

of having the tweeter similar in shape to the cone to better integrate the two drivers.

The key features of the beryllium tweeter and sandwich cone have been in place for years and, to cite a Focal technical paper, "the only way forward was to work more closely on the driver suspension." Using computer-modeling methods to investigate the effect of adding mass to a driver's suspension (a technique that's been used to assess automobile suspensions and anti-seismic systems for tall buildings), Focal developed its TMD (Tuned Harmonic Damper) suspension, configured as a pair of circular rings that oscillate to neutralize the resonance frequency of the driver's surround. The result, says Focal, is a greater than 50 percent reduction in distortion around the critical area of 2000Hz, which results in improved imaging, delineation, and timbral accuracy. Sopra speakers also take advantage of some "trickle-down" technology from the massive EM drivers found in Utopia models, and other refinements of the EM circuit that Focal sees as a work-in-progress, calling it the Neutral Inductance Concept, or NIC.

Focal set out to implement its improved drivers in a relatively compact design. The tweeter is positioned in a progressively damped



horn-shaped duct that leads to the back of the loudspeaker and preserves real estate for the Sopra N°1's low-frequency driver enclosure. In its continuing effort to create new initialisms representing its technological advances, Focal calls this IHL, for Infinite Horn Loading

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and states that measurable distortion in the midband is reduced to a degree complementary to that achieved by the new driver design. The cabinet is fabricated from MDF—Focal feels strongly that an enclosure that is *too* stiff can push resonances up into a more audible range, plus this material is easy to work with in creating the curved enclosure shapes that confer the advantages of less diffraction of sound and more structural rigidity. A variety of standard finishes are available: My review sample was an attractive Dogato walnut veneer, though I'm sure the brilliantly colored high-gloss lacquer finishes you see in the Focal ads are more frequently requested. On the back panel is a single pair of five-way binding posts, thoughtfully spaced about 2" from center-to-center, that are effectively tightened by hand, even over thick spade terminations. Grille covers are easily removed, and should be.

The Sopra N°1s arrived in two rather small cardboard boxes that could only mean one thing: "some assembly required," as the saying goes. It took me around two hours to unpack the speakers with their included stands and put them together, though I'm sure if I had to do it again, it would take half as long. The stand's robust supporting pillar must be bolted to the heavy glass base, a top metal plate to the pillar, and then—this is the frustrating part—the speakers are bolted to the top plate. Getting the threads in the Sopra N°1's bottom surface to align with the holes in that top plate so that the final set of bolts can be inserted and tightened is definitely a two-person job. This is something your dealer should do for you—presumably in recognition of the fact that you didn't audition

the speakers for three hours in his showroom and then buy them for \$200 less somewhere else. Added value, remember?

From the get-go—and especially after a few days of break-in—the Sopra N°1 was utterly enthralling. Focal's beryllium tweeter is surely the best in the business...

Positioning the Sopra N°1s was surprisingly easy. Once assembled, I plopped them down in the location where other, smallish stand-mounted speakers have worked well. The tonal balance and imaging were pretty good, even though the speakers weren't broken-in at all. The minimalist users manual provides a formula for placing the speakers and when I plugged the numbers in, they were sitting pretty much exactly where Focal said they should be. A little fiddling with toe-in and leveling with the easily adjustable floor spikes, and the deal was sealed. Preceding the Sopras in the reproduction chain was my usual reference gear. I used digital sources exclusively, either an Oppo 93 (as a disc transport) or the Baetis Reference music computer, both feeding data to my Anthem D2v for D-to-A conversion and control. Amplification was by a pair of Pass XA 60.8s and all cabling was recent vintage Transparent, save for the Shunyata Anaconda AES/EBU cable from Baetis to Anthem. In lieu of any physical room treatment, I ran Anthem's DSP room-correction program, utilizing measurements taken at eight room locations, and employed it up to 2kHz

after inspecting the frequency response curves generated by the software. Focal says that the Sopra N°1 is an appropriate loudspeaker for rooms up to 275 square feet and my space is 15' x 15', with the ceiling height varying from 11' to 13'—so my room should have been a felicitous match.

It was indeed. From the get-go—and especially after a few days of break-in—the Sopra N°1 was utterly enthralling. Focal's beryllium tweeter is surely the best in the business, and the air, openness, and delicacy of the top octaves equaled or even surpassed what's achieved with many electrostatic or ribbon transducers. Musical data living largely in the upper frequencies had a penetrating energy and presence without a trace of aggressiveness. I learned a lot about what the Focals could do in this regard from listening to digital representations of 1970s rock/pop material. Here is music that was recorded with analog gear and intended for vinyl playback. From a CD or even high-resolution digital file, the "shortcomings" of these recordings come to the fore—a lack of deep bass and a potentially wearying peakiness to voices and instruments with lots of upper partials such as cymbals or closely miked acoustic guitars. By way of example, I'm told that Joni Mitchell used Martin guitars equipped with steel strings to record her classic album *Blue*. With an average vinyl pressing, the dynamic immediacy and rhythmic impetus of Mitchell's accompaniment provides a perfect counterpoint to the vocal contour of a song like "Little Green." Too often, even the finest digital representations (the HDtracks 192/24 version, for instance) have the guitars seeming jarring

SPECS & PRICING

Type: Two-way, bass-reflex
Driver complement: One 1" inverted dome tweeter, one 6 ½" bass/midrange
Frequency response: 45Hz–40kHz
Sensitivity: 89dB
Recommended amplifier power: 25–150 watts
Nominal impedance: 8 ohms
Dimensions: 16.75" x 11" x 15 ½"
Weight: 42 lbs.
Price: \$8999, stands included

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and jangly, to the point of becoming a distraction from the gentle wistfulness of the song. The Sopras restored the indefectible unity of the lyrical and instrumental aspects of "Little Green," as heard from the hi-res file. I felt much the same about other material I love from this era, songs supported primarily by acoustic guitars—CS&N's "You Don't Have To Cry" or Todd Rundgren's "Love of the Common Man," and so many others.

Equipment Report Focal Sopra N°1

The Sopra's faithfulness to the overtone structure of more unusual musical sounds is another manifestation of the level of performance achieved with the loudspeaker's top end. In Igor Stravinsky's faux-baroque masterpiece *Pulcinella*, based on music by Pergolesi, at the close of the "Scherzino" movement, the composer wants to imitate the sound of a lute. The obvious modern instrument for the job is the harp—but the pared-down orchestration for *Pulcinella* doesn't include one. So Stravinsky, good student of Rimsky-Korsakov that he was, figured out another way to accomplish his end, by having cellos play pizzicato open fifth harmonics. Stravinsky's ingenious solution—cellos imitating harp imitating lute—has the desired effect and we hear it clearly through the Sopra N°1s. Of course, the stellar performance of the tweeter wouldn't matter if it weren't successfully transitioned to the mid/woofer driver. The materials comprising the W-sandwich cone and the improvements to the suspension evidently make for an extraordinarily uncolored midrange. The crossover frequency is a high-ish 2.2kHz and the handoff is accomplished invisibly to assure the integrity of solo voices, male and female, and all instrumental sonorities.

Detail retrieval is first-rate. It's a cliché to make an observation such as this, but small felicities in complex pop mixes that had escaped my attention for decades suddenly seemed utterly essential: claves on the title cut from Paul Simon's *Graceland* or the nuances of the Eagles' background harmonies on "New Kid in Town." The subtleties that one used to

have to go under headphones to appreciate are evident through loudspeakers operating in the potentially detail-obscuring environment of a room. Imaging, typically a strength of small stand-mounted speakers, is exemplary, making chamber music and small jazz group recordings



especially absorbing. Dynamics are striking for a loudspeaker this size, or any size, really. Powerful, virtuosic piano music makes the point nicely. Listening to the violently driven "Precipitato" finale of Prokofiev's Piano Sonata No. 7 (played by Matti Raekallio), Messiaen's "Regard de l'Esprit de joie" from *Vingt regards sur l'enfant Jésus* (Alice Ader) or Liszt's *Mephisto Waltz No. 1* (Minoru Nojima) was the intense and potentially exhausting experience it should be with a good performance.

Perhaps the most telling part of the audiophile loudspeaker review process is what happens when all the critical listening has finished.

Dynamics and loudness, of course, are not the same thing and one has to be reasonable about how loud you ask the Sopra N°1s to play. The fairly small size of my room may explain why I was usually able to achieve satisfying volume without a sense of stress, even with music meant to be experienced at attention-getting dB levels—hard rock, Mahler, 19th century French organ music. Just don't turn it up to 11; settle for eight-and-a-half. Then there's the issue of bass. The Sopra N°1 is down 6dB at 41Hz (-3dB at 45Hz) but is capable of providing the necessary visceral bass/drums foundation of well-recorded rock or the weight of an orchestra's string bass section. I did, of course, try adding a subwoofer. I have a good one, the passive Wilson WATCH Dog,

powered by a Parasound A23 bridged to produce 400 watts. I spent a good deal of time methodically varying the low frequency roll-off for the Sopras, the upper frequency roll-off for the sub, and tried numerous volume, polarity, and phase adjustments to the subwoofer signal. There was no problem increasing the amount of bass in the room but not without compromising the of-a-piece sonic fabric that this Focal speaker creates on its own. Enlarging the scale of the low end so it was disproportionate to the rest of the frequency spectrum was counterproductive. If you like what the Sopra does for the highs and the midband but feel underserved when it comes to bass or volume, you need a bigger Sopra. The Sopra N°2 ups the ante considerably when it comes to low-end output and coherence at high levels; by the time you're reading this, the even larger Sopra N°3 (\$20,000) will be available as well.

Perhaps the most telling part of the audiophile loud-speaker review process is what happens when all the critical listening has finished. In many instances, when I feel I'm ready to write, I'll pack up the speakers under consideration and fire up the reference Wilson Duette 2s that have been waiting patiently in the hallway off the listening room. With the Sopra N°1s, I felt compelled to hear them play music until the last possible moment. The truck picking up the Focals for the trip back to their U.S. distributor, Audio Plus Services, showed up earlier than anticipated. The driver called up from the street and I told him to return later as I scrambled to finish disassembling the Sopra N°1s and get their constituent parts back into the cardboard boxes. Sometimes it's hard to say goodbye. **tas**

Equipment Report

Totem Acoustic Sky

Forecast: Cloudless and Sunny

Neil Gader

When I consider the loudspeakers from Totem Acoustic, I think of designs with unalloyed speed, quick-twitch transient reflexes, and crystalline transparency. For me, Totem loudspeakers have always captured the musical intimacy and the fragility of the live moment like few other small affordable speakers. There's a good reason for this. From its beginnings nearly thirty years ago, founder, president, and designer Vince Bruzese has taken the same approach to building small transducers with wide bandwidth and high output—an approach first realized in 1987 with the now iconic Model 1. Simply stated, there is always a lot of music going on each time I light up a Totem.

Sky continues a bloodline of fine compacts from the Canadian firm, and appropriately coincides with Totem's 30th anniversary later this year. Visually, the Sky is classic Totem—clean, seamless, rigid cabinetry with beautifully finished veneers. Sky is a two-way, bass-reflex design with a rear-firing port. The driver complement is unusual in a couple of ways. The soft-dome tweeter is a large 1.3" unit with a hefty neodymium magnet that gives the transducer the ability to operate linearly at lower

frequencies than smaller soft domes typically do, minimizing compression and distortion. The design also permits higher output and extension to 30kHz. The 5.25" midbass is a long-throw design (longer than any similarly sized driver Totem currently produces), with an oversized three-inch voice coil wound with flat wire to avoid air gaps. It boasts an astounding power-handling rating of 500 watts, giving it the ability to play lower with greater dynamics and output. The Sky's vault-like cabinet employs lock-mitered joints and uses a borosilicate dampening that controls energy release yet maintains a certain cabinet liveliness. The hard-wired crossover is a first-order design at 2.5kHz and uses only one Litz large-gauge, air-core coil.

Solid, twin-pair, gold-plated terminals adorn the back panel, and magnetic grilles make for easy removal. Sky is available in three finishes: satin white, black, and mahogany veneer. (A personal note: The grilles could use slightly stronger magnets—I found the merest touch tended to dislodge them.)

The goals of the Sky project, according to Mr. Bruzese, were foremost to "be easier to drive so it didn't require extremely powerful amplification," and to "provide even deeper bass

than models we have with similar dimensions." He paid particular attention to on- and off-axis response to not only create the wide stage the brand is known for but also to allow users to place Sky "just about anywhere [they] choose within their home."

Turning to sonics, the Sky was *prima facie* evidence of just how much small speakers have evolved. Lay to rest any memories of the li'l screamers of yesteryear—all peaky white-hot speed, a rising top end, a 100Hz bait-and-

switch bump masking a stunted bass region. The Sky is not a speaker that will bite on top and turn listless in the bass. Sky was all about a more full-bodied and warmer musical balance rather than the cheap acoustic tricks that tend to rapidly wear out their welcome. While it may be light on its feet when the music demands, it also impressed me as firmly grounded—images stable, rooted, and unwavering. Tonal balance was very good, neither forward nor laid back and recessed. Additionally, there was a coher-



Equipment Report Totem Acoustic Sky

ent of-a-piece quality communicated by the tweeter and woofer. The soft-dome tweeter was superior in its grain-free refinement and speed. And upper-midrange and top-end transient and micro-dynamics were excellent, as I'd expected from the oversized tweeter. On occasion a random percussion cue or upper-octave brass note would reveal a sunny splash of surplus treble through the sibilance range, but this was a relatively minor deduction. Overall tweeter performance represents a level of resolution that favorably separates the Sky from much of its sub-\$2k competition.

As the speaker is only a foot tall, I wasn't surprised that the Sky's output levels and dynamics were limited when pushed to the extreme. But given the right room (medium to smallish) with strong amplifier support and sturdy floor stands, the Totem Sky just clears its throat and lets loose. And boy does it ever! On the full orchestral version of Peter Gabriel's "In Your Eyes," it had a pure midrange and startling presence. While the lower strings of cello and bass violin lacked the full weight and drama of the live event, the Sky still made a heroic effort and provided tuneful bass cues and resonant energy that were honest and organic rather than manufactured or suggestive of aggressive port tuning. Commendably, the port went about its business in near silence with little in the way of localization artifacts. Thus a well-recorded acoustic bass, for example, maintained pitch precision and resonance qualities that were consistent in the mid and upper bass ranges. Often when small speakers attempt to reproduce these octaves, they pro-

duce lumpy results where response dips and rises with each note.

The Sky is no pile driver in sub-80Hz macro-dynamics but it's honest, with clean pitches and good balance. It grows a little shy and self-limiting on deeper macro-dynamic excursions. As if standing at the edge of a cliff, it delicately backed off during Copland's *Fanfare for the Common Man*. But considering its size the Sky is one gutsy little transducer that'll race headlong into challenging crescendos and dynamics without shying away.

On male and female vocals I found the Sky to be a performer that projected much of the chest and physicality of the artist. On a tune like Tom Waits' "Come on Up to the House," the contrast between the Sky and some other compacts was like the difference between sitting listlessly in the pews listening to a dull sermon and hearing an inspiring speaker and rising to your feet in appreciation. The Sky was just as full-blooded on Waits' "Georgia Lee" with its noisy antique piano and barnyard atmospherics complete with tape hiss and chirping birds. The speaker couldn't quite capture Waits' full chest resonance—that would be too much to expect from any one-foot loudspeaker—but vocal presence was generally very good overall. Soundstage scale and dimension was impressive for a twelve-incher. The Sky didn't reproduce music in miniature. Thanks to its nicely honed mid-bass, it managed to reproduce a high-resolution track like Malcolm Arnold's *Sussex Overture* with considerable ambience, acoustic weight, and an image size well beyond the modest confines of its enclosure.

A caveat: There are two sides to the Sky personality worth taking note of. It plays easily and pleasantly with lower-priced low-to-medium power electronics—perfectly at ease, but also a bit dry with a whitish top, its limits more perceivable. Fact is, what it really needs to take flight are higher-quality electronics. After all, that's what those big voice coils and long-throw diaphragm are all about, right? Strap on seventy-five to a hundred watts or more of high-end power and watch the Sky soar. When that occurs, a hard-hitting, heavily tweaked studio track like Steely Dan's "Hey Nineteen" rises from the ashes with renewed dynamic vigor and slam. Similarly the Traveling Wilburys' vocals during "Handle With Care" grow significantly more textured and realistic. And on Elton John's "Someone Saved My Life Tonight," the atmosphere surrounding the singer becomes airier and more defined, while Elton's backing vocals have greater clarity, definition, and texture. The drum fills and cymbals also gain a shimmer, liveliness, and immediacy that, for me, were all the encouragement I needed to start playing air drums along with Nigel Olsson.

Totem's Sky is proof that high-performance audio happens in all sizes, shapes, and segments. The message that most resonates is that listening to a small-footprint compact doesn't condemn the listener to a diminished musical experience. Hats off to Totem's Bruzese and his continuing quest to coax big-time performance from a small two-way by harnessing the virtues of speed and transparency. My forecast: I can't imagine any music aficionado not taking to the Sky after hearing this loudspeaker. A fine and impressive effort. **tas**

SPECS & PRICING

Type: Two-way, bass-reflex
Drivers: 1.3" soft-dome tweeter, 5" mid/bass
Frequency response: 48Hz–29.5kHz
Crossover: 2.5kHz
Sensitivity: 87dB
Impedance: 8 ohms
Dimensions: 6.35" x 12" x 9"
Price: \$1850/pr.

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ASSOCIATED EQUIPMENT

Sota Cosmos Series IV turntable; SME V tonearm; Sumiko Palo Santos cartridge, Ortofon Quintet Black, Ortofon 2M Black; Parasound JC 3+; dCS Puccini; Lumin S1 Music Player; Synology NAS; MacBook Pro/Pure Music; ATC SCM19A, TAD ME-1K; Audience Au24SX cables and power cords, Synergistic Atmosphere Level Four, Nordost Frey 2 and Audience Ohno; and Kimber Palladian power cords. Audience USB, AudioQuest Carbon firewire, Wireworld Starlight Ethernet; VooDoo Cable Iso-Pod. Audience aR6-TSSOX

Equipment Report

Wharfedale Diamond 225

Undiscovered Gem

Drew Kalback

This is the world I grew up in: iPods, ear buds, tinny laptop speakers. Most people my age don't think twice about their equipment, so long as it makes sound. Your average iTunes aficionado isn't going to shell out big sums of cash on stereo equipment, especially when everything seems to have speakers built in these days. Why bother?

But there is good sound at approachable prices, fantastic sound really, the sort of sound that people obsess about. It's not a mystical thing; it's a visceral one; and younger people are finally starting to figure it out. Vinyl's comeback is proof of that. The iPod generation is ready for quality; it's just a matter of figuring out how to get it. And for me, it always starts with speakers.

There's nothing better than opening something new, which is probably why people watch videos of strangers unboxing hardware on YouTube. The Wharfedale Diamond 225s sat wrapped in plastic covers sandwiched between tight foam inserts at the top and bottom, keeping them secure in transit. When I finally got them up and out, I stared at the gorgeous rosewood-veneer boxes, with their black-lacquer MDF baffles and the small Wharfedale logo just beneath the woofer. I leaned back in my desk

chair and thought: "Wow, those are pretty." They're clean, unpretentious, and clearly put together very, very well.

OK, the speaker grilles were a little weird. They're two round foam pieces with little plastic rods that snap in over the tweeter and the woofer, leaving the rest of the baffle exposed, as opposed to something that covers the whole front. It's not my favorite aesthetic choice, though it's not necessarily a bad one, either. Just a matter of taste, I guess. At least they're easy to remove, so I popped them off and forgot about them.

The 225s are fairly compact, though deep and solid. Sound is always the most important aspect of any audio component, but you still have to live with these things, and it's easier to live with beautiful stuff. Fortunately, they're exactly what they need to be: simple and attractive. Clearly the people at Wharfedale know what they're doing, which makes sense, considering how long they've been around. Wharfedale is a relatively large British outfit founded back in the 1930s, and they've been a big name in British hi-fi ever since. The Diamond series debuted in 1981, and Wharfedale has been slowly improving the Diamond designs and sound without inflating cost, and that's exactly what I'm looking for.



The 225s list at \$450, which is a price an actual human with a real job could potentially afford. If you're like me, and you're sick of "affordable" equipment pushing easily into the \$1000 range, this review is for you. Fact is, the majority of people can't shell out the cash for the absurdly hyper-expensive audio equipment that clogs up most blogs. If we want to get the next generation to fall in love with great sound, I think it's about time to accept that there's some seriously good, affordable stuff worth writing about.

So with all that in mind, I put the 225s on top of my cheap stands, hooked them up to my (also British) Cambridge Audio CXA80 integrated, and

turned it all on. Truth is, my listening space isn't ideal. It's small, oddly shaped with a sloping roof, and my speaker placement is limited. They have to be up close to a wall, though fortunately for me, these Wharfedales were designed with that in mind. The slot-loaded bass port fires downwards, instead of back, minimizing room interaction. So don't worry about sticking them on either side of an entertainment system in the living room, for example, or squeezing them into a small office. Like I said, we have to live with these things, and space is sometimes at a premium.

Diving into the sound, I wasn't sure what to expect. Bookshelf speakers typically aren't known

Equipment Report Wharfedale Diamond 225

for deep, earth-shaking bass, and the 225s are no different in that regard. They aren't going to rattle anyone's bones and dig deep into that 40Hz bass region, which is fine—that's what a sub's for. Still, when I started with "Sparkle," the first track on Tatsuro Yamashita's City Pop masterpiece, *For You*, I got such a satisfyingly deep drop that I didn't find myself missing the lowest of the low registers. Frankly, I didn't find myself missing much of anything at all, especially when that clean, twanging guitar played its insanely catchy riff. The opening of "Sparkle" features a heavy, show-stopping reveal, and the 225s were more than up to the task of reproducing that big moment. I was surprised by how much weight I was getting from these things, more than enough for my small listening space. I can't say how well they'd do in a much larger room, although I suspect they'd be up to the task.

The other good thing about "Sparkle" is the way Yamashita's voice is recorded. There's tons of reverb and space, his notes just drifting off into the background, and the 225s highlighted that nicely. For such small speakers, these things could create an impressive soundstage. Not the greatest, most spectacular presentation, but plenty to keep me engaged. Sound hung, drifting, projected nicely in both directions. At some points at higher volume, I noticed a bit of gristle in the upper registers, and sometimes the lower end felt a bit soft. I have to admit though, I was having fun just running through my favorite sides, one after the other, looking for any sonic detail that might be worth delving into. That's the best sign that a piece of equipment is working. These little boxes just seemed to get me.

But I had to push the 225s, give them something challenging. That's the whole point of a review, after all, to see how these things really perform. I turned to one of the strangest and most complicated albums of the year, King Krule's *The Ooz*. This double-LP is as idiosyncratic as it is fascinating. On the most basic, surface level, it's an experimental trip-hop masterpiece, but I think it's so much more than that. It's a sonically difficult album, with deep, rolling bass lines, up-tempo shifting beats, and Krule's own morphing, grinding voice switching registers at will. The 225s did not disappoint me. They had a solid grip on the bass, keeping up with the hairpin-turn bumps and rumbles. The horns blaring in the background of "Dum Surfer" were rendered butter-smooth, along with that catchy guitar floating over the tight snares. I was drawn to the way the 225s made *The Ooz* somehow more accessible. It's such an intricately layered album, and little details such as Krule's English slang could easily be missed if anything muddy got in the way. I could feel the details of his voice despite the heavy synths and shimmering guitar effects. The 225s did a great job of creating a solid soundstage with minutely differentiated pieces. These songs felt so simple at first listen, but it took a piece of equipment like the 225s to do this level of complexity justice.

Finally, I wanted to hear how the Diamond 225s would deal with rich, complex upper-range vocals. These speakers could handle bass and midrange, but I was curious as to how they'd do when it came to subtlety. For that, I turned to Moses Sumney's odd, pared-down, R&B-

influenced album, *Romanticism*. Sumney's music focuses so much on his intense, wonderful, lilting falsetto, which nicely showcased the 225's ability to highlight delicate high-end and midrange detail as he moved through registers. I had a feeling the 225s would be plenty engaging with a softer sound, and I wasn't disappointed. The bass guitar on "Man on the Moon (reprise)" barely kept pace while Sumney's vocals played above it, yet through the 225s the layers of Sumney's voice came through clean, uncolored, and almost liquid. I didn't really understand this album on first listen, but as I went through it again and again on the 225s, I came to really love its low-key cleanliness. In the end, I think that's the real strength of the 225s. They weren't throwing the deepest bass or resolving the upper registers absolutely perfectly, but they had weight right where I needed it, along with the detail and the clarity necessary to resolve complex tracks into enjoyable musicality.

These speakers remind me that the "entry-level" isn't a bad place to be. Inexpensive components are getting better and better as high-end design trickles down into supposedly budget hardware. The Diamond 225s take everything good about high-end audio, the power of beautifully reproduced music, and they make it accessible to a wider audience. I believe the 225s would satisfy just about anybody looking for fantastic-sounding speakers designed by a respected manufacturer at a reasonable price. They're not perfect, but man, they're still more than good. I highly recommend them. **tas**

SPECS & PRICING

Driver complement: 6.5" woven Kevlar cone; 1" soft-dome tweeter
Frequency response: 45Hz–20kHz (+/-3dB)
Impedance: 8 ohms
Crossover: 2.3kHz
Loading: Bass-reflex
Finish: Black, white, walnut, rosewood
Dimensions: 14" x 7.7" x 10.3"
Weight: 14.33 lbs.
Price: \$449

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Equipment Report

TAD ME1

Little Marvel

Neil Gader

The TAD ME1 (ME for Micro-Evolution) is the third stand-mounted compact loudspeaker to be rolled out by Japan's Technical Audio Devices in recent years. Led by the Reference Series CR1, a beryllium-driver three-way of ravishing sonic quality and physical beauty, the procession continued with the Evolution Series CE1—nearly as formidable in some aspects, but at a more approachable, though still heady price. I've reviewed both of these fine efforts (Issues 205 and 256, respectively), and now it's my good fortune to write about TAD's latest offering. The ME1 is the company's smallest Evolution Series compact to date, and its least expensive as well. Yet in some ways it could also be its most impressive.

The ME1 is a three-way, stand-mounted monitor that measures sixteen inches tall. It's a bass-reflex configuration that is in many respects the physical spitting image of the CE1, only better proportioned. The ME1 has been scaled down impeccably. Where the CE1 always seemed a little top-heavy and precariously perched on its floor stands, the ME1 represents a speaker of uncommon balance. Its much smaller footprint will allow it to work well within the tighter confines of more modest listening spaces.

Among the ME1's features is its star transducer, the redoubtable CST (Coherent Source Transducer)—the concentric driver that has defined TAD's Reference and Evolution efforts. In the ME1's case, TAD has engineered a new and smaller version of this design; the tweeter is an ultra-light casting of high-rigidity beryllium. (In contrast, the beryllium tweeter of the CR1 is formed using the more costly vapor-deposition process.) The tweeter is then concentrically inset in a new 3.5" magnesium midrange. Compare this with the CE1, which uses a 5.5" magnesium mid, and the CR1, which sports the expensive (but worth it) 6.5" pure beryllium midrange.

For the ME1 the CST was designed to cover the bandwidth from 420Hz to 60kHz. In addition, the directional characteristics of this coaxially configured midrange and tweeter have been matched to eliminate audio interference (i.e., frequency suckouts centering around the crossover region), on-axis beaming, or that familiar cupped-hands honkiness that has plagued many concentric designs from the past. Thankfully the ME1 handily dodges these colorations. The woofer is a new 6" MACC (Diaphragm Multi-Layered Aramid Composite

Cone), based on a diaphragm made from "Aramid fabric and non-woven materials that are separately formed then laminated for enhanced strength and low internal loss."

The robustly built cabinet is constructed with a birch-ply frame and bracing, plus MDF outer

panels. Thick (4mm) steel plates are added to the left and right sides of the cabinet to further reduce unwanted resonances. TAD explained that the cabinet's internal space was analyzed to optimize placement of the damping and to reduce standing waves.



Equipment Report TAD ME1



At a glance the enclosure might appear to be a sealed-type but the ME1 is actually a bass-reflex design of a very stealthy order. Like the CE1 it fools the eye with its bi-directional ADS (Aero-Dynamic Slot Port), a clever feature that uses flared openings along each side hidden beneath the aforementioned panels. The ports vent to the outside through narrow vertical openings. This symmetrical layout reduces the effects of a port signature (such as chuffing) in addition to moderating standing waves within the enclosure.

The enclosure is beautifully appointed, with a

deep lustrous finish and high-quality dual binding posts that cinch a cable easily and properly. The raked stands are very stable, sturdy, and rigid, and bolt to the underside of the ME1, complementing the speaker to a tee.

The crossover network is no less carefully executed. The CST driver uses a polypropylene film capacitor and a non-inductive resistor, among other select parts. The 6.5" woofer filter uses a low-loss coil with superior magnetic properties, a low-loss electrolytic capacitor, a non-inductive wire-wound resistor, and an air-core coil in a configuration designed to lower resistance.

As I am well acquainted with the TAD brand it didn't surprise me that the sonic voice of the ME1 remained familiar—another way of saying that the ME1 was a speaker that just doesn't phone it in. Like its larger siblings, it retains a full-bodied, big-boned character that smoothly spans a wide frequency spectrum. Intensely dynamic, it performs with a power that is rare among smaller speakers. Tonally it is highly disciplined, well balanced, and predominately neutral—it won't play fast and loose with a recording. Great recordings are as musically satisfying as can be, while lackluster efforts are revealed, warts and all. Low-level timbral details are conveyed with naturalistic delicacy and realism.

Its midrange is quite neutral with a slightly warmer character, the treble a little less warm, resulting in an overall balance that I'd describe as intense but approachable. A company that produces both professional and consumer lines, TAD doesn't make shy, recessed, restrained, or laid-back products, and anyone who has spent

time in a recording or mastering studio knows that studio monitors seldom sound laid-back. Rather, such monitors tend to be incisive listening tools—cool and critical to a fault. If anything, they tend to be neutral-to-forward in personality, which is what the ME1 turned out to be. Put another way, if you were seated in a symphony hall, the listening perspective would be closer than mid-orchestra, more like a Row C or D seat. Personally, I prefer this orientation; others may seek something a little more reserved.

Prior experience with TAD's CST led me to expect excellent imaging, and the ME1 did, indeed, produce near-ideal point-source coherence—a sensation of crystalline focus and image integrity. Images were individuated with the precision of a julienne slicer.

The TAD also possessed a vast palette of tonal color that allowed the finest timbral distinctions to rise to the fore. During Glinka's "The Lark," for example, each note of the concert grand piano was portrayed with lush expressiveness, appearing to hang in the air an instant longer, while the resonance from the soundboard was fuller and more present. There was a starry twinkle to the piano's upper-octave arpeggios and more weight to bass chords. Dynamics were wide open, not piercing or aggressive, but incisive in the manner of a real concert grand.

I was transfixed by the way vocals nested unwaveringly within the venue's soundscape. Singers were replicated with nuance and sensitivity as the ME1 captured each vocal inflection, from deep chest sounds to airy falsetto. The speaker didn't favor male or female singers either. There was Frank Sinatra, his throaty

baritone caressing the ear during "Angel Eyes" and "In the Wee Small Hours," or Jane Monheit's version of "A Case of You" with its rich, humid timbre. During Martin Zeller's *Cellist 6 Suites & Violoncello Solo Senza Bassocello* [MA Recordings], the cello was appropriately resonant, not bloated but full, and carefully balanced between the instrument's natural woody warmth and the aggressiveness of the bowing. The ME1 struck a fine balance between the light and dark of the cello personality, yet never lost sight of the instrument's timbre and physicality.

Perhaps the most impressive aspect of the ME1's résumé was the ease with which it reproduced the gravity and scale of an orchestra. This might be a real eye-opener for compact-mon-

SPECS & PRICING

Type: Three-way, bass-reflex stand-mount

Drivers: Concentric, 1" dome tweeter, 3.5" midrange; 6.3" woofer

Frequency response: 36Hz–60kHz

Crossover frequencies: 420Hz, 2.5kHz

Sensitivity: 85dB

Nominal impedance: 4 ohms

Weight: 44 lbs.

Dimensions: 9.9" x 16.2" x 15.8"

Price: \$12,495; ST3-K stands, \$1795/pr.

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Equipment Report TAD ME1

itor fans, who may have thought their own fifteen-inch-tall two-ways were adequate for the task of bass reproduction. For them, the sheer oomph and drive of the TAD's power range might come as a shock.

As I listened to a couple of EMI-ASD chestnuts, Holst's *The Planets* (LSO/Previn) and Britten's *Four Sea Interludes* (LSO/Previn), the ME1 imparted an authority to the wind and brass sections and to the timpani and doublebasses that was exhilarating in its authenticity and ability to convey the acoustic of the hall. When the orchestra rose to a crescendo in the closing few bars of "Jupiter," I could feel the ominous welling up of low frequencies beneath my feet.

Similarly, when it comes to establishing and holding a rock beat, the ME1 really punched my dance card. Electric bass lines retained pitch control and linearity across the lower octaves. Drum kits with their assortment of drumhead tunings and "skin" sounds have rarely been more completely individuated. Port noise or overhang was never an issue even at higher levels. However, even the finest smaller monitors ultimately run low of bass firepower at some point. Thus sub-forty-cycle bass, while perceivable to a degree, became more of a challenge as the ME1's responsiveness and focus began to soften and waver slightly, especially at low volume levels.

The ME1 has very few obvious drawbacks, and its shortcomings are mostly attributable to the limits of its modest dimensions. However, its top-end still retains some residual dryness, and can't quite summon up the same velvety harmonics of the CR1 or the barn-storming mac-

ro-dynamics of the CE1. In spite of the stellar imaging I've written about, soundstage width and depth were only adequate in my smallish listening space. But I'd imagine better results could be had in larger rooms. Finally I can understand how some listeners might not cotton to the sharp specificity of a concentric driver. The precision with which it draws boundaries around images seems natural to me, but it may seem mechanical to others. (Experimenting with speaker positioning is very helpful in finding an ideal balance between too much focus and too little.)

A lot is expected from TAD loudspeakers. And having now reviewed three of its compacts I can put them in perspective with one another. The CR1 leads this pack, as its \$42k price would imply. Its uncompromising quality and performance remain a high-water mark for a stand-mounted loudspeaker. It has earned its flagship title. The CE1, in spite of its high-octane performance, is still the odd duck of this trio: It's a little awkward visually, cooler in character, and frankly a little pricey in its segment. The ME1, however, gets it just right, emulating much of what is so musically satisfying about the CR1, and doing so at a cost that is more than justified in a highly competitive category.

So satisfying is the ME1 that, in the right room at the right levels, you'll easily hear what all the hubbub over the CR1 was about. It can utterly destroy preconceptions about what a small speaker can do. Pound for pound, the ME1 is truly one of the greatest little loudspeakers to hit the audiophile market in years. **tas**



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Equipment Report

Bowers & Wilkins 705 S2

Magical Music Tour

Allan Moulton

Whether it's a fantastic \$3 ballpoint pen, or the multibillion-dollar Shanghai Tower, great design is not tied to a price tag. It might surprise many readers of *The Absolute Sound* to know that what gets the juices of many audio industry veterans flowing is not simply the "reference" gear priced beyond the reach of most everyone, but instead the equipment at all price points that demonstrates its designer's superior talents.

Exceptionally designed *things* are frequently easier to recognize than to quantify as such. We can describe them as objects. We can describe how they function. We can describe how they make us feel in use. There are magazines dedicated to each. Great design, however, is reserved for objects that transcend mere attributes. Great designs are ones where all the elements disappear into a functionality that is artistic and inspirational.

With a well-designed audio component, you listen through it, not to it. The *thing* disappears into its purpose.

The Reviewed

Bowers & Wilkins (as of a few years back, no longer officially B&W, so I'll try to avoid that) is

a diversified audio company. It makes the 705 S2 speakers here in front of me, the wonderful audio system in my brother's Volvo XC90 (love that interior!), Zeppelins for your kitchen, headphones for your head, speakers for your boat; it even brings new music to your home through its Society of Sound. To borrow the credit card slogan, it's everywhere you want to be.

Strangely however, even though I haven't known an audio landscape without Bowers & Wilkins (it was founded in 1966, me in 1967), I have never owned nor sold new any of its speakers in my retail days. For someone who has been in the industry for 20-odd years (and they have been odd), I come to an evaluation of one of its products about as fresh as one can. My overall impression is that it is a company doing fundamental research with the goal of building a better mousetrap.

The mousetrap in front of me for this review is a member of the shiny, brand-new 700 Series—the 705 S2. Alan Taffel did a very nice overview of the launch of this series in *TAS* Issue 277, reporting on his visit to its facility near Boston. I would encourage you to revisit his report for further information and his impressions of the 705 S2 and other 700 Series models. As



I live within about 45 minutes of these North American headquarters, I also recently made the trek, and some of my findings will be sprinkled in here.

Effectively, the 700 Series 2 loudspeakers take the outgoing and long-lasting CM Series

cabinets and change everything else. Since the introduction of the iconic 801 in 1979, the 800 Series has continuously held the position of Bowers & Wilkins' top reference speaker line (with the exception of a few one-offs like the Nautilus). As you might imagine, the next-

Equipment Report **Bowers & Wilkins 705 S2**

in-line 700 Series 2 incorporates many of the technologies developed for the current 800 D3 (more on that in the Technically Speaking sidebars). There are three floorstanding, three bookshelf/monitor, and two center-channel speakers in the 700 Series 2 lineup, ranging in price from \$1200/pair for the smallest monitors to \$4400/pair for the largest floorstanders. The 705 S2 under review is the top bookshelf/monitor—the one with the cherry (I mean tweeter) on top. It is priced at \$2500/pair, with companion FS-700 S2 stands (sand-filled by the vendor) at \$500/pair. My 705 S2s were white speakers on silver stands. Clean. Modern. Purposeful. I enjoyed them as objects. Packing and included materials reminded me that this is a company that has been doing it for some time. You know...professional.

Now on to some music already.

Initial Impressions: Speed Dating

Though I've never actually speed dated, I do like to begin every component or system evaluation by *audio speed dating*. This means randomly surfing through digital files on my hard drive to get an initial, instinctual answer to important questions such as "Do I basically like you?" or "Are you going to bite me (in a bad way...)" or "What are your likes and dislikes?" Of course, in audio speed dating the questions are musical ones, and the answers will set the atmosphere for potential, future questions and maybe even future "dates."

One of the first musical questions for the 705s was Jacqueline du Pré and Daniel Barenboim's 1968 recording of Brahms' Two Sonatas for Cello and Piano. This recording of the then recently married couple was captured in Stu-

dio #1 at Abbey Road, a studio most famous for and through The Beatles, and which also has had a longstanding (since the late 80s) relationship with Bowers & Wilkins. This is a fantastic performance, and I am ashamed to admit that I smeared its reputation (or more correctly, mine) by writing the words "say cello to my little friends" in my notebook while listening. The point being that I was comfortable. This was not the presentation of a small, thin-sounding bookshelf speaker pretending to be someone's idea of an analytic studio monitor. Detail, yes. But also a texture and dimension that come from a more fully realized harmonic structure. From the first notes, it was obvious that this was a speaker built for music, not sounds.

Most loudspeakers shift. They rock back and forth like a ship on a sonic ocean. Perhaps they get compressed and aggressive during dynamic passages, or perhaps their sound can be characterized differently for different frequency ranges. The 705 S2s were not shifting. Throwing in some quick hits of live J.J. Cale, Tony Rice, or Yo-Yo Ma demonstrated an ability to throw an absolutely locked-in stage. And these super-stable images were not cutouts. The warm atmospherics on J.J. Cale's "Old Man," recorded at Carnegie Hall in 1996, were remarkably free and palpable. The 705s were gaining my trust because they were consistent in their answers to these early musical questions. Top to bottom. One fabric. No Dr. Jekyll and Mr. Hyde.

Making a last stop on the track "Holdin' on to Yesterday" from the Alan Parsons engineered, self-titled 1975 album by Ambrosia was a surprise. This is 70s rock production at its best with soaring vocals and fantastic, sweeping organ to

open the song up. It was so good—and I was having so much fun—that I had to listen to more tracks from the album. I couldn't help it. When a system is working, there is a feeling that you just want to soak as much of it up as you can. You can't look/listen away. While my early comfort with the 705 S2s was founded in their textured, consistent disposition, here they showed an ability to loosen up and let it flow. Listening to Ambrosia was the final speed-dating question. We agreed to see each other again...

Inside Voices

I'll avoid being mean spirited, but I think it's fair to point out that I'm not predisposed to liking the midrange of every Bowers & Wilkins I've heard. Some examples of the yellow Kevlar midrange'd Matrix Series of yore were not my cup of tea. I'll admit to being initially worried. Turns out the worry was unnecessary.

"Unshakeable" was the term that kept coming up. No matter the artists or their vocal stylings, my focus was fully given over to *their* choices, and not those of the speakers. Listening to some of my favorite vocalists on good old LP through the Acoustic Signature Wow XL/TA-700/MM3 (Acoustic Signature-modified Ortofon 2M Black)/Sutherland KC Vibe phonostage was instructive. Reprise's awesome 2009 reissue of Joni Mitchell's 1971 album *Blue* actually gave me the chills on her frequently covered "A Case of You" (for another cool version of this, check out Prince's lesser known album *One Nite Alone*). Joni Mitchell is a cinch to screw up. Her voice can easily get into the "Dylan's harmonica" or "fingers on a chalkboard" zone, even for a Canadian like me who soaks her up. But through

SPECS & PRICING

Type: Two-way, stand-mounted loudspeaker

Driver complement: 6.5" woofer/midrange, 1" dome tweeter

Loading: Rear-firing port

Frequency response: 50Hz–28kHz +/-3dB (-6dB at 45Hz and 33kHz)

Sensitivity: 88dB

Impedance: 8 ohms (3.7 ohms minimum)

Dimensions: 7.8" x 16" x 11.9"

Weight: 20.5 lbs. each

Price: \$2500/pr.

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the 705s she sounded "pure." I was waiting for the loudspeaker to announce itself, and it never did. And, between you and me, I'd rather listen to Joni Mitchell than "a loudspeaker."

The best way to say it is that the artists' voices I've listened to thousands of times sounded like the artists' voices I've listened to thousands of times. Vinyl rips of Willie Nelson. Elly Ameling singing Schubert Lieder. Aaron Neville singing Bill Withers' "Ain't No Sunshine." Johnny Hartman. Stan Rogers. Bruno Mars. Skaggs and Rice. Quirky or silky. Didn't matter. I believe the correct term is "natural."

Equipment Report Bowers & Wilkins 705 S2

High Octane

And the 705 S2s don't sound small. In my approximately 19' x 14' x 8' room (which is open to larger rooms), I was getting good measured extension into the high 30Hz region. More importantly, the only real time that I actively felt like a larger speaker was needed was when listening to Ray Barretto's high-energy Latin album *Acid* [Fania]. But for this music, only something like a giant PA stack will do.

On almost every other "big" piece of music thrown at them, the 705s didn't "tap out" (to use the now common mixed martial arts phrase). This dynamic composure was another brick in the wall of trust. It's one area where small loudspeakers are expected to let you down and show themselves. The 705s did not.

On both the 45rpm double LP of the Academy Award and Grammy winning soundtrack for the movie *Dances with Wolves* [ORG], and the impressive 1959 London sessions of Solti conducting Wagner's *Das Rheingold* [Decca], the little Bowers & Wilkins did not shy away. The power and scale of the percussion on "Pawnee Attack" from the *Dances with Wolves* score would have had anyone shaking his head, and the stage on *Das Rheingold* was as large and stable as I've heard it in my home.

The only cries for uncle were heard when I played the very well-produced 2006 album *10,000 Days* from Maynard James Keenan's progressive hard rock band Tool. Playing the consecutive tracks "10,000 Days (Wings, Pt.2)" and then "The Pot," the poor 705s did get overwhelmed in the opening minutes. Bass guitar, giant and deep bass drum, all in the middle of a phase-aided (along the lines of Q Sound

surround-sound thunderstorm were all simultaneously too much for a two-way monitor—go figure. I got some compression and confusion, and the bottom octaves were, of course, missing. However, following the thunderstorm beginning and into "The Pot," the 705s came back to life, and in a big way. I was banging my head, and the air guitar was the kind where you rock back and forth with your arms hanging as low as you can get them. Awesome stuff! I could have been a rock star.

I'm certain that the larger 700 S2 loudspeakers would have been more extended and dynamically capable, but even in my not-so-small acoustical space I could enjoy the 705s with larger works at reasonably loud levels. Think "outperforms expectations" on the small-big scale and you'll be on the right track, not "rewrites laws of physics."

Guilty Pleasure

Simply put, Guilty Pleasure music is music you love, but would be embarrassed to admit to others that you did. All of us have this music in our "home alone" playlist. I'll start my confession with one guilty pleasure to illustrate a key attribute of the 705s (and many religions)—forgiveness.

My guilty pleasure confession for today is Styx. There are a lot of people in our industry who hate Styx, and I get that the theatric nature of prog-rock can feel as though something (or someone) has been neutered. But, I like it. For this review, I maxed out the guilty part of pleasure and put on a vinyl rip of "Come Sail Away" from the Mobile Fidelity reissue of Styx's 1977 album *The Grand Illusion*. I'm only going to relay that I was singing along and noticed that I was making hand ges-

tures which could only be described as equally "theatric" (you know, palms out and hands slightly away from the body). Hey, I just report the facts and, remember, guilty pleasure music listening is embarrassing by definition. You all do it too.

The point is that the 705s won't stomp on your fun when you want to have it, provided that the recording isn't a complete train wreck. I did try some awful recordings of Billy Squier (OK, another guilty pleasure leaked out), and those, unfortunately, were basically unlistenable. Throw some badly pressed, thin and compressed vinyl at them, and that's what you get.

Although reasonably forgiving, the 705s can't do the "silk purse out of a sow's ear" thing. In my opinion, they strike the correct balance between transparency and forgiveness. Your worst recordings won't be salvaged, and your average recordings won't be destroyed.

The Absolute Sound

Real instruments in real space. In audio too, space really is the ultimate frontier. It's the difference-maker between feeling like the musicians are in your room, or feeling that you're transported beyond your room to some other time and place. The system becomes a kind of portal into another acoustical space—your room is gone. This rarely happens because everything must be right, from the recording to the equipment and how it's set up, and finally to how your room is arranged. Really good systems can pull off the disappearing act and have the musicians in your room, but only a very few systems I've ever heard can both disappear *and* transport you to another time and place.

I bring this element of time and space travel forward here, because when it comes to some of the classical and jazz recordings that afford us this possibility, it's important to realize that judging against this standard is unforgiving (and potentially unfair). On the other hand, I hope that it provides some useful context. Remember that the 705 S2 is a \$2500/pair loudspeaker. What does one give up when judged on an absolute scale?

I'll cut to the chase and confirm that, although the 705 S2 is wonderful, there is still justification for some excellent loudspeakers that have 4, 5, or even 6 zeros in their prices. That justification is *resolution*. The 705s are balanced, uncolored, remarkably precise and self-effacing, but if your reference for a small monitor is something like a Magico Q1, you will be aware that through the 705 there are technological barriers at play. That's a long-winded (sorry—bad habit of mine) way of saying that you can only see so far into the space of a great recording. There were times when I felt like I was on the border between the original, recorded acoustic and my own (which is a remarkable accomplishment for a \$2500/pair loudspeaker), but I was never allowed the privilege of fully busting through.

Philips' 1987 LP of Polish composer Witold Lutoslawski conducting his own Cello Concerto (and yes, I know it's one of Philips' "Digital Classics") is one of the very few recordings that reminds me of a live mic feed. The music is certainly modern (variable time signatures and improvised mass soloists), but you really can get the feeling of peering into the open of the performers' stage. The 705s did what they always do and kept me engaged. They gave me most of what

Equipment Report Bowers & Wilkins 705 S2

that recording has to offer, and they didn't lose their composure when the "authorities" (brass section) came blazing in. What they couldn't do (and what very few speakers at any price can do) was fully transport me into the tension on that stage. But this is challenging stuff, and it's only when stretched to the outer limits of expectations without price barriers that you run up against a resolution barrier. There is no Diamond tweeter, or Matrix bracing in the cabinet, or Neodymium motor systems, as in the 800 Series. Instead of feeling the lightness and resolution of the empty space between instruments, you get with the 705 S2 a kind of warm connective tissue. While this can serve to enhance listening to music like Ambrosia, under the microscope of real instruments in real space it keeps the 705s (understandably) at least one step away from that overused term "reference."

That we must reach so far to get to the limits of these monitors is a huge credit to the design choices of Bowers & Wilkins' engineering team. This is a product about balance, coherence, and self-effacement. It's not some two-way monitor with a ribbon tweeter that all everyone talks about is its treble extension, sweetness, or detail retrieval. With the 705s, there is no obvious tilting of the tonal landscape to project a hyped or fake sense of detail.

A reminder as well that the review system was using a circa \$900 moving-magnet cartridge (Acoustic Signature MM3) digging info out for a \$2500 pair of loudspeakers. The "converters" in the system (first mechanical to electrical and then electrical to mechanical) sell for under \$3500 total. Not once in listening to the Boston Symphony Orchestra's performance of Berlioz's

Romeo and Juliet [RCA] did I think, "Boy, this is a great 'budget' system." The truth is, I was much too busy enjoying the performance. Great designs disappear into their purpose.

Essential

Essential music is music that must sound good on any system you listen to because it's important in one way or another. It may have little to do with recording quality, but when listening to essential music the system needs to get the hell out of the way. If it doesn't, you need to move quickly on. After all, if a system isn't engaging with the music you care most about, does anything else really matter?

One of these essential pieces of music for me is John Prine singing Steve Goodman's "My Old Man" from *Tribute to Steve Goodman* [Red Pajamas Records]. This is off a two-LP set recorded live in Chicago's Arie Crown Theater in 1985. Steve Goodman is best known as the writer of "City of New Orleans" (made famous by Arlo Guthrie), and some big names show up for a very heartfelt tribute. The aforementioned Arlo Guthrie, John Prine, Richie Havens, Nitty Gritty Dirt Band, Bonnie Raitt, Brian Bromberg, and many others are there in performances that are occasionally lacking in polish (doesn't sound like there was a great deal of rehearsal) but are always in the best spirit of remembrance.

John Prine's introduction, and then performance of "My Old Man" gets me most every time. I'm not completely sure why. This song is about the loss of Steve Goodman's father, but John Prine also delivers the song with the double power of the recent loss of his friend and

frequent road companion, Steve Goodman. My father is living, and I'm now the father of two young sons. The raw honesty of John Prine's delivery that carries this double sense of loss is, for me, overwhelming. The lyrics are simple, almost childlike. But they cut to the core of loss and grieving. Through the 705 S2s? Well, they weren't fake tears welling up.

How would one analyze this? Recalling the opening of this review, there are technical attributes of the *thing*. There are technical attributes of the sound the *thing* produces. We make efforts to elucidate aspects of both. And the experience of the *thing* in use itself? As a listener, which do we encounter first and most importantly? All I know is that some components possess the capability to allow the essential to shine through, and many do not. I'd suggest you own the ones that do.

Conclusion (Or, "Oh yeah? That's what you think!")

I'm sure everyone in the hobby has at one time asked himself and others what kind of system he'd own if he won the lottery or had unlimited funds. I'm well past the point of believing that any one system can do it all, and so for me, I'd have to have at least three systems (money's no object remember). One would probably be some kind of planar, perhaps a Quad-based system. Another would be a big set of horns with lots of glowing bottles to drive them. The "anchor" system would be built around a big set of dynamic speakers. The planar and horn systems offer an almost specialized set of strengths and perspectives, while the dynamic speakers serve as the "all-rounders."

The Bowers & Wilkins 705 S2s are all-rounders. If they had a medical degree they'd be a great family doctor, not a gastroenterologist or plastic surgeon. The music mentioned in this review is a sampling of the selections I listened to through them, and I always looked forward to firing the system up and following that day's musical muse. The 705s never slapped my hands and said, "No, we won't hang with you if you want to play that."

The 705 S2 is a product that few companies would have the ability and resources to match. It's also a wonderful case where a company's claims for technical advances line up with listening impressions. Resonances are well controlled, and the speakers present a natural, extremely precise, and engaging soundfield. The sound is vividly present without edge or annoyance. Overall, the 705 S2s are both coherent and self-effacing.

I can't speak for what each reader looks/listens for when he chooses a system or a new component. My needs are simple: I want to enjoy music in the comfort of my home. Well, during this review I tapped and stomped my feet. I air-guitared like a real rock star (better, if I'm honest). I had tears well up considering fatherhood, friendship, and loss. I closed my eyes to bathe in the best of the BSO. I headbanged. I had fun. Those are facts (not fake news).

I'd say that these are the responses to a great *design*. If your design enables me to do all that, then you can be sure I'll make a strong recommendation. Which I do. **tas**

Equipment Report

JWM Acoustics Alyson AML II

Designed to Please Both Eye and Ear

Andrew Quint

Photography by Dennis Weeks

“**T**hese are the first speakers you’ve brought home I’d allow in our living room.” This was a highly significant pronouncement, something I’d not heard before over 37 years of marital bliss. My wife is a painter with, shall we say, a strong sense of what’s attractive and what isn’t. Her eyes narrow and her jaw sets when crates bearing loudspeakers for review arrive and, generally, her mood does not improve when the latest specimens are unboxed. So, the positive reception here of the JWM Acoustics Alyson AML II was a singular development. Of course, aesthetic appeal alone won’t cut it with this magazine and its readers. I’d experienced the Alysons at two RMAFs—an earlier version and this new iteration—and was impressed by what I heard as well as by what I saw. A full consideration was definitely warranted.

Joshua Weston Miles was born and raised in San Antonio, Texas, but fell hard for Hawaii when he visited there nearly 30 years ago as a member of a mountain biking team. In 1998 he relocated to the Islands, where he continued his training and work as an artist—Miles is an accomplished sculptor, ceramicist, and painter—and indulged his passion for surfing and

the culture that surrounds it. In person, he still exudes the relaxed confidence that characterizes those who feel compelled to challenge the surging ocean. Miles was designing horn speakers for local bands and clubs by the time he got to college and, like many in the high-end loudspeaker world, got his start commercially building pro-audio and studio monitors before gravitating to the home market. “The goal of creating the clearest window possible for the recording engineer is the pinnacle for me,” he told me. When JWM Acoustics was started in 2007, it was only natural that Miles’ artistic ability would inform the look of his products. “My main background is in the visual arts and industrial design. Sculpture and the use of any plastic material is a true love of mine.” Locally obtainable wood species are used to fabricate JWM products—loudspeakers, turntables, and accessories—the “standard” kinds being monkeypod, sapele, mango, purple heart, maple, and wenge. Other types of wood have been used as well, when requested and when available. The visual impact of the “exotic” hardwoods is stunning, but Miles is as attentive to the acoustic behavior of his enclosures as any loudspeaker designer. (See sidebar.)

Family is important to Joshua Miles. Accordingly, a number of JWM Acoustics products honor his family members: For instances, the Alyson is named for one of his sisters, and the Karen line of turntables for another sister, and the larger Jane JKM loudspeaker pays homage to his mother.

Each pair of Alyson AML IIs is composed of two speakers and two matching stands. From the company’s operational headquarters in Austin, TX (where Miles returned in 2015), they are shipped in four wooden crates—Miles had some instances of damage when cardboard boxes were used—with an average FedEx Ground charge of \$300. Environmentally conscious as he is, Miles encourages purchasers to return the crates to Austin for re-use and will share the cost of doing so. The stand, which is approximately 24" tall, is a simple but elegant-looking and structurally sound design. Two sturdy vertical elements that curve gently from front to back are attached above and below to thick slabs of the chosen hardwood. The base can be fitted with either spikes or rubber feet, both of which are supplied. The top hardwood surface, which exactly matches the shape of the loudspeaker’s bottom aspect, is fitted



Equipment Report JWM Acoustics Alyson AML II



with four metal discs that accept small spikes from the speakers. The speaker is heavy enough that it will stay put on the stand in day-to-day use though if you inadvertently bump into the Alyson while walking past, there is the potential to displace the spikes from the discs—or worse. Owners of large energetic pets or who have curious children of a certain age (and/or clumsy tendencies) should be aware of this.

The loudspeaker itself is 22" in height and 16 3/8" deep; the front hardwood baffle measures 8 3/4" across with the bowed sides of the cabinet tapering to a rear hardwood panel that's 3 1/2" wide. The top, bottom, and sides of the enclosure are manufactured from a wood/epoxy laminate that's painted either white or black with either a satin or gloss finish, according to the purchaser's wishes. The Alyson is a two-way, three-driver design employing a 1" ring-radiator tweeter and two 6" woofers. The ported box has two internal chambers: a front compartment acts as a bandpass for the rear wave of the two woofers and a posterior chamber serves as a "compression unit for increasing the output feeding the port." Miles emphasizes that while technically the cabinet is not a transmission-line design, there are similarities to that approach. The port is tuned to "somewhere in the 38Hz zone." Very little internal bracing is required, the designer told me. There are some judiciously applied damping sheets and acoustic foam inside but Miles notes: "Rather than wasting all that energy, I utilize the movement of air and internal reflections as much as possible. I always prefer this approach instead of trying to choke them out and tuning with stuffing and other unnatural materials."

The front baffle features meticulously beveled openings that function as waveguides for the three drivers. An important design feature of the latest Alyson is the presence of a sub-baffle to which the drivers are attached, fabricated from the same constrained-layer damping material that is utilized in the cabinet. (See sidebar.) On the hardwood rear panel is a 2 1/2" port near the top and, near the bottom, a 3 1/2" x 8 1/4" inset with two sets of nickel/rhodium five-way binding posts.

The drivers in the Alyson AML II are sourced from ScanSpeak's Illuminator line. The woofers are sandwich paper cones; the tweeter sports a distinctive silver Hershey-Kiss-like phase plug. Miles modifies the drivers himself and favors the ScanSpeak models because he can easily break them down into their constituent parts and make sonically relevant alterations. Understandably, he doesn't want to get too specific about what it is that he does but allows that it involves "magnet gaps and damping materials." The crossover is a minimalist design, a second-order slope with the handoff centered at around 2500Hz. The basic design employs a silver circuit board but Miles will use direct wiring in the crossover for an extra charge. The procedure for getting the crossover to sound just so is the sort of thing that differentiates perfectionist audio from the mainstream consumer electronics industry. "I'm not ready to share the method I use for timing and staging at this point, but I will say that the computer is used for only about 40% of the tuning," Miles explains. "The rest is by ear—many late nights cuddled up to a stack of wax breadboards on the living room floor. A good Malbec usually helps."

The three drivers are arranged in a quasi-D'Appolito configuration, with off-center positioning of the ring radiator. Generally, listeners deploy the speakers with the tweeter to the inside but Miles encourages experimentation with the other possibility. The recessing of the drivers is visually stunning but the design is largely about acoustics. "The interaction between the ring radiator, phase plug, and waveguide does an interesting thing," Miles says. "Rather than the plug aiding in focusing the radiation pattern, as in a flush-mounted design, I intentionally break up that focus into a unique doughnut shape into the room. When the listener sits in alignment with this pattern, the perceived stage is dropped further back, allowing for better depth of field. This sounds counterintuitive but there's no voodoo here. When a void is created in the dispersion pattern, just in front of the baffle, your ears will be less likely to focus on the radiating surface and will push the stage back. Another advantage of this doughnut pattern and void is the infinite ability to tune that void to either embellish or pull back certain frequencies that are important for natural dynamics. One last advantage is the pleasant off-axis experience."

The Alyson AML IIs, the review samples sporting a gorgeous mango hardwood, ended up positioned close to where most speakers have performed best in my 15' x 15' space (a hallway off to one side prevents any issues with standing waves related to that symmetry; ceiling height varies from 10' to 12'). They were about 8' apart, center-to-center, with 2' between the back panel and the front wall of the listening room. It was 9' from the front baffle to the sweet

Equipment Report JWM Acoustics Alyson AML II

spot. The Alysons were canted in by about 15 degrees; I could see the inner side of the enclosure from the listening position. With a few detours noted below, most of my listening was done with David Berning Quadrature Z mono-block amplifiers, a tube OTL design rated at 220 watts into 8 ohms and 270 into 4 ohms (the Alysons are a nominal 6-ohm load). Only digital sources were utilized. An Oppo 103, used as a transport, and a Baetis Reference 2 music computer sent data to a T+A DAC 8 DSD that directly drove the power amps. Digital cables included a Revelation Audio Labs Prophecy Cryosilver AES/EBU (Baetis to T+A) or an Apogee WydeEYE WERR SPDIF (Oppo to T+A). Analog interconnects and speaker cables were Generation 5 Ultra.

Listening to all kinds of music via the JWM Alyson AML IIs on a daily basis for more than a month confirmed my impression that this speaker is an exceptionally balanced design without significant deficiencies in any of the usual audiophile metrics. However, before touching on some of the parameters on what my colleague Anthony H. Cordesman has called “the sonic checklist,” I want to note the exceptional capabilities of this product when it comes to one vitally important musical content category: The Alysons are as faithful to the human voice as any speaker I’ve ever heard. Cones, horns, electrostatics, ribbons—I’ve not heard anything better. This is a loudspeaker you’d want to use for a contest among opera buffs to blindly identify legendary singers from the 1920s or 30s, or to parse the artistry of the great jazz chanteuses of the 1950s and 60s. This doesn’t always mean that voices sound “real” because with pop and rock music, singers often sound the way their

The Alysons did an excellent job of delineating the sonic perspective of a given recording.

producers (or even the artist themselves) want them to sound, for better or worse. But through the Alyson AML IIs, Johnny Cash, Bob Dylan, Joni Mitchell, Dr. John, and Emmylou Harris sound so *recognizable, so right*, that the tonal truthfulness of the speaker is obvious. With the best vocal recordings—say, Diana Krall singing “I Don’t Know Enough About You” from her *Love Scenes* album or the late Lorraine Hunt Lieberson performing “Ombra mai fù” from Handel’s *Serse*—the sense of being present at the recording session, of breathing the same air as the vocalist, is very powerful.

This kind of fealty to tonal character extends to instrumental sonorities as well. The Alysons passed with flying colors the “Old Italian Violin Test” that I subject every loudspeaker I review to, reliably discriminating Stradivari from Guarneri del Gesù instruments on a recording featuring a single violinist playing the same concerto excerpt on 15 examples from each of the two famous violin makers’ workshops. On several recordings of Berlioz’s *Symphonie fantastique*, the cornet *obbligato* in the second movement “Un bal”—not always that easy to hear—was clearly played on the intended instrument rather than a trumpet. And on the Northstar Recordings SACD collection *The Spirit of Turtle*, on the ballad “Teardrops for Jimmy”, Maarten Ornstein plays a reed instrument that *could* be a sax, *could* be a B-flat clarinet play-

ing in its middle register, but is actually a bass clarinet straining to play the plaintive melody in its highest reaches. This is apparent from the get-go with the Alysons (and confirmed halfway through the selection when Ornstein finally drops to some of the instrument’s lowest notes).

In imaging and soundstage presentation, my initial impression was that these aspects of reproduction were done well, if not unusually so. At the beginning of the audition period, I had the Alyson’s tweeters aimed directly at my ears. When the speakers were splayed outward by a few degrees, I appreciated venue character and imaging to the degree I’m accustomed to hearing with other top loudspeakers. The Alysons did an excellent job of delineating the sonic perspective of a given recording—with chamber music, both the approach of putting the musicians in your room as well as engineering that brings one to the performance venue. Related is the way in which the speakers clarify detail. Listening to the RCO Live recording of the Shostakovich Symphony No. 15, a work (and recording) that’s extremely familiar to me, I heard instrumental doublings I’d not noticed previously.

Which brings us to the issues of dynamics, scale, and deep bass. It should not be a surprise that the Alysons will disappoint if your measure of success is the ability to reproduce the size and volume of a full orchestra as experienced from Row D. But it doesn’t mean that—with the right electronics and source material—the Alysons can’t approach the level of *emotional* experience achieved with larger speakers, because they do. A good example from the “power music” corner of the symphonic repertoire is the beloved Saint-Saëns “Organ” Symphony,

SPECS & PRICING

Type: Two-way bass-reflex/transmission-line hybrid
Driver complement: 1" ring-radiator tweeter, two 6" sandwich paper cone woofers
Frequency response: 35Hz–25kHz
Impedance: 6 ohms
Sensitivity: 89dB
Recommended amplifier requirements: 40–400 watts
Dimensions: 8 3/4" x 22" x 16 3/8"; stand, 14" x 24" x 20 5/8"
Weight: 75 lbs. (speaker plus stand)
Price: \$8250–\$8750/pr., depending on wood and finish

JWM ACOUSTICS
 P.O. Box 19750
 Austin, TX 78760
 (808) 349-6661
 jwmacoustics.com

specifically the recording on the Ondine label by Christoph Eschenbach and the Philadelphia Orchestra with Olivier Latry as soloist. So long as you don’t pass a certain point in setting the level, the performance remains as thrilling as ever—and when the audience erupts into ecstatic applause as the last chord fades, I felt like I was there. (Actually, I *was*, having attended one of the performances that the recording derives from, and the Alysons brought it all back.)

Well-engineered rock and jazz recordings also fared well when played back at enthusias-

Equipment Report **JMW Acoustics Alyson AML II**

tic levels. As especially enjoyable examples, I'd single out Steely Dan's "Two Against Nature" from the album of the same name—a dizzying perpetual-motion machine of interlocking instrumental parts and backup vocals—and "Backrow Politics" off the Big Phat Band's *Act Your Age* CD, which maintained coherency even when the four featured trumpet players let loose with simultaneous high-voltage improvisations.

Three potential "interventions" should be mentioned for those who favor music that's loud and low. First, the Alysons love bi-wiring. I tried this out with a pair of AntiCable bi-wires and found that detail with especially dynamic material improved. Secondly, solid-state amplification (I tried my Pass Labs XA 60.8 monoblocks and an older Parasound stereo amp, the HCA 2200II) might provide more controlled and tuneful bass than that heard with even very fine, powerful tube amplification. Third is the use of a subwoofer. This, of course, can be a tricky business with in-between-sized loudspeakers like the Alysons, and manufacturers of such products can be kept up at night worrying about how a reviewer or customer is going to screw up the sound of the their carefully voiced full-range transducer. But I couldn't resist. I have an excellent sub, the Magico SSub that I use with my Magico S3 Mk IIs. Sending the digital data stream to an Anthem D2v processor for bass management and D-to-A conversion, I ran the Alysons full range and the subwoofer up to 40Hz. The results were mixed. The Saint-Saëns gained in visceral impact when loud organ-pedal notes energized the room, and listening to some LCD Soundsystem tracks

("Emotional Haircut," "Dance Yrself Clean")... well, gut-wrenching bass is kind of the point. But with older rock recordings, the benefits, if any, were less clear-cut. Tom Petty passed away during my time with the Alysons, and I listened to many of his timeless songs. With the subwoofer on, "Running Down a Dream" lost some of its buoyant optimism; the life-affirming sense of driving fast down a highway with the top down after the rain has finally stopped. Clearly, a subwoofer must be employed judiciously with the Alyson AML II.

The JMW Alyson AML II is the best loudspeaker costing less than \$10,000 per pair I've heard in my listening room. That would have been my assessment, I think, even if I hadn't seen the things—the beauty here is very much more than skin deep. Joshua Miles may be a chill guy with shoulder-length hair who once made his own surfboards and still ends emails with "Aloha," but the current Alyson is a very traditional high-end product in that an exceptional sonic result has been achieved thanks to the diligent, yet imaginative application of tried-and-true methodologies. The tweeter isn't sprinkled with pixie dust and the woofers don't incorporate a material previously known only to NASA. There are familiar aspects of the enclosure's construction; the crossover has a very simple topology. But there's a harmony achieved in the acoustic design of these speakers that's a brilliant reflection of the artistic sensibility that informs their appearance. On a bright December afternoon, the Alysons left for their return trip to Austin. But they could have stayed, and in the living room. My wife said so.

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Equipment Report JWM Acoustics Alyson AML II

Fine Woodworking in the Service of Good Sound: Joshua Miles on the use of “exotic” hardwoods in JWM Acoustics loudspeakers

Just to confirm: The four visible pieces of wood in the Alysons are solid pieces of mango, not veneers?

I use solid hardwoods in my designs. And I use no CNC in any part of the construction. This includes the bevels on the waveguides and sub-baffle components. Yes, I’m nuts. I want to maintain “handmade” as long as I can. Veneers can be nice, and I have used them on cabinet bodies, primarily for custom installations. I always felt they were not permanent, though. Not real. Solid woods and hand tools are what I was brought up using, so for now I’ll stick with them.

Do you fabricate most of the speakers you sell from the six “standard” woods listed on the website? How often is it something else?

About 50% of my machines are ordered in monkey pod, 25% mango, 20% blood bubinga, and 5% the others. Only once in a while will I have a request for anything outside of the woods listed on the website. Now that I am in a new environment [Austin, TX] I have a much larger selection of locally grown materials such as pecan and spalted cyprus. I spend a great deal of time picking the woods I use, so I have never had an issue with the sonics. It is certainly true that some woods can make a difference, but in my application it is very consistent.

Where does the wood come from? You talk about the material being obtained in an environmentally responsible fashion. What does

that mean? Do you age or otherwise prepare the woods before incorporating them into a JWM Acoustics product?

For the last fifteen years I have primarily been sourcing my woods from the Pacific islands. Exotics are largely sourced from Africa, South America, and Asia. Now that I am in Texas, I am discovering many more domestics than I had ever imagined. One big rule though: All the woods are from naturally downed trees only—no slabs are sourced from harvested forests. It is much more difficult to find the materials this way, but it’s important to me. When sourcing materials in this way, often slabs need to be dried for a very long time. The mango on your speakers came into my shop five years ago. It came from a beautiful tree that fell in high winds near South Kona. After being air- and kiln-dried for four years, I received the slabs to finish drying for another four. Not all woods take as long, but the average is two to three years before the moisture point is low enough to begin working with them. To further offset the use of trees in my work, I volunteer in reforestation efforts. Each year at Hakalau National Forest Reserve, working with a group I plant nearly 10,000 koa tree seedlings. Perhaps in 150 years, one of these trees will be used to make a set of speakers.

I understand that the use of a sub-baffle to which the drivers are actually attached is an important difference between the new speaker and the original Alyson. What’s that

made of? Were you indeed hearing important differences between JWM speakers that were allegedly the same model but incorporated different woods—differences that have been minimized by the new design?

Yes, in the previous design, the drivers were bolted directly to the front baffle. Although the sonic effects of using different woods were minimal, there was indeed a difference, mainly caused by the density of the particular material. For instance, monkey pod is roughly 25% less dense than say, a red oak. The harder the wood, the higher the probability for ringing. Too little density could make the speaker sound slow; too dense and it starts to sound bright. With the use of accelerometers, the raw wood can be measured for its ability to hit the sonic sweet spot.

In the AML II, the addition of a sub-baffle has almost eliminated those subtle differences and made the speaker a more consistent product. I have chosen the materials for the sub-baffle to be close to that sweet spot. It’s constructed from three layers of resin-based fiber material, each with a different density than the other. I mixed, matched, and played with the materials and design until I hit that sound I love.

What material is used for the painted surfaces of the speaker? It’s not the same wood that’s used for the front and rear panels, is it?

The body of the cabinets is constructed out of laminated and alternating layers of wood and epoxy-based fiber materials. They are sprung

in the same fashion one would see in a drum shell. This provides just the right amount of rigidity and strength needed for the design. The angle and curves vary from model to model depending on what I need the air inside the chambers to do. The woods I use are alternating layers of maple, birch, and paulownia. If you are not familiar with paulownia, it is used by luthiers for the body of some stringed instruments, such as the koto. The tone of the wood is spectacular, and it just so happens it is very sustainable as a fast-growing tree. In concert with the different densities of these woods, the epoxy/fiber layers provide me with a great platform for a tuned cabinet such as the AML II. *tas*



Our Top Picks Bookshelf and Stand-mount



Wharfedale Diamond 225

\$449

First off, these simple yet attractive speakers list at just \$449—in the words of new reviewer Drew Kalbach—a price an actual human with a real job could actually afford. They aren't going to rattle anyone's bones and dig deep into that 40Hz bass region, which is fine (that's what a sub's for), yet these bookshelvers can handle low-end and midrange quite well. As for the upper registers, these Diamonds also had the ability to highlight delicate and high-end detail with suitable subtlety—and were plenty engaging with softer sound to boot. In brief, these speakers show that "entry-level" isn't a bad place to be: They make the power of beautifully reproduced music accessible to a wider audience. DK, 282



Elac Uni-Fi UB5

\$499

Sonically, if you loved the Debut B5, you're really going to love the UB5—it's the B5 gone to finishing school. There's greater specificity, steadiness, and focus to images—all trademarks of its concentric drivers. Add to that a sibilance range that is natural, sharp, and quick—like the live event. Plus there is rock-solid 50Hz midbass output similar to the B5 but more controlled, and less reliant on the port. This just might be the best five hundred bucks you'll ever spend. NG, 266



Revel Concerta2 M16

\$900

A feast for the eyes and ears in this segment. The look has been refreshed and refined with smartly contoured enclosures, high-gloss finishes, and elegant design accents. Sonically, Revel doesn't design wallflowers that shrink into the background. A sense of immersion and "widescreen" scale are two of the M16's most distinctive characteristics. A compact, budget loudspeaker that maintains classic Revel virtues. NG, 268



KEF LS50

\$1500 (wireless/active version, \$2199)

With its pink-gold Uni-Q coincident midrange/tweeter mounted in bulls-eye fashion atop the uniquely arched baffle of its beautifully crafted high-density enclosure, the LS50 is as visually arresting as it is sonically satisfying. Imaging is clean and precise. Neutrality is high, with superb midrange sonics, nice presence, potent midbass punch, and very little in the way of port coloration. May be destined to become a classic. A new active version with wireless connectivity expands the LS50's considerable appeal. NG, 231

Our Top Picks Bookshelf and Stand-mount



Totem Acoustic Sky

\$1895

Classic Totem through and through—purposeful, clean, seamless, with rigid cabinetry and beautifully finished veneers. Sky touches the ear with a warm, full-bodied musical balance. Given the right room (medium to smallish) and strong amplifier support, the Sky just clears its throat and lets loose, eliciting tuneful bass cues and resonant energy. Hats off to Totem for coaxing big-time performance while harnessing the virtues of speed and transparency from a small two-way. NG, 275



Air Tight Bonsai AL-05

\$2500

The tiny but mighty one-way Bonsai, also known as the AL-05, epitomizes what a single driver can do—in this case, a 4" hand-made paper cone devised by a former JBL engineer. The Bonsai's exemplary crossover-less design gives the speaker a full-range presence and immediacy and surprising spaciousness that all belie its petite size. Ideal for small-to-mid-sized rooms, the Bonsai's are capable of reproducing a wide range of music with astounding coherence. JM, 272



Bowers & Wilkins 705 S2

\$2500

This new compact two-way hits it out of the park in sound quality, build, technology, and value. The midrange driver is based on techniques developed for the flagship 800 series, and the new tweeter sits on top of the cabinet for lower diffraction. Among its other virtues, the 705 S2 is seamless and coherent top to bottom, and has surprising dynamic punch and the ability to play loudly for its size. It is a product that few companies would have the ability and resources to match. A great performer and an outstanding bargain. AM, 280



Totem Acoustic Signature One

\$2650/pr.

The Signature One celebrates Totem's 30th Anniversary and represents the largest series of changes to this iconic two-way compact. Craftsmanship is seamless and tasteful. And Totem sonic virtues prevail, as it imparts a familiar high-revving, high-output character that doesn't shy away from combustible dynamic swings or the demands of orchestral bass or pop rhythm tracks. Its generally neutral response is anchored by a tuneful, full-bodied midrange rich in color and texture. Treble is extended and articulate. It actually has fairly broad shoulders that impart authentic gravitas to recorded music. Totem continues to widen the performance envelope of the small speaker. NG, 282

Our Top Picks Bookshelf and Stand-mount



Starke Sound IC-H3 Halo Elite

\$6480

Starke's three-way acoustic-suspension IC-H3 is not only an excellent performer; it's also a visual delight that teases the eye with splashy candy color and metallic finishes, heavy aluminum baffles, and copper accents. Combining point-source-like delicacy and coherence and thrilling low-frequency performance and slam, the Starke carves a unique niche for stand-mounted speakers. Sonically, the Starke is, at heart, a boisterous floorstander thinly disguised as a stand-mounted compact. It summons low-frequency energy and weighty resonances effortlessly. Starke is causing a stir in a hobby that is often a little too reserved and insular. NG, 273



JWM Acoustics Alyson AML II

\$8250–\$8750/pr., depending on wood and finish

Sporting cabinets made from exotic natural woods—mango hardwood, for instance—the Alyson is a two-way, three-driver design employing a 1" ring-radiator tweeter and two 6" woofers. Listening to all kinds of music via the Alyson AML IIs on a daily basis for more than a month confirmed reviewer Andrew Quint's impression that this speaker is an exceptionally balanced design without significant deficiencies in any of the usual audiophile metrics. They are as faithful to the human voice as any speaker—cones, horns, electrostatics, ribbons—AQ has ever heard. In fact, he found the Alyson AML II to be the best speaker costing less than \$10k per pair he'd heard in his listening room. AQ, 282



Focal Sopra N° 1

\$8999

Reviewer Andy Quint wrote this about these superb two-way mini-monitors with articulating cabinets from celebrated French manufacturer Focal: "Perhaps the most telling part of the audiophile loudspeaker review process is what happens when all the critical listening has finished. In many instances, when I feel I'm ready to write, I'll pack up the speakers under consideration and fire up the reference Wilson Duette 2s. With the Sopra N° 1s, I felt compelled to hear them play music until the last possible moment." AQ, 266



Harbeth M40.2

\$14,699–\$15,699 (depending on finish)

A large three-way that requires stand-mounting, this is one of those rare speaker systems for which the term "monitor" is not in the least pretentious because it is literally accurate as a description of the speaker's function and as a statement about its own intrinsic accuracy. The 40.2 is the virtual embodiment of tonal neutrality, and with a frequency response from 38Hz–20kHz (+/-3dB, but near ruler-flat across most of that range) it possesses an authority almost nonexistent in PS' experience. By this he means there is an ease, effortlessness, and lack of strain in the reproduction that translates into a listening experience that draws all the attention to the music. This is now PS' new reference when it comes to reproducing music in all its natural power and glory. PS, 269

FLOORSTANDING <\$10K

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OUR TOP PICKS IN FLOORSTANDING <\$10K

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Equipment Report

Larsen Model 6.2

Up Against the Wall

Andrew Quint

At audio shows, anytime I've run into Michael Vamos, the president of Audio Skies and importer of Larsen loudspeakers, he seems to be in an exceptionally good mood. Maybe he's on medication. Maybe he's just been to the hotel bar. Maybe he's just constitutionally happy. Or perhaps it's because, unlike most of his fellow exhibitors, he's had a relatively easy time setting up an audio system in the notoriously challenging acoustic environment of a hotel room. Like all of the Swedish company's speakers, the Larsen 6.2 is designed to be placed against the wall the listener faces, directed straight ahead. Moreover, this means two often-vexing set-up variables have been eliminated: how far out into the room to situate the speaker, and the degree of toe-in needed. When a pair of 6.2s arrived for review this winter, I left the sofa that I listen from in its usual location and plunked the speakers down against the front wall where they looked right. In my 225-square-foot space, they were about 9' apart center-to-center and 10' from my ears. Tonal neutrality and imaging were exemplary from the get-go, and I didn't fuss at all with the

Larsens' position for the entire review period. Easy peasy.

The Larsen 6.2, \$3995 per pair, isn't going to win any beauty contests. On the other hand, they don't call attention to themselves, and the requirement that they be situated against a wall is likely to please a non-audiophile domestic partner. The 6.2's footprint is only 9 1/4" x 10 1/2" and the speaker is a mere 30" tall when placed on the foam pads that the manufacturer provides to couple the Larsen to whatever sort of surface it rests on. The enclosure is fabricated from sturdy MDF and covered with a wood veneer—options include mahogany, cherry, maple, and white or black lacquer. In the high-end loudspeaker world, hernia-inducing mass is an attribute that, rightly or not, has come to garner respect. In this context, the Larsen 6.2 is almost comically lightweight at 30 pounds. Once, when switching amplifiers, I pulled too hard on the cable connected to one speaker and the little guy fell over.

The top portion of the 6.2 and other Larsen models is an odd-looking affair. The speaker's two drivers are seated in an MDF baffle that tilts

back and angles inward toward the listening position (as seen in the photo). Those two drivers, both sourced from ScanSpeak, are a 1" low-mass textile soft-dome tweeter and a 7" carbon fiber mid/woofer cone that's coated with air-dried pulp. A semi-circle of felt surrounds both the tweeter and the empty real estate medial to the driver baffle, and on the horizontal shelf below it is fitted with triangular pieces of fabric-covered absorptive material. A grille cover of black fabric stretched over a metal frame is held in place by three pins; I left it on for listening. The backwave of the mid/woofer is conducted into the 22-liter box, which is vented to the rear. The 6.2's crossover, characterized as combination second and third order, is built with large, air-wound copper coils, polypropylene SCR capacitors, and non-magnetic connectors.

I began listening to the Larsen 6.2s with a pair of Pass Labs XA60.8 monoblocks and, as noted below, two more powerful amplifiers saw service as well. The rear panel of the Larsen sports two pairs of five-way binding posts, and I never refuse a chance to try bi-wiring. For most of my time with the Larsens, I employed



Equipment Report Larsen Model 6.2



a six-foot pair of the latest Anti-Cable bi-wires (at \$200/pair, still among the most exceptional values in speaker cable out there) but also used my usual Transparent Generation 5 Ultras, with robust Transparent jumpers replacing Larsen's standard jumper bars, one of which was missing from the well-travelled review pair of 6.2s. Source material was all digital: I played HD files with a Baetis Reference 2 media computer, either directly into my Anthem D2v pre/pro or via a T+A DAC 8 DSD, and polycarbonate discs using an Oppo BDP-93 as a transport.

For a characteristically cogent explanation of loudspeaker radiation patterns, room interactions, and the manner in which Larsen addresses these issues, I urge you to read Robert E. Greene's review of the larger Larsen 8 in Issue 251 (available for your consideration, gratis, on the TAS website). The principles that inform the design of today's Larsens were developed 50 years ago by Stig Carlsson and employed in Sonab loudspeakers; John Larsen worked closely with Carlsson for many years. In brief, unlike conventional speakers, the Larsen's unique design allows the speakers to be placed against the front wall without creating early reflection from a driver's backwave that can confuse the ear and register as distortion. Also, having the transducers facing inwards and upwards takes care of the first sidewall reflection. "The angle of the drivers ensures that the sound travels for the longest amount of time before hitting another surface," Vamos explained. "You only have late reflections left, just like in a good concert hall."

So that's the theory. How does it work in practice?

It was immediately apparent that the Larsen 6.2s reproduced music with exceptional tonal accuracy and a high level of resolution. On the first score, singers always sounded like themselves and instrumental timbres were reproduced with all their complexity intact. After a few days of concentrated listening, I got around to the "Old Italian Violin Test" (see my review of the Magico S1 Mk II in Issue 270, or online, for details) in which one artist plays the first minute of the Sibelius D minor Concerto on 30 rare instruments, 15 made by Antonio Stradivari and one of his sons, and 15 by Giuseppe Guarneri del Gesù. With most good loudspeakers, even a listener with little experience in seventeenth-century Cremonese violins will come away from the exercise with the ability to distinguish a Strad from a del Gesù—the former's brighter, more focused sonority vs. the latter's darker, earthier tone. With the Larsen speakers, I was able to distinguish *among* instruments crafted by one of the two workshops. For example, the "Oliveira" Strad, created in 1692, was heard to possess a bigger and bolder sonority than the "Auer" Strad of 1690. It was possible to parse varied hues within one musical tone color.

In terms of resolution, I should stress that we're not talking about hearing the kind of hyper-realistic musical minutiae that some speakers uncover but, rather, the subtle textural detail that one perceives in a hall, even when sitting fairly far from the performers. Via the Larsens, the ensemble string sound of the Mandelring Quartet playing Shostakovich's disconsolate and terrifying Quartet No. 8 in C minor was utterly convincing. And with "Southern Cross" from the 1982 CSN album *Daylight Again*, it was

The principles that inform the design of today's Larsens were developed 50 years ago by Stig Carlsson.

evident that David Crosby wasn't participating in the richly harmonized chorus on that selection—the inner vocal parts were handled by Art Garfunkel and Timothy B. Schmit, audibly so with the 6.2s.

Larsen's promotional materials boast of "deep and precise bass all the way down to 26Hz," a claim I took with a grain of salt. True, the low-frequency output from a single 7" woofer in a loudspeaker positioned against a room boundary should be greater than what would be expected from that same driver in an enclosure meant to be placed out in the room. However, with the Pass amps and Anti-Cable wires, acoustic bass lines with small jazz groups were muddy and uneven. Things did get better when the bi-wires were replaced by single-wire Transparent Ultra. But the improvement wasn't nearly as consequential as that seen (or heard) with two other changes.

I felt it was important to drive the 6.2s with an amplifier priced more in line with the Larsens, and so I connected them to a \$995 Parasound Halo A23. While there was some loss of tonal refinement and detail with the switch, the bass definitely improved. The Parasound puts out 200Wpc into 8 ohms as opposed to 60Wpc for the Passes. Clearly, these little speakers thrive on power; in fact, I later learned that John Larsen's reference amplifier is a Gamut Di150 LE,

Equipment Report Larsen Model 6.2

SPECS & PRICING

Type: Two-way, vented box enclosure
Driver complement: One 1" textile soft-dome tweeter, one 7" carbon fiber cone mid/woofer
Frequency response: 26Hz–20,000Hz +/- 3dB
Impedance: 8 ohms
Sensitivity: 88dB
Dimensions: 9 1/4" x 10 1/2" x 30"
Weight: 30 lbs.
Price: \$3995

AUDIO SKIES

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which is rated at 180Wpc into 8 ohms. I then did something I wasn't originally planning on doing—powering the 6.2s with my 200Wpc David Berning Quadrature Z monoblocks, an undeniably unlikely pairing as these amps cost roughly eight times the price of the speakers. The sonic result was amazing, including the bottom end. Bass and kick-drum had satisfying punch, and the organ in the Philadelphia Orchestra's recording of the Saint-Saëns Symphony No. 3 on an Ondine SACD was majestically massive. Like many well-designed loudspeakers, the Larsen 6.2s will perform well with modestly priced amplification of high quality but also have the potential to sound even better with *über*-electronics.

The other opportunity to improve bass performance came when I ran a DSP room-correction

calibration with the Anthem's ARC software. Inspection of the frequency response curves revealed some irregularities from around 30 to 400Hz—a phenomenon I've noted with most loudspeakers I've measured in this fashion. Employing the calculated room correction helped to smooth out the bass response considerably, on paper and to my ears. The lesson is this: The up-against-the-wall placement of Larsen loudspeakers offers a definite advantage in terms of bass output compared to free-standing speakers in a typical domestic environment. But that doesn't preclude room-related irregularities in bass response that may require attention with either physical acoustical treatments or electronic room correction.

For its size, the Larsen 6.2 is a definite over-achiever when it comes to bass output and dynamics that won't leave most listeners uninvolved—whether with late-Romantic symphonic repertoire or energetic pop and rock. If you're going for realistic dB levels with *Boris Godunov* or Daft Punk, you're going to be disappointed. For many, though, the 6.2s will effectively transmit the power and excitement of large-scale music of all sorts because of all the things it does so well. What we have in the Larsen 6.2 and other Larsen models is the full realization of a decades-long effort to understand the behavior of real rooms and to leverage those observations in the design of a loudspeaker that will play music with a minimum of coloration and distortion. If your loudspeaker budget is anything up to \$5k, the Larsen 6.2 deserves a very, very long listen. **tss**



Clear Reflection

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Equipment Report

Emotiva Airmotiv T1

Twofer

Neil Gader

Seeking: A lasting relationship with a loudspeaker for under a grand. Familiar? It's a recurring goal among enthusiasts pursuing performance but also looking to tap the brakes on the budget. Typically there are two choices. One appeals to the purist audiophile region of our brain that seeks the musicality and finesse of a fine-boned compact monitor. The other, shall we say, more reptilian side stumps for the stomach-churning, neck-snapping, roof-rattling indulgence that only a multiple-driver, cinema-ready floorstander can offer. We've all been there. Is there a middle ground? Something like a twofer?

Permit me to introduce the Emotiva Airmotiv T1—a tower design on the smaller side of medium, standing a little more than three feet in height. The largest in the Airmotiv Series, the T1 is a four-driver system in a bass-reflex configuration with a rear-firing port located near the foot of the back panel. The driver complement comprises a single 5.25" midrange and

dual 6" bass transducers, both with woven-fiber cones. The tweeter is not the typical one-inch soft dome but rather a 32mm folded ribbon that Emotiva-watchers will recognize from the brand's active Stealth line of studio monitors. Rarely encountered at this price point, lightweight ribbons offer sonic advantages over their dome brethren in distortion and transient response.

The T1 enclosure is all MDF, well braced, and topped off by a heavy 25mm front panel, which firmly anchors the drivers. The T1's profile is further buttressed by a faceted baffle designed to minimize diffraction in the mid and upper octaves. Utilitarian, textured vinyl replaces traditional gloss coats on the side and back panels, but the front is nicely finished in multiple applications of satin-black lacquer. The removable grilles are magnetically attached for a clean look.

Sonically, the Emotiva T1 has *attitude*—a big, brawny sound that energizes listening spaces



Equipment Report Emotiva Airmotiv T1

with engaging midbass output and potent dynamic thrust. Its warmer somewhat darker overall balance makes it a loudspeaker that paints the emotion of a performance in broader brush strokes, which is what often the case with speakers that try to produce the full frequency spectrum. This would be in contrast with many smaller two-way monitors that trade low-frequency extension and bass dynamics for higher resolution of mid- and treble-range sonic minutiae.

Musically, the T1 just brings it. As a result, orchestral performances take on new urgency and gravity. The brass and wind volleys in Copland's "Fanfare for the Common Man" [Reference Recordings], for example, came across as open and unrestricted; the top end was detailed and sweet; and bass drum and timpani strikes were heavy, impactful, and nicely scaled.

SPECS & PRICING

Type: Three-way, bass-reflex floorstander

Drivers: 32mm folded ribbon, 5.25" mid, (2) 6" woofers

Frequency response: 37Hz–27kHz ±6dB

Nominal impedance:
4 ohms

Sensitivity: 88dB

Dimensions: 8.33" x 37.6" x 11.6"

Weight: 40 lbs.

Price: \$699/pr.

EMOTIVA CORPORATION

135 Southeast Parkway Court
Franklin, TN 37064
emotiva.com

On pop music, such as the black-water-deep opening bass line of Leonard Cohen's "You Want it Darker" from his eponymous final album, the sheer volume of air generated by the T1 made the hair on the back of my neck stand up. On Mary Gauthier's "Camelot Motel," the tuneful bass line was just as firmly established, while Gauthier's drawling vocal was captured with all the sympathy, humor, and affection for the displaced and damaged characters she often writes about. As I cued up the DSD file of Cat Stevens' "Hard Headed Woman" via the Playback Designs Syrah and Merlot server/DAC tandem (review forthcoming) I was impressed with the realism of the swift acoustic guitar transients and, once again, the bass foundation that the T1 produced.

In tonal balance the T1 projects a well-cushioned, "bottom-up" signature defined by grippy lower frequencies, an expressive lower mid-range that allows a cello or bass viol full breath and exhalation, a relaxed vocal range that neither forces singers into your lap nor shoves them to the back wall, and a round, sweet, transparent top end. Vocal presence tends to register a row or two farther back from a neutral listening perspective, so the overall impression is a slightly subtractive and forgiving presentation. Although ruler-flat frequency response was not within reach, the T1's balance was very easy on the ear.

The jewel in the T1 crown is its ribbon tweeter, and indeed it is a thing of beauty to hear—airy, textured, and transparent. Favorites like James Taylor's "Places in my Past" and the Beatles' "Hey Jude" rang true with well-defined tonal color and harmonics. There was a fully in-

The jewel in the T1 crown is its ribbon tweeter, and indeed it is a thing of beauty to hear—airy, textured, and transparent.

tegrated ease and naturalism to both female and male singers, with none of the "duck-and-cover" rising-treble hijinks of so many modestly priced speakers. The excellent vocal articulation from background singers was another fine attribute. In general, articulation without hype or coloration was an important virtue of the T1—all the more so if one's aim is to use the T1 for home cinema dialogue.

Even with the mix of ribbon and cone driver technology, the T1 exhibits good inter-driver coherence—an area that trips up many multi-driver speaker at all price levels. In an earlier day, mixing ribbons with cone transducers was not only a rarity; it was often ill-advised. The transient speed and low distortion of ribbons contrasted too sharply with the then-sluggish performance and colorations of traditional dynamic drivers, and the resulting mismatch couldn't be ignored. This was especially true in the low frequencies where cabinet resonances drew further attention to the problem. This is why ribbons were better paired with smaller, faster cone drivers in smaller, more rigid cabinets. While the T1s showed occasional minor transient discontinuities, overall they exhibited very few of these issues.

A side note: Since the T1 is little more than three feet tall, be sure to use the included

rubber footers or spikes, which not only improve bass response and imaging but also lift the tweeter and midrange to better align with the listener's ear. Without the feet, top-end response darkens slightly, and loses some its crystalline sparkle.

Lest expectations begin spinning out of control, the T1 doesn't quite hit the bullseye in every sonic criterion. It misses some of the textural, tonal, and dynamic linearity of an expensive studio monitor. Transparency is very good but as the music descends into the upper- and midbass there are hints of dynamic reticence and traces of cabinet noise that cause decays and reverberant information to be slightly reduced.

At more than a hundred bucks less, the Elac Debut F5 (Issue 260) could be Emotiva's toughest competitor. Both are studies in "slam" with weighty bass response into the thirty-cycle range. However, the F5 is a bit more forward in the studio-monitor sense, and the tweeter distinctly drier than the free-flowing Emotiva folded ribbon. Both speakers lose some transparency and imaging precision to modest cabinet colorations, and both represent unimpeachable value.

By the often serious standards of the high end, where folks regularly tap an equity line to pony up for a set of cables, the Emotiva T1—with the occasional compromise—hits big-time paydirt. When you find a near-full-range loudspeaker with some high-end musical cred that will also take you on a high-octane sonic ride for just shy of \$700, what's not to like? A great twofer? Count me in. *tas*

Equipment Report

GoldenEar Technology Triton Reference

Making Reference Quality Affordable

Anthony H. Cordesman

I suppose that in some ways it was inevitable that GoldenEar Technology could not rest on its laurels in producing the Triton One—a truly excellent speaker at its price of \$5000 a pair. GoldenEar’s corporate slogan may be “We make the high end affordable,” but almost all of the companies that produce high-end audio products are led by audiophiles. Even those that focus on the affordable side of the high end can rarely resist trying to introduce reference-quality products.

I had mixed feelings, however, when I started reading the product announcement for the new GoldenEar Reference. As I began to skim through it, I found a passage that mentioned potentially designing a speaker that would be an “all-out assault on the state of the art,” and “producing an all-out assault on the ultimate state of the art, producing a six-figure loudspeaker to do battle with the most esoteric and expensive loudspeakers on the planet.”

Fortunately for the vast majority of audiophiles, GoldenEar stayed true to its heritage. The announcement immediately went on to state a very different goal: To create “a loudspeaker destined to raise the bar and set a completely new performance standard for reasonably priced, affordable loudspeakers.” “Reasonably priced” also actually turned out to be reasonably priced—well, reasonably priced by high-end standards. The GoldenEar Reference costs \$4250 each, or \$8500 a pair.

When the review pair arrived, its sound sent a far more important message. The Triton Reference is a major improvement over the Triton One, and is a truly excellent speaker for the money. I’ll leave judgments about a “completely new performance standard” to GoldenEar’s marketers, but the Reference does everything exceptionally well for a speaker near its price range. It offers a remarkable amount of transparency, life, and soundstage detail along with some of the best-integrated powered subwoofer

performance I’ve heard at anything like the price.

GoldenEar’s Explanation of Why It Developed the Triton Reference

Before I get to the sound and the music, however, I should mention the sidebar to this review. I normally try to provide a detailed technical description of any product I review, but in this case, I pushed Sandy Gross, the head of GoldenEar, into explaining the design rationale behind the speaker.

I also asked him to focus on the tradeoffs that he had to make relative to those six-figure super-references, and on the specifics of the improvements over the Triton One and the extent to which they involved any diminishing returns in value for money, and the fact that a pair of Triton References costs 70% more than a pair of Triton Ones.

Rather than simply do an interview, he took the time to provide a detailed response, and one that does a great job of



Equipment Report GoldenEar Technology Triton Reference

describing the goals behind the new Triton Reference and its technical features. I'm still struggling with his nicknaming the speaker the "T Ref," and I can't quite shake the image of a new version of *Jurassic Park* where a "T Ref" starts eating the reviewers at an audio show. Nevertheless, his explanation of the speaker is objective enough to provide an exceptionally sound picture of the design rationale behind the Triton Reference, the changes in its components and technology, and the how these changes are intended to affect the music.

If anything, I think Sandy downplays the importance of one key aspect of the Triton Reference. The Triton One covered its body in fabric in order to deliver exceptional sound for the money. The Triton Reference has wood sides and a matching base that are finished in a glossy piano black. It is a substantially more attractive speaker, has no techno-geek visual features, and is 58" tall and 22 ¼" deep, but only 6 ¾" wide at the front and 13 ½" at the back. Form follows function in a really attractive way, and in visual terms it's a speaker a wife or partner can easily live with.

The Triton Reference and the Music

As Sandy's sidebar states, the Triton Reference is not some revolutionary advance over the Triton One, but it does make meaningful sonic advances in every respect and in ways that seem to more than justify its costs in comparison with other speakers in anything near its price range.

One of its most important features is to combine better performance—while also making the loudspeaker compatible with a wide range of electronics and cables—with a balance of

sound qualities that make it a pleasure to listen to over extended periods of time. The "gee whiz" factor in the sound of a new speaker disappears when you realize that it involves added coloration and/or produces listening fatigue.

Like the Triton One, the Triton Reference has a very smooth overall timbre through its frequency range, with deeper bass, smoother midrange with more detail in the upper midband, and a cleaner treble with a great deal of air. This is particularly true if it is tilted so the tweeter is directed at the listener's ears in the primary listening position. It is a remarkably seamless speaker in timbre/frequency response, soundfield, and imaging for anything close to its cost.

My initial reaction was that the Reference did have a slightly "soft" or warm voicing, but a combination of break-in and better adjustment of its subwoofer level made it clear that the Triton Reference had excellent upper midrange and treble detail but without any of the touch of hardness that can occur with some dome tweeters or with speakers that are voiced to emphasize detail by adding energy in the upper midrange.

It was apparent that the Reference did have the all warmth it should have, and that its reproduction of the lower midrange and upper bass was exceptionally well balanced. This is a speaker that minimizes listening fatigue even when the music is miked too closely, but does not mask upper midrange detail. It also measurably reproduces highs up into the supertweeter region.

GoldenEar's technical literature claims the Triton Reference has substantially improved crossovers with upgrades to better-sounding

components, such as film capacitors, that may help explain its improved coherence. At the same time, the speaker's pleasing sonic qualities may also reflect the use of new drivers—including a new ribbon and upper-bass/midrange—in a redesigned array.

What is equally important is that the Triton Reference has a remarkably coherent set of dispersion characteristics and a wider, more stable, and exceptionally detailed soundstage. In fact, if you audition this speaker, I would suggest bringing recordings with truly demanding and natural soundstages, so you could hear how well reproduced they are. *Jazz at the Pawnshop* is one classic example that most audiophiles possess, but a really good natural recording of a symphony can be even more revealing.

I have a 96kHz/24-bit version of a Tauno Hanikainen and Tossy Spivakovsky recording of Sibelius' Violin Concerto that was originally captured on 35mm tape back in 1960; in both the digital and LP versions it's a classic. A properly set up pair of Triton References (widely spaced with carefully adjusted toe-in, good spacing from the sidewalls, and enough space from the rear wall to get smooth, deep bass) playing back this source file revealed a wide range of subtle aspects of this recording's imaging with excellent soundstage width and full centerfill. The tape hiss on this recording is a minor distraction, but the Reference's ability to float such a detailed and natural soundstage still made this concerto a true pleasure even nearly 60 years later.

As for nuance, the Reference is again better than the already very good Triton One. I get a lot of pleasure from cello music and one of my fa-

vorite pieces is J.S. Bach's Cello Suite No. 1 in G major [BMV 1007]. I already own seven recordings, and now have access to a long additional list from Tidal. If you want to judge a speaker's ability to deliver detail, work your way through the opening passages of the first movement from a Casals recording in the 1930s to one of today's best performances, and see just how many sub-

SPECS & PRICING

Frequency response: 12Hz–35kHz

Sensitivity: 93.25dB

Nominal impedance: 8 ohms

Recommended amplifier power: 20–750 watts

Drivers: Three 6" x 10" long-throw quadratic sub-bass drivers, coupled to four inertially balanced 10 ¼" x 9 ½" planar infrasonic radiators; two 6" high-definition cast-basket MVPP mid/bass drivers; one neodymium High Velocity Folded Ribbon (HFVR) tweeter

Integral woofer amplifier: 1800-watt Force-Field DSP-controlled switching amplifier

Dimensions: 6 ¾" (front) x 9 ¼" (rear) x 58" x 18 ¾"

Weight: 108 lbs.

Price: \$8500

GOLDENEAR TECHNOLOGY

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Equipment Report GoldenEar Technology Triton Reference

tleties—even from a solo instrument—a really good transducer like the Triton Reference can reveal.

The Reference was equally revealing of the nuances in female voice. Brass and woodwinds were very clean and natural, and the Reference handled difficult-to-record instruments such as the recorder and harpsichord as well as my recordings permit. As for strings, it did a superb job of reproducing the subtleties in the performance and the character of the Stradivarius instruments used in a L'Archibudelli, Smithsonian Chamber Players recording of Mendelssohn and Gade's Octet for Strings [Vivarte 1992].

Unlike many speakers, the Triton Reference did not have some particular listening level that seemed to bring out its best characteristics. The best listening level was always the one that best suited the music, rather than the one that best suited the speaker. No loudspeaker can alter the changing frequency sensitivity of the human ear to bass and treble as the sound level rises, but the Reference did not introduce any clear coloration at low or high levels.

Thanks in part to its integrated subwoofer, which is powered via an 1800-watt, DSP-controlled switching amp, when it comes to its more saurian sound character, the "T Ref" proved to be one of the few speakers that can actually reproduce very-low-frequency organ, bass guitar, and synthesizer bass down to subwoofer levels—provided that it is properly set up and placed, and that the room allows deep bass reproduction.

The Triton Reference did an excellent job with the demanding bass in the Reference Recordings version of Copland's *Fanfare for the Common Man* performed by Eiji Oue and the Minnesota Orches-

tra. It had very clean bass drum transients as well as sustained musical power.

The Reference outperformed some very expensive competition in handling the extraordinary deep bass notes and dynamics on bands 2, 13, and 14 of Jean Guillou's performance of Musorgsky's *Pictures at an Exhibition*. It also did as much as possible to reproduce the complex mix of deep lower frequencies, massive orchestral power, and soundstage imaging in my recording of the last movement of Saint-Saëns Symphony No. 3. Like Mahler's "Symphony of a Thousand," there are some pieces of music that are simply too massive to accurately reproduce in the home.

In short, the Triton Reference is one of the few loudspeakers I've encountered that can actually produce truly low musical bass and warble test tones down to the lowest subwoofer depths and do so in ways that are properly integrated into the overall response of the speaker. It really does bring out the deepest notes a recording allows with tight detail and without exaggeration. It is not room-placement-proof. Care is needed to keep the subwoofer level restrained to natural music levels, and proper spiking can help, but only a few far more expensive speakers—normally with digital room compensation—have performed better in my system.

And just to be clear, I'd add the same praise for its ability to handle rock 'n' roll such as the Stones, and jazz such as the MJQ, which is just about as contemporary as I want to get.

Summary Judgment

Highly recommended. Well worth auditioning and fully competitive with some substantially more expensive speakers.



Equipment Report GoldenEar Technology Triton Reference

Musings on the Triton Reference Goals and Development Process Sandy Gross

■ We introduced the Triton One with the goal of producing an attractive, affordable, easy-to-drive loudspeaker that delivered audiophile performance and that could be compared with loudspeakers that sell for many times its price. We think we succeeded. Then the question comes up: Why the Triton Reference? What were the goals and what were the means to accomplish these goals?

No loudspeaker is perfect, and as with any product, even \$100,000+ ones, there are always compromises. In developing the T Ref, we wanted to go beyond what we had achieved with the Triton One. We had, as an overall goal, to create a still-affordable loudspeaker, which would be able to deliver even greater dynamic range and more powerful, deeper, tighter, faster bass than the Triton One, with a higher level of refinement and higher resolution. In fact, we had our eyes and ears focused on creating a speaker that could play with the authority of the large and very expensive superspeakers from manufacturers like Wilson, Magico, YG, etc., with the same kind of expansive but detailed and focused imaging, which is so important to us.

The development process was long and arduous, actually almost two years from defining the concept until the final production prototype. With my team of Bob Johnston and Don Givogue, we prototyped and evaluated each component or concept both by precise measurements, made in our full-size anechoic chamber, and by critical

listening. First, we developed all-new drivers for the Reference. The upper-bass/midrange units are basically 6" drivers arranged in a D'Appolito array around our tweeter. They use the same cast basket as the driver in the Triton Five, but the similarity ends there. While the Triton One incorporates 5.25" upper-bass/midrange drivers, we felt that going to larger 6" drivers in the Reference, would give us greater dynamic range and lower distortion. At the same time, the 6" drivers would still give us excellent dispersion and a wide enough frequency response to enable them to match nicely with our tweeter. Additionally, we felt that they would do a better job of allowing us to cross-over lower to our built-in powered subwoofer/bass section.

Clearly, with the Reference, we wanted to improve on the already excellent bass performance of the Triton One.

We incorporated a new magnet structure—we call it "Focused Field"—which has a somewhat conical backplate that better focuses the magnetic flux into the voice coil gap. This gives us better control and higher efficiency. Because the driver is not being used for long-throw bass excursions, we were able to go with a shorter, lighter voice coil, which gives us better transient response, higher resolution, and higher sensitivity.

There is much discussion about cone materi-

als. No material is perfect, and there are always trade-offs. We use a newly designed polypropylene cone, which we feel gives us a nice balance between speed of sonic transmission within the cone (Young's Modulus) and good internal damping. One of the final details to be optimized on this driver was the glue bond between the cone and the butyl rubber surround. This required many iterations of the prototype, actually delaying the project, but we finally achieved what we were looking for: a lighter, but still strong glue bond that improved transient response, while maintaining good wave termination at the cone edge.

Next, we focused on the tweeter. We really love the AMT folded-ribbon tweeter technology. We find that it gives us very extended frequency response, tremendous dynamic range, superb transient performance with very low distortion and none of the breakup and ringing so common with most dome designs. How to improve it, was the question. Our engineering team came up with the idea of increasing the strength of the magnetic field that the diaphragm sits in. Although it utilizes the same diaphragm as our other tweeters, the Reference tweeter incorporates 50% more rare earth neodymium magnet material. This gives us even better control of the diaphragm's motion, along with higher efficiency, improved resolution, and, of course, greater dynamic range. And because we did not increase the size of the diaphragm, we preserved the tweeter's excellent dispersion.

Next came the subwoofer and active bass drivers. Clearly, with the Reference, we wanted to im-



prove on the already-excellent bass performance of the Triton One. Since we had a somewhat wider cabinet to accommodate the larger 6" drivers, we were able to design an all-new, larger, active bass driver for the Reference. With 40% more surface area than the active driver we previously used, and a much larger "Focused Field" magnet structure and larger-diameter voice coil, it allowed us to achieve dramatically better bass performance: deeper, faster, more dynamic and effortless, with lower distortion.

Equipment Report GoldenEar Technology Triton Reference

Musings on the Triton Reference Goals and Development Process (cont'd.) Sandy Gross

As we all know, the cabinet is a key component of a loudspeaker system. In order to achieve a solid, non-resonant structure, we spent a lot of time working with cabinet damping and bracing, making precise measurements with very sensitive accelerometers. Also, there was the expensive decision we made to do the Reference in a beautiful hand-rubbed piano-black lacquer finish.

Some of the other improvements we made, relative to the One, related to the specific internal speaker wire we chose and getting the precise twist between the two wires correct; utilizing a mix of Dacron and long-fiber lamb's wool for damping in the upper-bass/midrange chamber (lamb's wool has some uniquely effective damping characteristics, as does Dacron, and the combination achieves an effective synergy); and using steel spikes instead of brass ones.

We incorporated a 3/32"-thick steel plate in the base for added rigidity, which results in tighter bass with better detail and improved resolution.

And then there were the capacitors in the high-pass section of the passive crossover, feeding the upper-bass/midrange drivers. As this crossover is very low, it required very large capacitors. If we were to use pure film capacitors for this, it would have been excruciatingly expensive. Instead, we put a small value high-quality film cap across the electrolytics in order to come very close to what we would achieve with pure film.

And, of course, in the end, the final key was the voicing of the speaker. This is really the artistry that combines with the science in order to achieve the desired final result. At GoldenEar, we have a full size anechoic chamber within our engineering facility, which is a duplicate of the famous one at the NRC in Ottawa. The chamber allows us to get really precise measurements throughout the development process—to get our designs into the ballpark, as well as to understand and confirm changes that we make during listening/voicing. Voicing is a long process, and we have many tools, developed over many years, that we bring into play. For instance: We have a recording of two wooden blocks being struck against one another, which has proven to be very useful. One of the most difficult to achieve goals in a complex multi-driver loudspeaker design like T Ref, is to get the drivers to all blend into a coherent whole, and speak with one voice. This is a major focus of our voicing process. **tas**



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“The JMW Alyson AML II is the best loudspeaker costing less than \$10,000 per pair I’ve heard in my listening room.”

—Andrew Quint, *The Absolute Sound*, April 2018

Equipment Report

MartinLogan Impression ESL 11A Hybrid Electrostatic

What's in a Name?

Paul Seydor

MartinLogan's new Impression ESL 11A is a direct replacement for the company's Montis that I reviewed so enthusiastically almost three years ago. Like the earlier model, which is priced identically to the new one at \$9995 a pair, the Impression is the third from the top of the company's floorstanding Masterpiece line and consists of one of ML's proprietary CLS electrostatic panels affixed to an enclosed dynamic subwoofer. Inasmuch as both my colleague Dick Olsher and I have written extensively about MartinLogan speakers in the past few years, I refer readers to our respective reviews of the Montis (Issue 244) and the Summit X (Issue 209) for technical and historical background, and to Dick's chapter on the company in TAS' *Illustrated History of High-End Audio, Volume One: Loudspeakers*.

The main talking points are two: First is ML's electrostatic panel, which it designates CLS for "Curvilinear Line Source," owing to the mild horizontal convex curve designed to overcome the typical narrow high-frequency dispersion of flat panels. Second is the use of powered dynamic woofers to surmount the usual bass and dynamic limitations of most ESLs. Owing to the superior transparency of electrostatics and flat panels' dipole radiation pattern, matching ESL panels to dynamic woofers has proved vexing both for designers and for audiophiles who prefer to

add aftermarket woofers. In recent years and models, however, MartinLogan has managed to solve the integration problem virtually to perfection. Since then, however, evidently feeling that "virtually" is not close enough, ML's engineers—largely Joe Vojtko, whom his colleagues often refer to as their resident genius—have completely redesigned the woofer section for all-around superior performance, which shall be the focus of this review.

Glance at a single Impression from the front and you'd be forgiven for thinking it's identical to the Montis. Look at it from the side and the back and you see that the compact, almost square woofer housing of the earlier model and its ten-inch driver have given way to a cabinet extending almost two feet back that houses a pair of eight-inch woofers, one front-mounted, the other rear-mounted. (A friend of my wife's inquired if they were some kind of contemporary chair.) At first I assumed the cabinet was to allow the woofers to mimic the panel's dipole radiation. In fact, with help from the digital circuitry, the two woofers, crossed over at 300Hz, are made to work in a kind of sliding phase arrangement whereby the phase shifts with frequency in order to suppress the backwave and also to prevent frequency-specific cancellations that may result from woofers arranged to mimic dipole radiation. According to Vojtko, digital manipulation of phasing directs

most of the two woofers' output forward, not toward the back wall, an arrangement claimed to facilitate setup and speaker placement: "The sliding phasing is weighted toward the frequencies where directionality is more critical, where the manipulation of the phasing is taking place, and the woofers come into phase together at the lower frequencies." This does address what has always been one of the thornier problems with ESL/dynamic hybrids, namely, that optimal placement of the panels does not necessarily correspond to optimal placement of the woofers, hence the preference among many audiophiles for the positional flexibility of stand-alone woofers.

But the ace up ML's sleeve in the Impression is the provision for Anthem Room Correction (ARC), a highly effective digital-signal-processing program designed to cope with typical bass response anomalies of most listening rooms. I say "provision" because while the speaker comes equipped with the circuitry, it can't be activated without purchasing the ARC microphone, which is an optional accessory priced at \$100. In other words, if you don't purchase the microphone, then the Impression can be used as-is without DSP, just like previous ML speakers. But, as I'll come to, the Anthem feature is so effective it's hard for me to believe that any user, once committed to ten grand, wouldn't spring for the extra hundred bucks.



Equipment Report MartinLogan Impression ESL 11A Hybrid Electrostatic

Using ARC is quite easy once you get it to lock onto the online program that allows it to work. Unfortunately, if you're an Apple-man like me and are PC-phobic to boot (me again), this is easier said than done. I eventually got it to work properly thanks in no small part to my wife, who is ambidextrous when it comes to computers and has a PC laptop. But if you're an Apple-only household, you might want to ask your dealer to do it or else enlist the help of a PC-savvy friend.

As I say, once you're hooked up and online, it's a snap: Set up the microphone according to the instructions, then sit back for the few minutes it takes for the application to do its work. (A before-and-after curve is displayed on the screen.) Once it's done, it's done, though of course if you change your listening location or move the speakers, then you must redo the procedure. It should go without saying but I'll say it anyhow: Prior to engaging ARC, you are advised to make every effort to place the speakers optimally in your room. As remarkable as digital room correction is when it works—and this Anthem system certainly works a treat—it's most effective when it corrects speakers that have already been set up to good or better advantage.

Before I get into the sound, let me take you on a tour of the signal path and the woofer cabinet's back panel. From the binding posts, the full-range signal goes through two filters, an analog 300Hz high-pass filter to the ESL panels and a digital low-pass filter to the woofers. The low-pass signal is digitized, filtered, and then passed through the ARC circuit. The corrected signal is next sent to a switching amplifier and to the woofers (back in analog). If you're a digi-phobe—in my opinion, a really silly prejudice in this day and age—then

know that if you opt for the ARC feature, at least part of the signal will have undergone A-to-D and D-to-A conversion.

As for the back panel, in addition to the binding posts there is a bass-level knob, a midbass level switch, the ARC in/out switch, the ARC setup input (a mini-USB connector), and the ARC Setup Speaker Link (which requires an RJ-45 [Ethernet] connector), plus two status lights, one for the whole speaker, the other for the ARC equalization. The speaker-link connector, which ties the right and left arrays together, allows the ARC to program both speakers simultaneously. If you don't have the requisite cable, all it means is the minor inconvenience of programming each speaker separately. The bass-level control is basically a tone control that operates below 75Hz while the midbass level boosts or cuts the bass 2dB at 200Hz. Both of these controls operate independently of ARC and regardless of setting are bypassed while ARC is in calibration mode.

With ARC on hand, you might wonder why these additional controls are there in the first place. Well, as noted, the Impression comes ARC-ready but not ARC-functional unless you purchase the optional microphone. These controls allow you a modicum of control over the mid-to-low bass and the upper bass *apart* from ARC. But even with ARC, these circuits come in handy for additional trimming and other fine-tuning of the bass, including compensating for bass characteristics of recordings, if you care to use them for that. For example, while the ARC does a very effective job of addressing room acoustics, a bass-shy recording—like a great number of my favorites by Szell and the

Cleveland Orchestra—is still a bass-shy recording and will sound that way. The bass-level control is surprisingly effective for correcting this even after you've performed the room equalization. As for the 200Hz switch, again, many audiophiles like a lean upper bass which the Impression's 2dB cut will help provide; at the same time, if you like more warmth in this area, then the 2dB boost will help, too.

Impression Bass with and without ARC

Let me say it up front: The Impression 11A with its built-in ARC engaged has provided the best bass response I've ever heard in my room in the areas of overall smoothness of response and of clarity, definition, and pitch differentiation. A few examples: One of my favorite recordings is the Sitkovetsky arrangement of Bach's Goldberg Variations (Nonesuch) for string orchestra and harpsichord. There is only one double bass in the group, yet for the first time I heard it with a foundational definition that was rather revelatory. I don't want to suggest that without ARC the bass is inaudible—far from it—only that with ARC you can follow the musical line with greater ease and a less effortful concentration, and there is a greater impression of air around it. The same holds for the one non-stringed instrument, the harpsichord, which is also separated out and easier to hear and to follow. In saying this, I don't want to give the impression of anything unnatural or clinical in this clarity—rather, it's just easier to listen into, as it were, yet at the same time allowing it to assume its rightful place in the overall texture without being submerged or calling undue attention to itself.

The same applies to another string orchestra arrangement—Bernstein's recording of Beethoven's Opus 131 string quartet with the full complement of the Vienna Philharmonic's string section, including (where appropriate) the basses doubling the cellos. This is one of my desert-island discs. Played over these Impressions I didn't hear details I've never heard before, but I was rewarded with clarity of line, texture, and articulation throughout the bass range that filled me with new respect for this inspired and inspiring performance and the way it is recorded. Another of my favorite recordings, Kei Koi-to's organ recital of Bach [Claves] displays the same virtues of increased clarity and definition. The organ is a notoriously difficult instrument to record because it's a difficult instrument in and of itself. Many churches tend toward a highly reverberant acoustical character that even in the best of hands militates against textural clarity. And truly full-range organ recordings that are recorded clearly can become muddy in systems that can't handle the bass, especially when driven too hard.

This Claves organ recording is considered by *Diapason* magazine to be a textbook example of how to record the instrument optimally. The reason, I assume, is that it displays an ideal combination of clarity, articulation, reverberation, extension, and power—all of which (save only the last attribute) is pretty much what you get from the Impressions. And make no mistake; you certainly hear plenty enough power, especially in view of the relatively diminutive woofers. But that sense of ultimate room-filling bass power, plus crunch and slam—the kind I hear from my reference Harbeth Monitor 40.1—is “merely”

Equipment Report MartinLogan Impression ESL 11A Hybrid Electrostatic

excellent here without being truly outstanding. I believe this is because there is only so much you can get out of small drivers such as these eight-inch transducers, especially given the lack of any sort of baffle reinforcement. Having said that, however, I should add once you set aside these special categories of big music, only rarely throughout the evaluation period did I ever feel any serious shortcomings or limitation in the 11A's bass response.

Fortunately, however, there is an easy remedy at hand for those who love the big stuff, though it comes at a cost: Add an REL subwoofer. Any number of good subwoofers will do the trick, but I favor the RELs because they are designed to be true *sub*-bass systems, that is, to add that last half-octave of bottom-end extension to speakers that already have excellent bass response. In that respect, MartinLogans, like full-range Harbeths, make ideal partners for RELs. The only potential drawback is that inasmuch as the RELs take the signal from the main amplifier's speaker terminals, the ARC cannot operate upon the subwoofer. I didn't find this a problem. For one thing, the bass acoustics of my room are very good and don't present any oddities. For another, because the 11A's bass response is already so extended, there is no need to set the crossover of the REL any higher than its lowest position. After that, get the phasing right and adjust the level, and you'll be rewarded by some of the cleanest, most precise, articulate, and powerful bass you can buy. The difference is really audible on an awesomely spectacular recording like the Zander Mahler Sixth with the hammer blows in the last movement. By themselves the Impressions render these sensationally; with the RELs you

SPECS & PRICING

Type: Hybrid electrostatic floorstanding loudspeaker

Driver complement:

1 XStat CLS electrostatic transducer panel (44" × 11"); dual 8-inch Powered Force Forward woofers with dual 275Wpc amplifiers and 24-bit Vojtko DSP Engine

Frequency response: 29–23,000Hz ±3dB

Recommended amplifier power: 20–550 watts

Impedance: 4 ohms, 0.6 at 20kHz

Dimensions: 60.75" × 11.9" × 27.4"

Weight: 90 lbs.

Price: \$9995/pr.

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feel them in the pit of your stomach.

Are there any downsides to ARC? Only one: As employed by MartinLogan, "all" ARC can do is make the bass response as accurate as possible in any given room. But this means that it will also "correct" characteristics you might find pleasing, such as a bit more warmth or power owing to standing waves or other modal effects. Objectively you will hear improvement, but your subjective response may evaluate it differently. I would have no problem living with the bass response of a un-ARC'd pair of carefully placed Impressions, but, though I do not consider myself a detail-over-everything audiophile, and

the acoustics of my room are very attractive, I always preferred these speakers with ARC-corrected response.

The Curvilinear ESL panels

This needn't require a lot of verbiage because, with one exception, the curvilinear ESL panels perform the way I described them in my review of the Montis. First, they do an astonishing job of projecting height, so that well-recorded vocalists and instrumentalists really are presented with an extraordinary sense of life-sized realism. Second, MartinLogans are renowned for their clarity, transparency, detail, and dynamic range, and these new ones are no exception, not least, I think, because the panels are freed from having to produce the lowest frequencies and also because the room correction pays dividends further up the frequency band. Third, they produce a fabulously wide and deep soundstage. Big music such as large orchestral-choral works and nineteenth-century operas become quite thrilling in the sense of projected size and scale. Those of you who get off on soundstaging that extends beyond the boundaries defined by the speakers are going to love the Impressions.

This last, however, is a not without a penalty. The rationale behind the curved panels is to overcome the high-frequency beaming of most panel speakers. And to some extent this works surprisingly well, not so well as the omnidirectional Muraudio ESLs, but those who find Quads of any vintage entirely too directional will find these more satisfactory or at least much less unsatisfactory. The sacrifice, however, is less precise imaging. One member of my listening group was driven crazy by the Impressions in



this regard (and also by other MartinLogans) because he felt that things never occupied a precise and defined place. I personally feel he is overreacting here. I like precise imaging but I don't have a fetish about it, and while I'm aware of what my buddy is talking about, I didn't find that it much impaired my enjoyment of the Impressions. But he does have a valid point: There's always a very subtle vagary about the positional placement of solo instruments and vocal soloists within the soundstage. (See Robert E. Greene's review of the Sanders Model 10e in Issue 276 for some reasoned speculation about the effects of a curved panel.)

This leaves me with only one additional matter. Perhaps the thing I liked best—indeed, loved—about the Montis was its tonal balance,

Equipment Report MartinLogan Impression ESL 11A

which I described this way: “ever so *slightly* forgiving in the 2k–4k region, and above a mild sloping response. Together these characteristics are neither gross nor obvious, and do not manifest themselves as coloration or a significant deviation from overall neutrality. The effect is rather more like a shift in perspective from, say, row A–G to H–P. This means that with recordings that are far too closely miked, which is to say most recordings, the Montis will actually sound more natural in ways that a literally accurate speaker will not. If I were to search for a thumbnail characterization, I’d say its tonal character is reminiscent of what in the old days used to be called ‘New England’ sound: essentially neutral, uncolored, smooth, civilized, maybe a bit polite. But with one huge difference: No ‘New England’ speaker I’ve ever heard was ever capable of a presentation as full of life and vitality as the Montis, able to scale instruments to life size and bring the room as alive with music. And no such speaker ever sounded as open and free from a box as this one.”

In the Impression 11A, however, a distinct Yang character has replaced the Montis’ lovely Yin personality with a presentation that is crisper, sharper, more forward, and, depending on the recording, even a bit aggressive. There’s also an impression of glare, a subtly “shouty” quality that, again depending on the recording, can be rather pronounced and never entirely disappears. Allow me to call upon an obviously flawed recording to indicate more clearly what I’m talking about here. Bernstein’s first recording of *Appalachian Spring* [Sony] is notoriously bright. Over speakers that are a bit recessed

throughout the presence region and that do not rise above that—the Montis or Harbeth’s wonderful SuperHLP5plus—the recording still sounds bright but is listenable. Over speakers that are essentially neutral—my reference Harbeth Monitor 40.2 or Quad 2805 ESL—the recording sounds as excessively bright as it is, indeed, almost fierce, but remains tolerable. Over the Impression the fierceness really takes over and it becomes a recording I don’t especially want to listen to—a pity inasmuch as this remains the best performance and interpretation of the piece that I know (I was glad to have McIntosh’s superb new C52 preamplifier, with its seven bands of equalization on hand for review, so I could tame the recording).

As I say, that recording is flawed, but it illustrates the issue. In case you think I’m relying on what we all know is sometimes notoriously unreliable audio memory, I should point out that the review pair of the Montis are now owned by a couple who are industry professionals, live nearby, and are very close friends: Rarely a month goes by that I don’t get to listen to those speakers two or three times. As in all judgments like this, we’re dealing with matters of taste and I must emphasize that these new Impressions are very much in line with the trend of speaker sound these last twenty years, the kind of sound that a lot of audiophiles, not to mention speaker designers, seem to like. There is no gainsaying the fact that all the typical ML virtues are here in abundance. So if you’re tempted—and there is a great deal to like about these speakers assuming the tonal balance appeals to you—an audition is mandated. **tas**




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Equipment Report

Monitor Audio Silver 300

The Right Stuff

Robert Harley

How's this for a recipe for a high-value speaker: Take a highly skilled designer, match him to a company with an audiophile ethos, mix in economy-of-scale manufacturing, and add the cost savings conferred by a company-owned factory in China. Put those ingredients together and you have the new Monitor Audio Silver 300, an astonishing amount of speaker for \$2000 per pair. I heard the Silver 300 at the Munich show last year as a pre-production prototype, and was immediately taken by its musicality and blown away by its value. I asked on the spot for review samples.

The Silver 300 was designed by Monitor Audio's Dean Hartley, author of the \$29,000 Monitor Audio Platinum PL500 II that I heard sound spectacular a few months earlier at CES (see our interview with Dean in the Designer Roundtable elsewhere in this issue). The Platinum PL500 II was, if not a giant-killer, competitive with speakers approaching six figures. Julie Mullins favorably reviewed the speaker in Issue 268. At that speaker's CES introduction I had lunch with Dean and Sheldon Ginn of Kevro, Monitor Audio's North American distributor. During the lunch Dean pulled out a flight case filled with cutaway drivers and explained all the design techniques that went into the new transducers, as well as how the speakers are manufactured in

the Monitor Audio-owned-and-operated factory in China. I was greatly impressed that what is essentially a mass-produced speaker had been designed and built with the painstaking attention to performance details that are usually reserved for esoteric high-end models. Monitor Audio's large global distribution allows the company to bring high-end design to mass-market prices.

The four-driver, three-way Silver 300 is the second-to-the-top model in the newly overhauled Silver line. (This is the sixth generation of the long-running Silver series.) The Silver line consists of two bookshelf speakers, three floorstanding models, a center-channel speaker, surround speakers, and a subwoofer. The 300's slim cabinet is supported by outrigger feet that provide stability as well as the ability to level the speaker. The rubber-coated feet will accept spikes for greater performance. (What are the three words an audiophile should never utter in front of his spouse? "Carpet-piercing spikes.") Two pairs of binding posts are provided for bi-wiring. Each of the woofers is loaded in a separate ported enclosure, resulting in two rear ports. Monitor Audio says that the Silver 300 was designed to work well in typical rooms where the speaker must be close to the back-wall. Foam port plugs are provided to tame excessive bass if necessary (I didn't need them).



Equipment Report Monitor Audio Silver 300

The cabinet's appearance is nothing short of amazing in a \$2000-per-pair loudspeaker—it is finished not in vinyl wrap, but in real book-matched wood veneer. This level of finish would be at home on much more expensive speakers. Six veneer options are available including black oak, walnut, rosenut, natural oak, gloss black, and satin white. The upscale vibe is enhanced by the brushed-aluminum plate housing the midrange and tweeter, as well as the magnetically attached grilles with no visible grille- or driver-mounting hardware.

Each of the drivers is made using updated versions of Monitor Audio's C-CAM diaphragms. C-CAM stands for Ceramic-Coated Aluminum/Magnesium, a sandwich material that Monitor says provides high stiffness with low mass. Monitor Audio has been working with metal diaphragms for 30 years; the latest C-CAM design is the culmination of that history. The Silver 300 uses two 6" C-CAM woofers run in parallel, one 4" C-CAM midrange, and a 1" C-CAM tweeter. The midrange and tweeter share a single front plate to bring their acoustic centers closer together. A new motor system features vented magnets and, in the midrange, an under-hung voice coil. (In an under-hung voice coil, the coil is shorter than the magnetic field it moves through. This technique assures that the voice coil remains within the full strength of the magnetic field even at peak excursion. Otherwise, the driver's motion becomes non-linear with high-level signals as the coil leaves the area of full magnetic strength at the ends of its back-and-forth travel.) The woofers and midrange drivers are dish-shaped, which Monitor says increases diaphragm stiffness com-

pared with conventionally shaped cones that have a hole in the middle through which the voice coil partially protrudes. The gold-dome tweeter is all-new for the Silver 300, and reportedly has as much as 20dB less third-harmonic distortion between 2kHz and 3kHz than its predecessor. All the drivers have higher sensitivity than those in the previous Silver series, making the Silver 300 an easier load for power amplifiers. Sensitivity is highish at 90dB, and the 8-ohm nominal impedance and the 3.5-ohm minimum impedance should allow the Silver 300 to be paired with a wide range of power amplifiers. The woofers cross over to the midrange at 570Hz, and the midrange operates from 570Hz to 3.5kHz.

The enclosure design benefits from research done at the National Physical Laboratory in London, where the cabinet was analyzed with a laser-scanning vibrometer. This study allowed Monitor Audio to identify cabinet resonances and then optimize the internal bracing. The laser-scanning vibrometer can detect enclosure displacement in the micrometer range. Enclosure vibration is further reduced by affixing the woofers to the baffle with a single large bolt that runs through the entire cabinet from front to back. In the interview with Dean Hartley in the Loudspeaker Designer Roundtable in this issue, you can see the vibrometer plots in the comparison of the previous-generation Silver series with the new Silver 300.

This is a lot of careful engineering and sophisticated technology for any speaker, never mind a full-range floorstander in book-matched wood enclosures that sells for \$2000.

SPECS & PRICING

Type: Three-way, four-driver floorstanding loudspeaker

Driver complement: Two 6" woofers, one 4" midrange, one 1" tweeter

Loading: Dual-port reflex

Frequency response: 32Hz–35kHz

Sensitivity: 90dB (1W/1m)

Impedance: 8 ohms (3.5 ohms minimum)

Maximum SPL: 116dBA (pair)

Power handling: 200W (RMS)

Dimensions: 7.5" x 39.5" x 11.8" (not including grille, outrigger feet, or binding posts)

Weight: 44 lbs.

Price: \$2000/pr.

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902 McKay Road, Unit #4
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Listening

I've spent quite a bit of time with the Silver 300 in my new short-term listening room. My wife and I are building a house with a dedicated listening room, but until that home is finished we're living in a rental. Fortunately, in the interim I have a good-sized room (20' x 28') just for listening. Electronics driving the Silver 300 included the \$4995 AVM CS2.2 all-in-one unit that outputs 110Wpc into 8 ohms, and 165Wpc into 4 ohms (see my review this issue), and the

Associated Equipment

Amplification: Esoteric F-03A integrated amplifier; AVM CS2.2 all-in-one system

Sources: AVM CS2.2; Berkeley Alpha Reference Series 2 MQA DAC; Berkeley Alpha USB; Aurender W20 music server; Pro-Ject 6Per-speX SB turntable with Sumiko Blue Point No.2 cartridge

Speaker cables: Kimber 4TC, Wireworld Mini Eclipse 7

Interconnects: Wireworld Eclipse 7

Digital interconnects: Audience Au24 USB, AudioQuest Wild

AC Power: Shunyata Denali, Shunyata Sigma AC cords

Room: ASC 16" Full-Round Tube Traps, Stillpoints Aperture Panels

\$13,000 Esoteric F-03A 30Wpc Class A integrated amplifier.

The Silver 300 has a big, bold, and robust sound that is in sharp contrast with the lighter weight and more laid-back sound of similarly priced two-way stand-mount speakers. This is a full-range speaker capable of extended bass reproduction and wide dynamic contrasts. In fact, the Silver 300's most salient attribute is its outstanding portrayal of dynamics—quick, powerful, and full of verve. Transient signals

Equipment Report Monitor Audio Silver 300

such as drums have real power, impact, and drive. Subtle, but musically important low-level transient information is equally well-served. The track "Stella on the Stairs" from saxophonist Gary Meek's terrific album *Originals* begins with an unaccompanied piano introduction, and then drummer Terri Lyne Carrington comes in with a very unusual and intricate rhythmic pattern played gently behind the melody. The Silver 300 beautifully rendered these aspects of her playing. The Silver 300 also conveyed the percussive component of piano, adding to the lively character that I appreciated listening to Herbie Hancock on *River: The Joni Letters*. I also liked the fact that the Silver 300 exhibited this transient speed even at low listening levels; you don't have to push the speaker hard to feel music's rhythmic expression. I listened to countless hours of background music through the Silver 300 while working at my computer and greatly enjoyed these qualities.

The Silver 300's overall balance was slightly upfront and immediate through the midrange and treble. This isn't a speaker that creates a sense of depth through a recessed midband. Soundstage depth was good, although the Silver 300 tended to project images in front of the speaker. Image precision was razor-sharp and clearly defined. Centrally positioned vocalists were rock-solid both in their placement and tangibility of image. Commendably, this solidity didn't collapse when I was sitting slightly off the centerline.

I was surprised by the Silver 300's refinement and resolution through the midrange, as well as by its inner detailing. Instruments toward the back of the hall, or the back of the mix, were

clearly resolved and delineated rather than disappearing into the murk. Check out Joe Sample's piano playing behind B.B. King's guitar solo on "Three O'Clock Blues" from *Riding with the King*. Every note was clearly articulated and spatially distinct from the rest of the mix. Most speakers at this price lack this ability to resolve individual instruments and portray such inner detailing. I also heard this quality on Keith Johnson's recording of *The Rite of Spring*; the very quiet woodwinds in the back of the orchestra were fully fleshed out with textural detail and imaged distinctly in space instead of just sounding like undifferentiated noise.

The Silver 300's bottom end is remarkable in extension and articulation. This speaker plays much bigger than its size and delivers a satisfyingly solid bottom end. I was shocked that a \$2000-per-pair speaker could sound so clean, fast, and defined in the bass and midbass. On the opening track of the aforementioned *Originals*, Brian Bromberg tears off a solo on standup bass that would put any speaker to the test. The Silver 300 deftly conveyed every aspect of that large resonant wooden instrument, from harmonic texture to pitch definition to dynamic expression. I had the distinct impression of hearing those aspects thanks to the Silver 300's resolution of timbre and density of textural detail. The bass was not accompanied by bloat, overhang, thickness, or slowness. The entire range the acoustic bass spans was also remarkably continuous and free from discontinuities as the instrument traversed different registers. Throughout my entire time with the Silver 300 I also heard this smoothness and lack of artifacts on left-hand piano lines. The dynamic agility of this speaker through the bass

regions, both in the way notes start and stop, is off-the-charts great.

Given the Silver 300's stunning overall performance for the asking price, I feel a bit churlish pointing out specific shortcomings. But that's my job, and you should take these comments in the context of the rest of this review. The lower treble tends to be on the dry side with a bit of hardness. The Silver 300 is not a lush, sweet, and forgiving speaker that makes everything sound "beautiful." Rather, it leans toward an upfront and lively treble balance, though I wouldn't call the treble bright. Second, when pushed hard, the bass can get a bit congealed and lose some of the fabulous pitch definition I heard at normal to fairly loud listening levels. Again, these criticisms should be considered in the context of a \$2000-per-pair speaker.

I have hundreds of enjoyable listening hours on the Silver 300 and consider these shortcomings minor in light of the overall sound quality. A hard and bright treble would have been a disqualifier for me, no matter how good the rest of the sound. That certainly wasn't the case with the Silver 300 but you should know that this speaker isn't a shrinking violet.

Conclusion

The Monitor Audio Silver 300 is an extremely accomplished product that offers a level of sound quality unexpected at this price. I was especially impressed by the fact that the overall design is so well balanced and complete. The speaker doesn't excel in just one or two areas, but performs admirably across the board. Some similarly priced mini-monitors may have a lush-er midband or silkier treble, but they won't be-

gin to match the Silver 300 in bass articulation, low-frequency extension, and dynamic contrasts. Moreover, the Silver 300 plays far bigger than its cabinet size, driver complement, and price would suggest, with robust dynamic authority. It's also very easy to drive; the Esoteric F-03A's 30Wpc was more than enough power.

Even after coming off a mega-system in my previous house I always found the Silver 300 musically communicative, expressive, and satisfying. With many inexpensive speakers there's always that nagging feeling of having to listen past some flaw that detracts from the music. Not so with the Silver 300.

I must reiterate my comments about the build and finish quality. You can spend five times more for a pair of speakers and not get book-matched wood veneers—and with six finish options to boot.

I once read in a car magazine about how the seats in a prosaic Ford were better engineered than those in an exotic luxury car. Ford could simply spend more time and money on the design because the seats would be manufactured in vastly greater quantities. There's a parallel with the Silver 300 (and presumably Monitor Audio's other speakers); great design doesn't add much to the per-unit cost with economy-of-scale manufacturing. The catch, however, is that the design must be driven by an audiophile ethos that values musical expression rather than sonic fireworks.

That audiophile ethos was on full display in the Silver 300. And when combined with skilled technical design and efficient manufacturing, you end up with a speaker that makes true high-end sound eminently affordable. **tas**

Our Top Picks Floorstanding <\$10k



Elac Debut F5

\$560

The floorstanding F5 leverages the strengths of the compact B5—its warm, relaxed, and responsive midrange, surprising bass extension and tunefulness, and strong sense of musical truth—then significantly builds on them. What really distinguishes the F5 is the sheer volume of air that its additional woofers can move. The F5 created nicely weighted orchestral scale and scope, and vocalists of all genres were fully formed and fleshed out, with chest resonance, weight, and bloom. A veritable gift to budget-conscious audiophiles and the younger audience. While not flawless, the F5 is as faultless as a speaker is likely to get at this price. NG, 260



Emotiva Airmotiv T1

\$699

The Emotiva T1 has sonic attitude—a big, brawny sound that energizes listening spaces with potent dynamic thrust. The T1's warmer, somewhat darker character makes it a loudspeaker that paints the overall emotion and heart of a performance in broader brush strokes, but musically the T1 just brings it. The jewel in the T1 crown is the 32mm folded ribbon tweeter, which is a thing of beauty—airy, textured, and transparent. Seriously, folks: a high-octane sonic ride for just shy of seven hundred bucks, what's not to like? NG, 278



Magnepan MG .7

\$1395

The latest (and greatest) “mini-Maggie,” this modestly sized, two-way line-source floorstander uses all quasi-ribbon drivers (as opposed to the mix of quasi-ribbon and planar-magnetic in the MMG). The result is a superior blend between tweeter and mid/bass, with much better power-and-bass-range speed, low-level resolution, tone color, and extension. Though the .7 benefits on some (chiefly large-scale) music from the addition of a subwoofer, reviewer JM thought that, all by its lonesome, it was shockingly realistic on acoustic instruments (and equally swell on a good deal of rock). JV agreed completely. JM/JV, 250



GoldenEar Technology Triton Five

\$1999

Sandy Gross, the proprietor of GoldenEar, may be the Babe Ruth of reasonably priced loudspeaker designs. With the Triton Five, the gregarious Gross has hit yet another one out of the park. The Triton Five is a remarkably low-distortion design that belts out Led Zeppelin but also has the finesse to reproduce the most finely filigreed musical passages. A high-velocity ribbon driver helps account for the purity of the treble. Four side-mounted sub-bass radiators allow it to plumb the depths of the sonic spectrum. Not least, it's also an elegant and unobtrusive-looking design that should appeal to a wide range of listeners. JHb, 255

Our Top Picks Floorstanding <\$10k



Monitor Audio Silver 300

\$2000

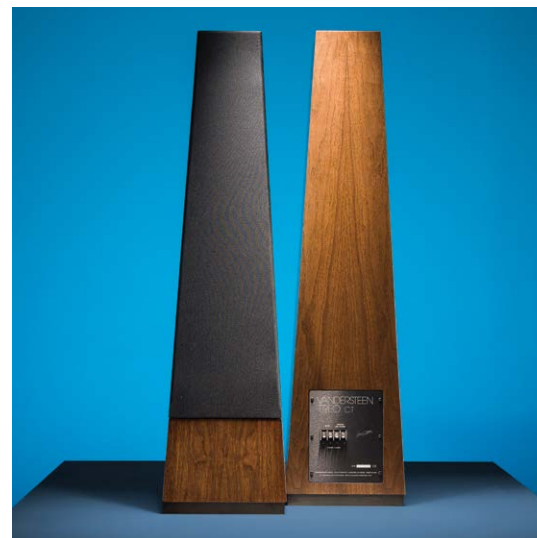
A three-way, four-driver speaker (dual six-inch woofers, 4-inch midrange, 1-inch tweeter) housed in a cabinet that looks far too nice for this price range, the Silver 300 offers a compelling array of musical virtues. Chief among these is the Silver 300's terrific speed on transients, effortless reproduction of dynamics, and overall sense of musical coherence. The bass is detailed and resolved, providing a clear sense of pitch. This is one very well designed loudspeaker and a great value. RH, 282



Larsen Model 6.2

\$3995

This remarkable floorstander effectively overcomes the room-interaction problems that plague conventional speakers. Specifically, the Model 6.2 is designed to be positioned against a wall rather than out into a room. Rather than coloring the sound and degrading imaging, this placement helps the 6.2 shine, producing a smooth bass balance and a superb soundstage. Even in a hotel-room demo, with the Model 6.2 flanking a dresser, the speaker threw a convincing soundstage. Andrew Quint, 276



Vandersteen Treo CT

\$7990

A loudspeaker of uncommon musicality and precision. Building upon the R&D that went into the flagship Model Seven, the four-driver, medium-scale Treo CT conveys a single-driver-like coherence that immerses the listener in the very moment the recording was captured. It combines uncanny image specificity, color, and texture with an enveloping sense of air and immersion. At least some credit must go to the Model Seven-derived CT (carbon tweeter), which is as transparent and open as it is extended. Basically a passive version of the Quattro Wood CT, the Treo may not have quite the serious bass slam of that model, but you hardly miss it due to its excellent pitch definition. NG, 262



MartinLogan Impression ESL 11A

\$9995

This latest hybrid from MartinLogan combines an electrostatic panel with dual 8" woofers—but with a twist. ML has added DSP room correction in the bass, greatly improving pitch definition, transient fidelity, and one's ability to follow bass lines. Compared with its predecessor, the highly regarded Montis, the ESL 11A is a bit more forward and assertive. The virtues for which electrostats are famous are abundant—transient speed, clarity, and resolution of ne detail. PS, 281

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FLOORSTANDING >\$10K

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"The **Focus SE** let the music soar in unbridled splendor. Fortissimos and crescendos emerge unfettered, clear, and lifelike."

F. Alles, *StereoTimes*

"I can say with full conscience, that they are truly amazing."

J. Johnson, *Secrets of Home Theater & High Fidelity*



LEGACY



"The **Legacy Aeris** is the avatar of what the next generation of speakers should be. It is a truly full-range speaker, with bass deep into the subwoofer region, outstanding performance at every frequency to the limits of hearing and beyond, excellent definition, outstanding dynamics, and a visual image that might win it an entry to the Museum of Modern Art in New York."

A. Cordesman, *The Absolute Sound 235*

"The **Aeris** is a major accomplishment. Simply the finest loudspeaker system I've had the privilege of hearing."

J. Darby, *Stereo Mojo*

"Without question one of the greatest values in high end audio."

R. Youman, *Positive Feedback*

"The **Signature SE** towers have some of the best overall bass response and accuracy of any speaker I have ever heard. Throw in the easy-to-drive nature of these speakers along with their excellent build quality and you have one heck of a bargain in the high-end audio world."

T. Stripko, *Secrets of Home Theater & High Fidelity*

"Whether it was music or films, there was no content that failed to impress with its incredible imaging, effortless dynamic range and tonal purity."

D. Upton, *Home Theater Forum*

"The **Signature SE's** produced a clarity and an ease of musical performance which I never experienced before."

W. Kemper, *HiFi Statement & Positive Feedback*



"The **VALOR's** imaging from the original signal is preserved with greater clarity than ever before."

G. Dellasala, *Audioholics.com*

Most Significant Product Introduction, RMAF 2017

A. Quint, *The Absolute Sound*

"A new technology developed by Legacy Audio...is aimed at the aural equivalent of making the jump to light speed. SUT (Stereo Unfold Technology™) ... created images that were life-size, and separated in space across a wide, deep soundstage."

J. Stancavage, *PartTimeAudiophile*



Equipment Report

Legacy Aeris with Wavelet Processor

Wishes Granted

Anthony H. Cordesman

In my initial review of the Legacy Aeris (Issue 235) I found that it was an excellent speaker for its price. The addition of the new Wavelet processor, however, makes a great speaker even better.

The Wavelet is a stand-alone electronic processing component that combines a DAC, a digital and analog preamp, electronic crossover, and far better room-correction features than were provided by Legacy's original Wavelaunch processor for the Aeris. The end result is a combination that integrates electronics and speaker design in ways that not only do more to solve room-interaction problems, but produce cleaner and more musical sound at every dynamic level.

The Wavelet also provides the kind of defeatable adjustments in the bass and the lower midrange that should be in the electronics and not the speaker, and which can help make many recordings sound more musical and realistic. Moreover, the Wavelet is the answer to my one major wish for an improvement in the original Aeris design: It provides automatic set-up and room-correction adjustment features. In fact, they are a snap to operate.

The combination of the Aeris and the Wave-

let are also relatively affordable by the steadily escalating pricing of the high end. The Legacy V that I reviewed in Issue 258 is the best speaker I've encountered with room compensation, but it costs \$49,500—daunting even to most dedicated high-end audiophiles. Legacy has adapted the same Wavelet unit it developed for the Legacy V for use in the Aeris at a much more affordable \$24,475. Moreover, users who already have the Aeris can buy the Wavelet for \$4950, and the price for a consumer who wants to trade-in his original Wavelaunch processor supplied with the Aeris will be \$3450.

Key Features of the Aeris

I'm not going to repeat most of the content in my initial review, but even a brief look at the photos of the Aeris in the Legacy website will show you that it is one of the most attractive pieces of sculptured woodwork in audio.

To provide a short refresher course, its features include:

- A cardioid-shaped radiation pattern to decrease boundary coloration from sidewalls while decreasing modal sensitivity at low frequencies.



- Increased dynamic range and waveform tracing accuracy by employing drivers with higher sensitivity and greater acceleration. The high-flux magnetic motors of the midrange drivers are larger than on most bass drivers.
- The Legacy dual AMT (Heil) design employs a 4" folded ribbon that hands off to a similar 1" unit at the shorter wavelengths. The AMTs integrate with a high-efficiency 8" midrange that together cover over seven octaves at a sensitivity of 98dB, and that I found helped produce something close to point source sound, in spite of the Aeris' overall size, and to be smoother and more natural in the midrange and treble than any similar driver I've yet encountered.
- A titanium-encrusted 8" midrange with an enormous motor structure imported from Italy.
- A 10" mid/bass and dual 12" subwoofers with a linear volume displacement of nearly 200 cubic inches. The bass section is powered by a cumulative 1000 watts of included ICEpower Class D amplification and offers exceptional extension to 18Hz. (Separate 500-watt

full-bandwidth ICEpower amplifier modules are used for each of the 12" woofers to reduce intermodulation distortion and prevent the user's main amplifier from encountering up to 40 volts of back EMF generated by the Aura motor system used in the woofers.)

- Reverberation is minimized by reducing side-wall reflections via the radiation nulls to the side of the speaker. This open-air arrangement behaves as a dipole from 80Hz to 3kHz, summing into a cardioid pattern with the bass drivers in the band from 80Hz to 200Hz. Listening panels in controlled trials have determined that imaging precision and soundstage width is consistently improved over the Legacy Focus system, for example, which exhibits an otherwise-similar monopolar driver layout.

The Wavelet's Key Features

The new Wavelet provides a far more flexible and capable package of electronics than the combination of the Aeris and the Wavelaunch electronics that I reviewed in Issue 235. The Wavelet is a full-featured outboard analog and

Equipment Report Legacy Aeris with Wavelet Processor

SPECS & PRICING

Type: Frequency- and time-domain-optimized 4.5-way loudspeaker with directivity controlled array

Tweeter: 1" AMT neodymium ribbon

Upper midrange: 4" AMT neodymium ribbon

Midrange: 8" cast-frame, titanium-encrusted diaphragm, dipolar configuration (open baffle)

Midbass: 10" cast-frame, carbon-fiber/pulp diaphragm, dipolar configuration (open baffle)

Bass: Dual 12" aluminum diaphragm, Aura neodymium motor, sealed enclosure

Frequency response: 18Hz-30kHz +/-2dB

Impedance: 4 ohms

Sensitivity: 95.4 dB @ 2.83 volts/1m in-room

Recommended amplification: Bass section is powered internally with dual 500-watt

ICEpower amplifiers; 30 watts or greater required for upper section

Crossover: 80Hz, 2.8kHz, 8kHz

Inputs: 1 pair of external binding posts, 1 XLR balanced inputs

Dimensions: 14.5" x 58" x 16"

Weight: 171 lbs.

Price: \$22,975

LEGACY AUDIO

3023 E Sangamon Ave.

Springfield, IL 62702

(800) 283-4644 or

(217) 544-3178

info@legacyaudio.com

legacyaudio.com

digital preamp. It also provides automatic setup, including adjustment of the levels for its electronic crossover and channel balance, and far better room compensation than the earlier Wavelaunch—compensation that helps eliminate the coloration from unwanted room reflections.

The Wavelet includes two pairs of XLR and two pairs of RCA stereo inputs, and USB, RCA, and optical digital inputs for connection to an excellent 24-bit/96kHz DAC with switchable apodizing filtering. There is also an Ethernet port to keep the unit's software and firmware up-to-date. Wi-Fi operated remote-control software can be loaded into a iPad or smartphone, and provides precise volume and balance settings as well as a number of other features most

modern preamps lack.

Features also include easy switching between room-controlled and uncompensated sound, and settings for normal and reverse-stereo or mono operation. The unit also has four different settings for dynamic expansion, and one of the most practical equalization settings I've encountered. You can adjust playback as required to suit your taste or individual recordings. There are now four faders for bass-frequency contours centered at 50Hz, 100Hz, 150Hz, and 300Hz, a spectral tilt control hinging at 1kHz, and a brilliance control at 13kHz. The faders are visible on-screen at your remote and their effect is audible in real time. These controls are far more practical in compensating for the real-world differences in recordings than all but

the most advanced parametric equalizers. The latest software update allows the user to store/recall up to eight different contour settings.

The Wavelet's New Approach to Room Correction Software

The Wavelet does retain several important software features that were in the Wavelaunch.

Built-in software uses an algorithm to divide the left and right inputs with a customized high-pass and low-pass network to form a stereo two-way crossover. The transfer function for each loudspeaker is pre-programmed at Legacy for linear output from each driver, correcting minor anomalies inherent in the combined array. The output side of the matrix is factory configured for Aeris, the input side (left side of the matrix display in the software) is for you or your installer to make adjustments in your room.

Software includes an empirically derived algorithm that is integrated into the speaker design to compensate for the losses in low-frequency separation in most listening rooms by increasing the ratio of difference information in bass frequencies to more closely approximate half space (free space with ground plane).

What is radically different about the Wavelet, however, is that it debuts Bohmer acoustic processing. This is a system that can optimize the loudspeaker/room acoustic-transfer function in both the frequency and time domains. It uses a new set of algorithms, and starts with a psycho-acoustically based measurement method with the provided calibrated microphone.

Alignments are then individually optimized within an unprecedented 40ms window by way of a setup using a calibrated microphone and

wireless iPad, smartphone, or computer. The result is audibly improved transient response that allows the Aeris to operate accurately and consistently in any listening environment.

And here, let me stress a set-up feature that I failed to give proper emphasis in my review of the Legacy V. You do not put the mike at the listening position and try to average out what can often be serious variations in response in the bass with minor differences in microphone height, or if you rely on one seating position for setup, or try to create average settings over a wider area of listening positions. Instead you set the mike on axis with the Aeris' tweeter at a distance of 48" and then move it twice per channel—once to check phase and set the crossover and balance and once for room correction. I found the end result worked well with a wide range of speaker and listening positions, and produced consistently accurate measured results, where other units I've tested that place the mike in or around the listening position sometimes produce strange settings because the mike just happens to be in the wrong position. Moreover, no amount of tweaking the settings on the Wavelet to their extremes presented digital processing problems—something that can happen with room-correction devices that have more features than processing power.

The only limits I find to the Wavelet's features that will have an impact on most audiophiles are first—like virtually every preamp now on the market—it does not include a built-in phono section. Second, it uses Wi-Fi for remote operation, and while it works well with a decent Wi-Fi system, I prefer to use a computer with a wired connection.

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I should also note that the Wavelet does not attempt to get into the hi-res equivalent of the horsepower race at 384kHz and 32 bits. Legacy notes that “higher resolution files such as PCM and DSD can be readily played back through the Wavelet using software such as JRiver.”

In practice, however, I don’t find a limit of 192kHz/24-bits to be real-world limitation to sound quality. The room correction and other DSP processing in the Wavelet are very advanced. It uses an Analog Devices processor with an internal processing sampling rate of 96kHz and bit depth of 56 bits—a bit-rate that Legacy states is “56 bits of depth in a domain more than one trilliontimes finer in resolution than that of a standard CD.”

When it comes to actual recordings, I have not yet heard any reason to even go as high as 192kHz. Some of my colleagues disagree, but I have so far found rates above 96kHz/24 bits to be a waste of money. I do buy the 96kHz/24-bit version of the music I download or stream for safety’s sake, but most of the time, a good 16-bit/44.1kHz version of the same mastering of a recordings will sound exactly the same. One has to be very careful in paying what usually is nearly twice as much for the 96kHz/24-bit when there is no way to hear whether there is any difference, particularly with a modern DAC with really good filtering. Oddly enough, the better your DAC, the less likely you are to hear any difference.

As for streaming DSD, most DSD recordings have already gone through some form of PCM mastering before they are issued in DSD form. Moreover, I have yet to hear any comparison test that indicates high-rate DSD recording sound

better than 96kHz/24-bit recordings. I do keep my SACD player, but largely because I love classical music, and the SACD versions on disc are usually a bit more detailed and have more musical upper octaves than the CD version on the same disc. However, to the limited extent that I have heard direct comparisons of DSD and PCM files that some of my friends have made of the same performance on high resolution systems, I have heard no more superiority from DSD over 88kHz–96kHz/24-bit than I have heard from 192kHz/24-bit over 88kHz–96kHz/24-bit.

As for the rest of the Wavelet features, it does come with a small basic remote volume control, but what counts is the Wavelet app you can download for both setting up and operating the system. It provides exact volume and balance control, dynamic expansion and equalization settings, switchable room correction, and all the sophisticated control options I touch upon later. Just set up the wavelet for the form of remote control, leave it on continuously, and forget about the small remote entirely.

The Sound

I should stress from the outset that the Legacy Aeris with the Wavelet is a very good speaker even without the room correction switched on. To repeat some key points from my first review, the treble and upper midrange are realistic without any softening or, contrarily, any touches of hardness. The treble from the dual Air-Motion Transformer (Heil) folded ribbon tweeter is extended and provides all the air I could want. Equally important, its transition to the mid frequencies of the “titanium-encrusted” 8” midrange is virtually inaudible. Many of the designs

I’ve heard that mix driver technologies have at least minor sonic anomalies in the transition areas between them and you can sometimes hear the difference.

Even without the room correction switched on, the Aeris will reproduce the midrange of my best piano and violin recordings with the kind of accuracy that is sometime missing in even the most expensive competition. It does equally well with flute and clarinet and soprano voice, reproducing the difficult passages in voice in ways that still shows the strain a given singer was under but that add nothing in terms of hardness or coloration. It does an unusually good job reproducing the most difficult instruments in the sonic repertoire, like the harpsichord, and it is as natural with cymbals as my recordings allow.

As for the bass, the Aeris will reproduce most of the bass detail that is actually on even the most demanding bass spectaculars. Saint-Saëns’ Third, the deepest organ music, Kodo drums, Telarc bass spectaculars, bass guitar, synthesizer, take your pick.

Switching on the Bohmer room correction makes improvements that are a matter of nuance, not a revolution in sound, and it can take a few minutes to realize that less room resonance is a good thing and excessive, lingering, peaky bass is not. But, there is no question that the new room correction option makes a critical difference.

The Wavelet’s room correction is subject to well-chosen limits and will not produce perfectly flat response at the cost of excessive correction. It can still compensate to a great degree, however, for really bad speaker placement in

areas where there is too little bass or too much. It provides a capability that will make a vital improvement if you have a truly bad room, or you have to use a setup that is less than optimal because of the décor or other reasons. It does enough to get rid of the worst peaks—peaks which not only give the sound something of “one note bass character” but also excite room resonances and mask the midrange, the highs, and the details of the rest of the bass.

What is even more important to me, however, is that it also produces major sonic benefits even in a good room and a good location. The bass is much tighter, and transients are far better defined. You can hear the full range of bass without dominant peaks and fewer apparent suck-outs. Higher-level dynamics are cleaner, particularly in the bass. The Aeris does not have all of the power and bass detail of the Legacy V, but it can overdrive my room at every bass frequency that is musically relevant. Adding the Bohmer room correction means that the overall sound is much cleaner at higher volumes. There are fewer room-boundary problems, where higher bass levels mask the rest of the music to some degree or are too sustained to sound realistic. Room correction not only provides great bass detail, it does so more evenly.

The critical transition from the deep bass to the midbass is cleaner and more musically natural, as is the transition from upper bass to the lower midrange. This allows the Aeris to do a better job of cleanly reproducing the natural warmth of music that is present in good recordings and doing so more accurately. The middle and upper midrange and the treble become clearer when the hills and valleys in the

Equipment Report Legacy Aeris with Wavelet Processor

bass response, and excess room resonances, are reduced. This is something I've also noted in really good speakers without room correction and that measure exceptionally smoothly in the bass in a given listening room. Getting the bass right is critical to getting the best in midrange and treble sound.

Soundstage detail and depth become cleaner and more detailed, and imaging becomes notably more precise and natural in many recordings. The Aeris' soundstage is very good even without room correction, but the speaker seems to act more like a point source with room correction engaged.

Summing Up

The combination of the Aeris and Wavelet provide some of the most musically realistic sound I've ever encountered. They take digital processing and room correction a vital step forward, and show they can reach levels that are competitive with even the best purist speakers.

The ability to make firmware upgrades, as the interview attached to this review with Bill Dudleston (the chief designer of the Aeris) indicates, will lead Legacy and Bohmer to make steady improvements in processing, operating, and set-up features, and don't forget, as you look at the price, the Wavelet is also a really good analog and digital preamp and DAC as well.

If I now have a new wish, it's to hear what the Bohmer level of correction can do when applied to other brands of speakers. As the interview indicates, this is another wish that may end up being granted.



AHC Talks with Legacy's Bill Dudleston

Let's talk about the future of both your efforts in room correction and plans for the Wavelet. Any plans for a universal version of the Wavelet that could handle any speaker, including ones with a single input?

Yes. An example is already in the works. We are introducing a 750-watt flex-powered version of our Focus speaker, which can be driven three different ways; mono-amplified internally with a single input, bi-amplified with internal crossover, and bi-amplified with the Wavelet crossover. In all three variations the Focus XD can employ the room correction. To correct a generic speaker with a single input, we will offer a basic menu of target function choices, including excursion limit protection at low frequencies, and request the user input the best fit of the speaker's radiation pattern (e.g., omni full-range, omni bass with cardioid upper range, and dipolar). Another parameter to be input will involve the number of subwoofers in use if any.

If we can switch back to the Legacy Aeris and Wavelet, what adaptations from the room correction for the Legacy V did you have to make to suit the Aeris?

The room correction process remains the same with a very similar target function as the V. However, building the V system from the ground up using the Wavelet revealed several areas where we could get more performance

from the Aeris in the crossover region and in driver correction. Aeris is more coherent with the Wavelet in place before the room correction is even applied.

How is your approach to room compensation evolving? Have there been changes since the Legacy V review and what changes are you exploring? Will they all be possible through software changes?

Most of the recent improvements to the software have been made to improve setup and user control, such as the polarity check and level adjustments. We are now looking at the upper range of the reverberant field more closely. Here the density of reflection, spectral balance, and relevant temporal information are being studied along with the psychoacoustic weighting of this information. All improvements will be available through software updates downloaded to the USB stick and inserting in the Wavelet port.

The remote control features and software download commands are now accessed via Wi-Fi. Do you have plans for a wired network connection to realize software updates?

The prototype Wavelet originally hosted its own network, but this prevented the continual improvement to the remote interface and functions. The current method provides many advantages include control of multiple units

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AHC Talks with Legacy's Bill Dudleston (cont'd.)



simultaneously. Software updates will eventually be offered from the Legacy website, regardless of what port is used. Users will be allowed to subscribe to updates for a modest fee to keep the programming current.

Any potential for Wavelet to adopt MQA or higher sampling rates?

That really is a DSP question. The Wavelet will presently accept PCM files rates at high as 352.8kHz and higher. But remember Wavelet is not just converting a single sample of data per unit time, but correcting a 40msec window. This is equivalent to 14,080 samples to applying complex computations upon in real time.

A sampling rate of 96kHz is more efficient, consuming less processing power and sonically equivalent in the end. Think of a digital photo. A sharply focused image at 150 dpi will provide more real detail than a slightly out of focus image at 300 or 600 dpi. That is why it is the role of the Wavelet to sharpen focus in the time domain at 56 bits and then use apodizing to remove digital artifacts.

As you know I am a strong believer in the workings of Bob Stuart's MQA. I think if audiophiles experienced it, even if they didn't comprehend the genius of the solution it offers, they would realize that sonic improvements are not to be had by merely increasing sample rates. I hope the press gives MQA the attention it deserves. The consumer must

demand it for the format to gain acceptance.

We would then most certainly consider a license. While I will personally always record live in WAV, MQA is the best solution yet proposed to deliver music to the audiophile. No compromise in dynamics, noise floor, or audible bandwidth, yet file size is similar to a 16-bit WAV file. It is certainly a great replacement for FLAC, DXD, DSD, SACD. Today, music should not even be distributed in MP3, AAC, WMA. These formats should be used in talking appliances.

Your literature describes the way the Wavelet reduces room reflections, but does not describe frequency correction. How does the Wavelet do this?

First the loaded algorithm corrects the loudspeaker frequency anomalies in each channel of output, independent of the room. Let's say we have a shallow dip at 1800Hz, for example, but next to it is a sharper rise in response at 2200Hz. Previous methods would apply a broad boost at 1800Hz, and a sharp cut at 2200Hz using filters that introduce phase shift. While this can make the frequency response appear smoother at a single mike position, the ear is aware something is still wrong in the time domain and the power response. Time domain measurements substantiate this.

The Wavelet applies a totally different approach. First of all, it will not force the frequency response flat at the expense of transient behavior. It will address the cause of

the problem and make a psychoacoustic correction weighing the time domain heavily. The Wavelet's software will identify domain errors introduced by stored energy in the diaphragms, which are ultimately the actual cause of the peaks and dips. It will undergo iterative calculations to determine the most optimal solution with regard to phase to preserve transient response. It may apply a gentle lift if energy is lacking, or remove a resonance in the diaphragm material but the time domain will always be improved in the process.

The room correction continues in the same manner, with emphasis on treating errors introduced by boundary interaction. It does not merely notch response due to room resonances. It instead works to prevent these resonances from forming by looking for late arrival of redundant information in the measurement process. Resonances take quite a while to build up. Even a simple floor to ceiling axial resonances requires at least 16msec to form. The problematic buildup from the wall behind the speaker usually requires less than 8msec in comparison.

This old information is predicatively and literally fed forward in time, canceling its own presence. It is not accomplished relative to a position or multiple averaged positions in the room but relative to the launch from the speaker itself. It is unique in this manner. The process really should be described as automated loudspeaker adaptation instead of room correction. We didn't change the room a bit! **tas**

Equipment Report

Ryan Speakers Tempus III

Not To Be Missed

Andrew Quint

For the 2015 Rocky Mountain Audio Fest, my beat was loudspeakers costing less than \$20,000 per pair and, in advance of the trip to Denver, I meticulously studied the show guide and made a list of all the rooms I'd need to visit. Well, not meticulously enough. TAS's RMAF reports were up online within a week of the event and an early visitor reading my account wanted to know how I felt about the Ryan Speakers Tempus IIIs. Oops. I'd missed them, and posted my *mea culpa*. Fortunately, Robert Harley *had* heard the speakers and wrote that they "offered outstanding performance. Watch for a full review." It took over six months for a pair to become available but sometimes good things come to those who wait. Or can't read an audio show guide.

Perhaps I can be conditionally absolved for overlooking the brand in Denver last fall because Ryan Speakers had only been in business for about two years at the time. I should say *back* in business because from 1986 to 1993, Todd and Trevor Ryan of Riverside, California, made a number of well-regarded loudspeakers as Ryan Acoustics. (The MCL-1 bookshelf model was reviewed positively way back in TAS Issue 61.) The brothers have not been away from

the loudspeaker business since Ryan Acoustics closed shop. Todd has worked at Sonance for two decades, currently as the chief designer for this leading manufacturer of "architectural speakers." Trevor, for a time, was a principal of Motus Audio, which makes speaker drivers. The Ryans returned to producing their own audiophile loudspeakers in 2013 with Todd as Director of Design and Development and Trevor as Director of Operations.

The Tempus III sits atop a line of four models that starts with the R610, a two-way bookshelf speaker priced at \$2000 per pair, and moves up the range to two-and-a-half-way and three-way floorstanders, the R620 at \$3500 and the R630 at \$5000. The \$15,995 Tempus III is a 165-pound four-way design that employs a 1.1" chambered beryllium dome tweeter, a 4" midrange, a 6.5" mid/woofer, and a pair of side-mounted 8" woofers. Like many manufacturers, Ryan's drivers are manufactured in China—a fact that many prestigious high-end loudspeaker-makers tend to deemphasize. With this company, there's an important difference. Because of his position with Sonance, Todd Ryan actually lives for half of each year in Guangdong, the southern Chinese province where the country's booming



Equipment Report Ryan Speakers Tempus III

electronics industry is located. He not only designs the drivers that are unique to Ryan speakers but also oversees their manufacture to a far greater degree than do other North American and European companies. Speaker manufacturers have their drivers made in Asia, of course, for economic reasons and there's a perception among some consumers that the quality of the work and labor conditions are potentially suspect. Trevor Ryan addressed the issue forthrightly when asked about it, explaining that workers in southern China generally come from the central and northern parts of the country to work in the electronics industry. "These workers have two long holidays when they travel back home to spend time with their families. If

SPECS & PRICING

Type: Four-way, ported enclosure

Driver complement: One 1.1" chambered beryllium dome tweeter, one 4" midrange, one 6.5" mid/woofer, two 8" woofers

Frequency response: 24Hz–35kHz

Impedance: 6 ohms nominal, 4.1 ohms minimum

Sensitivity: 88dB

Dimensions: 10.75" x 48" x 27.5"

Weight: 165 lbs.

Price: \$15,995

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the working conditions and salaries were really unacceptable, they would find other places to work—but that is not what occurs in the factories that we have partnerships with. For us, the best sign that an employee cares about and enjoys what he is doing is that he returns year after year to the factory. Over time, these people become highly skilled. Many are promoted and work their way up through the factory."

Todd Ryan has advanced modeling software and instrumentation at his disposal and strives to achieve several sorts of "symmetry" in his driver design—symmetry of driver mechanics, magnetic symmetry, symmetry of the voice coil's inductance, and symmetry of the mechanical resistance of the drivers' suspensions. The midrange, midwoofer, and bass drivers all incorporate Ryan Speakers' proprietary diaphragm material, a laminate of Kevlar and Nomex. Bonding the two dissimilar materials together has the effect of eliminating the acoustical breakup each would have on its own. Ryan's Kevlar/Nomex laminate is very light—the midrange driver, for example, weighs only 4.5 grams. The Tempus III tweeter includes a Truextent beryllium acoustic dome "renowned for its extreme stiffness and low moving mass." It features a die-cast aluminum faceplate and a large receptacle behind the dome to minimize backpressure from the tweeter's rear wave.

Unlike the drivers that, under Todd Ryan's watchful eye, are made on the other side of the world, the cabinets are built in Riverside CA by an American company that actually produces enclosures for several other high-end loudspeaker manufacturers. The Tempus IIIs are substantial speakers, though Ryan explained that the driv-

ers and crossovers account for nearly 50 of the speaker's 165 pounds. The cabinet is fabricated from MDF an inch thick on all sides. (The exceptionally rigid side panels are made from four laminated ¼" MDF layers.) There's extensive internal bracing with ¾" MDF—two braces in the vertical direction and five horizontally. The midrange and midwoofer have their own sub-enclosures; the woofers' air space goes up behind these sub-enclosures to the top of the speaker. The bass chamber is ported near the floor. Todd Ryan told me that listening tests demonstrated that "placing the port tube in close proximity to the woofer produces the most cohesive low-frequency response." The side-firing woofers are connected in phase to minimize vibrational energy that could potentially be transmitted to the cabinet. The woofers are crossed over to the mid/woofer at a lower frequency (100Hz) than usual for configurations of this sort, and Ryan notes a positive influence on the "placement sensitivity" sometimes seen with side-mounted woofers. Ryan's literature is a bit mysterious regarding details of the Tempus III's crossover network, describing it as "a highly complex four-way design" that employs high-order, asymmetric slopes. Top quality parts are used—Clarity capacitors, Mundorf resistors, Solen inductors—and it's explained that because the large inductors in the woofer and mid/woofer crossovers can behave like "antennas broadcasting audio signals to any other inductors close enough to receive it," the crossovers are physically separated within the large cabinet.

The shape of the Tempus III approximates a backwards-leaning trapezoid, the tilt helping to assure time-alignment of the three drivers

mounted on the front baffle. The enclosure is quite deep at 27½" but a sense of massiveness is substantially mitigated by the narrow width of the speaker, from 8½" to 10½". (The sides of the Tempus III bow out slightly.) With tow-in as recommended, the speakers' sides are barely visible from the listening position, and I never felt that they visually overwhelmed the room. The Tempus IIIs are finished with a choice of wood veneers; they're not sexy but the workmanship is exemplary. The two sets of binding posts on the rear panel are of Ryan's design, machined from solid oxygen-free copper plated with nickel, suitable for either spades or banana plugs. Inside the speakers, the binding posts are soldered directly to the crossover network.

The Tempus IIIs arrived carefully packed in cardboard boxes with a well-judged amount of supporting foam. Unboxing them is definitely a two-person job but once the speaker is upright, one can move them unassisted without much difficulty before installing the supplied spikes. The 12-page owner's manual has excellent setup instructions. The Tempus IIIs have a driver arrangement and dimensions that are very similar to the Audio Physic LJE Cardeas loudspeakers considered in Issue 266, and I started by placing the Ryans where the German speakers had fared well. This ended up being close to the ideal location. After I'd had the speakers up and running for a few weeks, Todd and Trevor Ryan, visiting some of their East Coast dealers, stopped by to listen for a few hours and optimize the setup. Other than to assure that the Tempus III were perfectly level, pretty much all they did was to toe the speakers outward a few degrees—which did make a substantial improvement, in

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terms of solidifying images. When all was said and done, in my 225 square-foot room, the Tempus IIIs were about eight feet apart (center baffle to center baffle), between 18" to 22" from the wall behind the speaker, and approximately nine feet from the ideal listening position. Two sets of monoblock amplifiers were used, in turn, to power the Ryans, Pass XA60.8s as well as David Berning Quadrature Zs, and an Anthem D2v pre/pro was consistently in the system. Sources were an Oppo-93, a VPI Scoutmaster with JMW tonearm and Sumiko Blue Point EVO III cartridge played through an Audio Research PH2 phono-stage, and a Baetis Reference music computer. Interconnects were Transparent, except for the Shunyata Anaconda AES/EBU used from Baetis to Anthem.

The Ryans strongly urge users to bi-wire the speakers, and hope you'll remove the nickel-plated brass jumpers with which the Tempus IIIs are shipped. I began my listening with the jumpers in place, utilizing my usual Transparent Ultra (Generation 5) speaker cables. The only bi-wire set I own are the outrageously over-achieving AntiCable Level 2 Performance Series model (\$164 for a six-foot pair!) and I was more than a bit surprised at the improvement I heard in transparency, dynamic nuance, and soundstage continuity when I substituted them for the Transparent cables. When Trevor and Todd visited, they brought a set of Cardas Clear Beyond bi-wires for me to borrow. These cables moved the dial further in a positive direction, providing a better sense of openness and tonal complexity (they damn well better, at roughly \$10,500 for an eight-foot pair) but given the degree of improvement heard with the Anti-

Cables, I wondered if the supplied jumper bars might be degrading the sound. I had on hand a set of Transparent "bi-wire adapters," specifically designed to replace the jumper bars in a bi-wireable speaker like the Ryans, and found that they narrowed the gap in performance between the Transparent single-wire and the AntiCable bi-wires. I do feel that bi-wiring is preferable with the Tempus IIIs—it usually is with most loudspeakers—and kept the Cardas product in place for most of my evaluation. But I do wonder if Ryan should revisit the composition/design of the jumpers it supplies, recognizing that some customers, for various reasons, are going to decide on the single-wire option.

The Tempus IIIs were the only loudspeaker in my reference system for five weeks and I thoroughly enjoyed their residence. With both tubed and solid-state amplification, the Ryan flagship was highly effective in communicating the musical meaning of whatever reached its binding posts. The sound was vital more than it was vivid, the kind of speaker that might not stop you in your tracks at a dealer but, at home, encourages you to listen straight through two-disc concert albums. Whether the material was chaste ("Will We Gather at the River?" from Anonymous 4's *1865*) or majestic (the brass chorales in the finale of Bruckner's Symphony No. 5, as performed by Benjamin Zander and the Philharmonia Orchestra) the Tempus IIIs consistently locked on to the basic character of the music and largely eliminated themselves from the equation.

The Ryans are not super-detailed loudspeakers, yet their reproduction of vocal and instrumental texture is very specific, and thus

realistic. The Hagan String Quartet, in concert and on SACD, manifests a gorgeously blended sonority that can be heard especially well in the Andante movement of Beethoven's Quartet in D major, Op. 18, No. 3. There are good reasons for their richly complex yet homogenous ensemble sound—these musicians have been playing together for a long time (three are siblings) and they use a set of matched Stradivarius instruments—and the Tempus IIIs permit one to savor it fully. Or listen to Ricki Lee Jones's eponymous first album, to the "rightness" of the tonality of her youthful voice, a slight roughness superimposed upon an almost childlike quality. The Ryan's ability to deliver natural musical textures is a significant advantage, as there is such a thing as too much detail. Most of the vocals on Lyn Stanley's *Potions from the 50's* were recorded at a different time, in a different studio than the jazz instrumental accompaniments. An over-analytical speaker could reveal that fact to a distracting degree but the Tempus III's give a convincing impression of a performance occurring in real time.

When it comes to issues of spatiality, the Tempus IIIs perform quite well. A superb orchestral recording dating from 1958 that I only recently came to know is a selection of movements from Tchaikovsky's *The Nutcracker*, Efrem Kurtz conducting the Philharmonia. (The Parlophone original was remastered for an XRCD on the Hi-Q Records label.) With both the Pass and David Berning amps, the soundstage was gratifyingly broad and deep, and the degree of instrument localization within the soundfield was believable, specific without having an over-etched quality. Likewise, the scaling of instrumental

and vocal images was redolent of a live concert experience, as demonstrated on another recently issued XRCD with soprano Mariella Devia as the featured performer in an all-Mozart program (Master Music XRCD24-NT018.) With "Regina coeli," K.108, the Ryan speakers neither exaggerate nor minimize the relative acoustic masses of soloist, chorus, and orchestra, the proportions of which contribute significantly to the naturalness of the 1997 analog recording.

In terms of tonal balance, these speakers do not editorialize. The human voice lives, of



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course, in the critical midband and if a vocal is aggressively recorded and equalized, that's what you'll hear: "Baltimore" from Lyle Lovett's *Joshua Judges Ruth* was an example that came up as I listened to favorite albums. That's not to say, however, that dynamics present on the original recording are in any way suppressed. The Rickie Lee Jones album noted above was recorded well before the onset of egregious dynamic compression of pop recordings. The emotional intensity of the climax to the song "Last Chance Texaco" comes through loud and clear with the Ryan speakers.

Though rated down to 24Hz +/-3dB, the Tempus III's low end doesn't register as especially prodigious. This may be a good thing, the consequence of a well-executed side-firing woofer system, which can minimize standing wave problems. I always use DSP room correction that, as performed by the Anthem pre/pro ARC software, allows the user to choose how far up the frequency spectrum to apply the correction. The Tempus IIIs required less correction than any other loudspeaker I've had in my room—only up to 500Hz (5000Hz is more typically necessary to smooth out irregularities.) Bass was naturally connected to higher frequencies, without bloat or overhang and with excellent pitch differentiation. By no stretch of the imagination was the low end in subwoofer territory, qualitatively or quantitatively. There wasn't china-rattling, pant-leg-flapping bass, the gut-wrenching visceral impact that so many audiophiles seem to crave—and the musical validity of which I often question. I listened with great satisfaction to the Philadelphia Orchestra's recording of the Saint-Saëns "Organ" Sym-

phony, ripped from my Ondine SACD. I was at one of the concerts in May of 2006 from which this recording derives, sitting in Row L. Though the experience was thrilling, with the orchestra and organ (the largest concert hall instrument in the U.S.) playing full out, there was no pant-leg-flapping going on at Verizon Hall that night. Good bass reproduction is about more than just visceral sensation.

The Ryan Tempus III is a smartly designed loudspeaker, the most ambitious commercial effort to date from an engineer with both high-end ideals and extensive manufacturing experience. Most speaker designers piously maintain that the decisions they make are in the service of creating a musical device, even as the emphasis of their promotional efforts (and the coverage their product receives) tend to emphasize exotic materials, unusual aesthetic choices, and ear-grabbing elements of the audiophile's perceptual palette—detail, sound-staging, bass extension, and so on. Sometimes, an audio product can add up to more than the apparent sum of its parts. Consider this as well. The price of Todd Ryan's best effort is around the same as "entry level" models from a number of higher cachet brands. This is not because Todd Ryan has cut corners in any way. If your speaker budget is up to \$20k, by all means listen to the usual suspects but also try to audition the Tempus IIIs—the company now has around 30 dealers and is steadily adding more. You may conclude that it represents one of the more exceptional values in a full-range audiophile loudspeaker that's available. As for me, I won't be missing Ryan Speakers at shows anymore. Promise. *tas*

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Equipment Report

Paradigm Persona 9H

Sleek, Sophisticated, Stylish

Anthony H. Cordesman

Photos by Dennis Burnett

Let me begin with the conclusion. The Paradigm Persona 9H is a new assault on the state of the art in speaker design by one of Canada's leading companies. It may cost some \$35,000 a pair, but it's one of the best speaker systems I have ever had the opportunity to listen to or review.

The Paradigm 9H has superb upper-octave and midrange response, and it can deliver flat, detailed, and room-corrected bass that normally requires a massive separate subwoofer. Soundstaging and imaging are equally excellent. As is the case with every top speaker, the nuances of its voicing and physical style are matters of taste, but this is a truly exceptional product that merits high praise.

Why begin with the ending? Because it is all too tempting to focus on the Paradigm 9H's exceptional bass and room-correction features, and this would be distinctly unfair to the speaker. The Paradigm 9H joins the Legacy V and Legacy Aeries in showing that room correction can really work and provide truly accurate deep bass, even in a speaker that is relatively small by reference-quality standards.

In recent years I have been steadily more impressed with the fact that today's speakers have

improved to the point where the average real-world listening room is more of a problem than flaws in the transducer. Really demanding experimentation with speaker placement, room treatment, and the use of separate subwoofers can get around this, but often at the cost of letting the audio system dominate the décor, making a dedicated listening room a necessity, and still living with significant problems in the mid-low to low end.

Features and Technology

Paradigm describes the 9H as a "6-driver, 3-1/2-way hybrid floorstanding system with active-bass acoustic suspension. Its room correction only applies below 500Hz, and there is no room correction or active circuitry that plays any role in affecting the sound of your system in a range from some 40kHz to 500Hz."

On the face of it, the Paradigm 9H's frequency specifications seem almost too good to believe: $\pm 2\text{dB}$ from 19Hz–45kHz on axis, and $\pm 2\text{dB}$ from 19Hz–20kHz off axis. My limited home test gear isn't close to the level of confirming whether such specifications are accurate, but the 9H does have better in-home RTA, pink noise, and warble tone measurements, once it is room corrected, than any



Equipment Report Paradigm Persona 9H

other speaker I have reviewed. Paradigm also has very advanced test facilities, and a good reputation for making honest claims.

More importantly, listening tests also show that the 9H is a superbly integrated speaker without any audible peaks or colorations at any point in its frequency range—and not simply at low or moderate listening levels. It easily deals with complex dynamics up to listening levels that go far beyond my taste and tolerance.

While it may or may not matter in your system, the 9H is also exceptionally efficient. Its sensitivity is rated at 96dB in-room—which is high enough to allow you to use certain low-powered triode tube amps for the treble and midrange (and let the 9H's active electronics handle the bass). The room correction in each of two pairs of woofers is used in conjunction with separate DSP-controlled 700W amplifiers—providing a total of 1400W RMS (2800W dynamic peak).

In the mids and treble, the Paradigm 9H is rated for use with amps from 15 to 500 watts, and could take all the power my ears could stand from a pair of PS Audio BHK Signature 300s without coloring the peak passages from music like Saint-Saëns Third Symphony. As for rock, this is a speaker where you would have to push even bass synthesizer and guitar sound to ear-damaging levels to hear coloration in anything approaching a normal listening room. Its combination of power and efficiency helps give the Paradigm 9H outstanding life and dynamic realism even in very loud, complex passages.

The treble and midrange drivers are also exceptional and as important to the 9H's success as its bass drivers, power, and room correction. The speaker has a 1" beryllium tweeter and a 7" beryllium



midrange driver, crossed over with third-order slopes at 2.4kHz and 400Hz. It is the first speaker I've heard with a beryllium midrange, and while I've come to be extremely cautious about singling out any given driver material or technology as uniquely better, these particular beryllium drivers do provide remarkably clean and detailed sound over an unusually wide, stable listening area. They are as good at keeping solo instruments and "small music" natural in imaging and depth as they are at resolving the soundstage details of complex operas and choral music.

Once again, I've found that enclosure design tends to be like driver design; individual design-

ers may favor one choice over another, but the execution of a given approach tends to be more important than the particulars. In the case of the Paradigm Persona 9H, the manufacturer states that "completely inert enclosures begin with seven layers of wood composite material and viscoelastic adhesive placed in a custom press. The enclosures are treated with radio-frequency energy to accelerate the curing process, which takes almost a week to complete. The result is a strong, constrained-layer-damped enclosure that's the perfect acoustical foundation to build upon."

It is well worth looking at the Persona 9H brochure on the Paradigm website to get an idea of just how complex the enclosure bracing and subwoofer layout is. This is critical in a speaker that utilizes four ultra-high-excursion 8.5" woofers and relies on a balanced vibration-canceling configuration (two front-firing, two rear-firing) to go so low in the bass, uses full room correction, and delivers even the lowest bass at high levels when the musical dynamics require it.

I got better and smoother bass out of the Paradigm Persona 9H in a variety of room locations than I have with any other system that did not have room correction. Moreover, it outperformed any other pair of speakers—or pair with separate subwoofers—that did have room correction. It measured better; it did a better job with a wide range of bass warble tones; and, most importantly, it sounded better with organ, jazz, rock, and the kind of sonic spectacles you may hate as music but can't resist using to test your system.

Its size is also remarkably easy to live with. The 9H isn't small, and each enclosure does weigh 190 pounds. Its measurements of 11.875" x 51.75" x 20.5" are also scarcely petite. At the same time,

this is still a size that is compatible with most real-world listening rooms, most decors, and most partners and roommates. Its form factor is particularly critical when so much bass power has to be delivered in a relatively small package.

Talking about a speaker's wife acceptance factor (WAF) is now deservedly "DWM" and politically incorrect. At the same time, most of us are going to appreciate having a speaker that does not dominate the room but does have the ability to use its room correction to equal or outperform far larger integrated speakers and systems with separate woofer towers or pairs of properly located subwoofers, *and* avoid highly visible room treatment. Unless you like being a hermit (hermitess?) in your sound room or audio cave, there is real merit in being able to listen casually to music, and demonstrate your system to non-audiophiles as if the music were what matters, and you hadn't turned the system into an object of pagan worship.

About the only caveat I can think of in this respect is that the Paradigm 9H has good techno styling, but it also has exposed drivers with mildly psychedelic grilles over its tweeter and midrange driver. Exposed drivers are scarcely uncommon in high-end speakers, but some of us work, live, and play with non-audiophiles. Many visitors liked or ignored the 9H's physical design, but were more than mildly amused by the tweeter and midrange's unique driver grilles. These grilles' unusual design and appearance, however, serve an important technical function, as explained in the accompanying interview.

The Music

Let me again stress that the Paradigm 9Hs have far more going for them than superb bass perfor-

Equipment Report Paradigm Persona 9H

SPECS & PRICING

Type: 6-driver, 3-1/2-way hybrid floor-stander with active-bass acoustic suspension

Crossover: Third-order electro-acoustic at 2.4kHz (tweeter/mid), third-order at 400Hz (mid/front bass), second-order at 200Hz (rear bass)

Amplifier: Each woofer pair is powered by a separate DSP-controlled 700W RMS amplifier

Room correction: Anthem Room Correction, with included calibrated microphone

Frequency response: On-axis, ±2dB from 19Hz–45kHz; 30° off-axis, ±2dB from 19Hz–20kHz

Drivers: 1" beryllium dome tweeter; 7" beryllium mid/bass; four 8-1/2" woofers

Sensitivity: Room/Anechoic, 96dB/93dB

Impedance: Compatible with 8 ohms

Suitable amplifier power range: 15–500 watts

Maximum input power: 400 watts

Dimensions: 11.875" x 51.75" x 20.5"

Weight: 190 lbs.

Price: \$35,000/pr.

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mance. I used them as well as my own reference speakers—the Magico S7 and Legacy Aeris—in trying the new PS Audio Directstream Memory Player. I had some initial doubts about the ability of any new disc player to reveal more of the music on CDs, SACDs, and high-resolution discs like the Reference Recordings HRx series of 176.4kHz/24-bit discs—as well as some high-resolution discs made by my friends.

The tweeter and midrange in the Paradigm 9Hs did a superb job of revealing fine transient details in the midrange and highs, and making it immediately apparent that the PS Audio Directstream Memory Player did make real—if subtle—improvements in the sound of virtually every type of disc, in a direct comparison with transports like the Oppo BDP-105D and the earlier PS Audio. The improvement in life, detail, and upper-octave clarity was most striking with CDs, but it was also apparent with SACDs and even with the 24-bit/176.2kHz versions of number of Keith Johnson's (and other Reference Recordings) discs that will be familiar to many audiophiles—*Exotic Dances from the Opera* [Reference Recordings HR-71], *Rachmaninoff Symphonic Dances* [Reference Recordings HR-96], *Arnold Overtures* [Reference Recordings HR-48], and *Crown Imperial* [HR-112].

I'm not sure that rediscovering the sonic improvements made by today's most advanced digital transports will lead to a rebirth of optical and digital discs in the way that better hardware and software have led to the rebirth of the LP. Nevertheless, it did make me think hard about shifting fully from disc to digital storage. More importantly, the ability to make these nuances audible showed just how good the Paradigm 9Hs could be in resolving depth (when the recording has such

data), preserving soundstage integrity and image size, and handling the full range of instruments—strings, brass, woodwinds, percussion, and organ. There is no way to adequately describe the differences in nuance and voicing between three great speakers like the Paradigm 9H, the Magico S7, and the Legacy Aeris without writing a whole new review, but even if one ignores the bass, the 9Hs are clearly competitive. And no audiophile can ever really ignore the importance of bass or the impact of a listening room. The Magico S7 has truly excellent and deep bass, but it does not have room correction. I have to use them with a pair of carefully calibrated Golden Ear XXL subwoofers so I can place them where they provide the best soundstage and midrange and treble performance. The Legacy Aeris has a separate DAC/pre-amp/room correction system called the Wavelet that provides both bass and full-range correction and equalization features. It does provide a wider range of correction that includes room reflections, but the speaker does not go as deep with as much power as the Magico or the Paradigm. Life is filled with trade-offs.

The Paradigm Persona 9Hs not only provided the best overall bass response I've had in my listening room, it did so when playing back deep bass at subwoofer frequencies and loudness levels. It virtually eliminated the mountain-sized bass resonance peaks that are inevitable in most real-world listening rooms, and it filled in much of the equally deep valleys in bass response. I've been listening to room correction systems since the days when loudspeaker manufacturer Snell began to experiment with the technology and when Tact introduced full room correction. The 9Hs is the first speaker I've heard aside from the

Legacy Vs that can really provide full correction of the bass and do so with extraordinary detail at almost any rational listening level.

I do have some cautions about the result. If you are not familiar with flat full-range bass, you may initially feel that room correction slightly reduces the apparent bass performance of a speaker. We are accustomed to hearing the impact of the resonant peaks in our speakers, and their sudden absence takes some getting used to. It is only when you listen to the entire range of bass music over time that you realize how much more lower-octave detail is available, and that bass peaks are no longer adding at least a slight one-note character to the low end and no longer partly masking the midrange and treble. It is also only when the bass truly extends to frequencies you sense more than hear—below about 35Hz—that you realize how much the deep bass can contribute to musical life and realism. It is only when low-end response is truly smooth that you realize how many minor room resonances and vibrations are no longer being excited by the bass. Put simply, there is far more to the low end than 1812 cannons, bass drum whacks, excessive synthesizer and bass guitar bass lines, and organ notes that vibrate the walls and the couch.

The Realities of Bass Room Correction

There also are several points about the realities of bass room correction you should be aware of. First, it in no way affects the need to place your speakers in the best spot to provide a realistic soundstage and the best overall mix of bass, midrange, and treble. If anything, the more revealing the overall response, the more placement details matter and the better the bass response will be after

Equipment Report **Paradigm Persona 9H**

room correction. Good placement without correction means less correction is required, and better results when it is applied in the bass. (The room correction software does provide a quick measurement setting to allow you to measure different speaker placements and minimize the amount of room correction.)

Second, the lack of bass peaks does affect the apparent level of midrange and treble energy, and the 9Hs have relatively flat upper midrange and treble response. This can give the impression of a slight hardness or of excessive energy in the upper midrange with violin, harpsichord, soprano voice, woodwinds, and brass—particularly with many recent recordings where the miking is too close and the production values apparent detail over natural musical warmth.

Engineering purity is all very well, but I want to listen to the music and not the equipment. This is why I like the full-range correction features of the Legacy Wavelet, although the Bohmer room correction in the Wavelet DAC/preamp/room correction electronics emphasizes different aspects of sound quality than the bass-oriented ARC-2 system used in the 9H. The Paradigm 9H does not have such options, but you can accomplish a great deal by experimenting with different placement of the mic when you set up the room correction, by finding just the right toe-in and spacing for the 9Hs, and by experimenting with minor adjustments in the distance of the speakers to side and rear walls to minimize any excessive upper-midrange energy.

A number of reviewers question whether speaker midrange and treble energy should measure flat or be rolled slightly downwards. As a classical music and jazz fan I have mixed feelings about old-

er recordings, and many more modern recordings that emphasize natural musical warmth. Speaker voicing of any kind will favor one set of recordings, cartridge, DAC, preamp, amp, and set of wires over another.

I don't believe that this is a problem that should be solved at the speaker. Loudspeaker crossovers are complex enough as it is, and a speaker designer can really only voice the non-active circuits inside in one way. It is a problem that needs to be solved by making more musically realistic recordings and/or by providing some form of equalization in the preamp or some outboard unit, rather than in the speaker. As far as I'm concerned, high-end electronics designers really need to rethink their design goals. They need to get away from the "less-is-more" approach to front ends and DACs and/or digital preamps.

I'd like to see high-end electronics designers provide the ability to "tilt" the overall frequency response up or down over the entire frequency range—or at some point from the upper bass to the highest frequencies—by at least several dBs from "flat." I'd also like to see the option of being able to slightly dip the upper midrange. Apparent musical realism, not specsmanship and simplicity, should be the real goal of high-end sound.

Third, for all these reasons, be careful if you visit a dealer to hear the 9Hs. Listen with and without room correction. Make sure the speakers are properly placed in the showroom, and—if you decide to buy—make sure the dealer has the skill and willingness to help you with an initial setup that really suits your ear and taste. Bring your own favorite bass spectaculars, but also bring at least a couple of your best recordings of music you really love. This is a remarkably coherent, detailed, full-range

speaker, and you should judge it accordingly.

Fourth, if you plan on doing your own setup of the ARC-2 room correction system used in the Paradigm 9H, be aware that it requires the use of a PC—devices that approach the work of the Devil and/or embracing the dark side of the Force to a Mac user like me. The instructions in the manual also are only "acceptable," and I'd check for updates to both the instructions and the software at the Paradigm website before running the program. At the same time, downloading the software is easy, setup is quick once you get the hang of it, and the display shows you the before and after measurements. As for Mac users, many online software and black magic stores do sell an application that allows you to run Windows on your Mac.

Finally, I'm not sure that a detailed explanation of the technology behind the ARC-2 system is really needed, and many audiophiles will rely on dealer setup. But, people and speakers do get moved, and high-enders love to tweak and fiddle. Accordingly be aware that you can readily find out the technical details and get some good high-tech reviews by putting "ARC-2 room correction" into your computer search routine. (Be aware that the ARC-2 system in the 9H is designed and used in very different ways than the ARC-2 in Anthem receivers, and for home theater.)

At the same time, you should also be aware that Paradigm speakers and the manufacturers of the Anthem ARC-2 room correction system are one company, and the Paradigm is designed around its proprietary room correction system. This allows it to correct for dips of up to 6dB and peaks of up to at least 30dB.

I'd dearly love to see the Anthem aside of Anthem-Paradigm make an outboard ARC-2 unit that

could be adjusted to suit any given speaker. In the interim, however, I've found that past attempts to provide universal room correction that cannot be tailored to an individual speaker's design often fall seriously short of providing the best performance in dynamics, power handling, and distortion. Both Paradigm and Legacy avoid this by ensuring the speaker's capabilities match the room correction and vice versa—although they take very different approaches. The results really pay off in superior sound quality.

Summary

One of the best around. Highly recommended.



Equipment Report Paradigm Persona 9H

A Conversation with Paradigm's Oleg Bogdanov by Robert Harley

The Persona line is in some ways a radical departure for Paradigm; in other ways it is a logical progression for the Canadian manufacturer. The company is best known for its affordable speakers that combine high-end design with economy-of-scale manufacturing. In the past, creating flagship products with cutting-edge technologies just wasn't in Paradigm's wheelhouse. But Persona is also a natural step forward because it represents the culmination of everything Paradigm has learned about making



speakers over the past 35 years. One could argue that the discipline of three-and-a-half decades of building speakers to strict price points is the ideal foundation for creating a much more ambitious and expensive line such as Persona.

For some background on the Persona's genesis and technology, I spoke with Oleg Bogdanov, Director of Product Development.

Tell me how the Persona project came about.

What were the inspiration and the goal?

It's been about five years in the making. We wanted to create a speaker that would really make a statement, that would cover the full range of human hearing, playing at 120dB over the widest range of frequencies from below 20Hz to beyond 20kHz.

Was there a concern about a company known for making affordable, high-value speakers producing a \$35,000 product?

We have never offered a speaker in this price range, but we're known for providing performance and value. We're not a brand that just makes it cheap. Our approach is to provide performance and features that would cost way, way more from other companies. We can do it efficiently and provide good value.

Consumers will definitely see and appreciate the value in the Persona even though the price is higher than we ever had before at Paradigm. But at the same time, it's pushing features and technologies that are not available at this



price—and maybe not available at all from other companies, such as the 7" beryllium midrange driver. Beryllium is very light, very rigid, and has very good damping. There may be one or two other companies with that technology, but we're talking a six-digit price range. Beryllium diaphragms are just one of the technologies we use.

Did you develop the beryllium cone technology in-house?

We partnered with a company called Materion, which mines beryllium in Utah and processes it into 99.9%-pure beryllium foil. Based on our design, they made a tool that creates the cone's

shape and thickness. We then assemble the drivers here in Canada.

Let's talk about some of the other technologies in the Persona, starting with the differential-drive woofers.

We originally developed differential-drive for subwoofers. It improves the motor design and makes the driver much more linear. We take a very long voice-coil bobbin and put two voice-coil windings on it, wound in opposite directions. Each coil is sitting in its own magnetic gap. The magnetic fields of each coil are in opposite polarity, but the force that each coil generates

Equipment Report Paradigm Persona 9H

A Conversation with Paradigm's Oleg Bogdanov (cont'd.)

■ adds together. This has many advantages, including lower distortion, higher power handling, and better heat dissipation, and thus less thermal dynamic compression. The long voice-coil former and dual spiders create a very stable mechanical structure that will not rock from side to side or add any extraneous noise when pushed to high excursions, as conventional drivers do. The differential-drive and woofer-suspension structures allow greater excursion, which is related to how loudly the system can play at low distortion levels. The differential-drive woofer contributes to the Persona's sense of ease and effortlessness.

Why did you make the Persona a hybrid system, combining a passive midrange and tweeter with internally amplified woofers and DSP room correction below 500Hz?

We quickly realized that achieving our lofty goals would be impossible with a passive speaker. For example, to extend the frequency response to 20Hz in a passive speaker would require a much larger cabinet. The result would have been a large box that was difficult to place in a room. We wouldn't have been able to incorporate room correction if it were passive. Without room correction the frequency response will be very different in different rooms, and with different placements in the same room. Room correction and active woofers give us the ability to have flat response in the bass down to 14Hz and consistent performance from room to room.

Also, the combination of powered woofers and a high-efficiency midrange and tweeter means that even very low power amplifiers, including tube amplifiers, can drive the Persona to sound-pressure levels that are unheard of in a less-sensitive speaker. *[The 9H has a rated sensitivity of a whopping 96dB.—RH]*

Tell me about the enclosure.

One of the challenges was combining all those elements into a relatively compact enclosure that was attractive. The industrial designers did a great job in creating the shape, but the next challenge was how to manufacture the enclosure. The enclosure is made from seven layers of wood

composite, with layers of vibration-damping adhesive between them. It's bent into shape in a press *[see photo above]*, and the adhesive is cured with a burst of microwave energy. The back of the speaker is curved, and that curve meets the top and bottom surfaces at an angle, which creates challenges. The solution was to use five-axis CNC machines at a level of sophistication we'd never tried before. The CNC machines do all the cutting and carving to create the complex curvatures and angles. *[See Paradigm's website video showing how the cabinets are made.—RH]*

One important element we haven't talked about is the Perforated Phase Alignment (PPA) lenses in front of the midrange and tweeter.

These are non-removable because they are an important part of the acoustic design. The PPA lenses over the midrange and tweeter solve a fundamental problem with cone and dome drivers. As the frequency of the sound increases, at some point the sound's wavelength becomes comparable in size to, or even smaller than, the cone in the case of the midrange driver or the dome in the case of the tweeter. When that happens different portions of the dome or cone become their own point sources. This causes phase difference cancellation due to the different distances from the ear to different portions of the cone or dome. The sound from one part of the cone or dome travels a shorter distance to the ear than the sound produced by a different part of the cone or dome. The two waves combine constructively to increase the sound's amplitude at certain frequencies, or combine destructively to decrease the sound's amplitude at other frequencies. You get a series of small peaks and dips in frequency response.

The PPA lenses block the out-of-phase sound so that it can't combine with the in-phase sound. We get flatter response, particularly off axis. Even at 30-degrees off axis the Persona response goes out to 20kHz. That means there's no limited sweet spot. There's a very wide area where you can listen and still have it sound good. The image doesn't collapse as you move off-center. Two people can sit side-by-side and still hear a good soundstage and flat frequency response. The patent-pending PPAs are a striking feature of the Persona 9H. **t85**



Equipment Report

Magico S3 Mk II

In the Sweet Spot

Andrew Quint

When Magico, LLC announced the imminent introduction of the S3 Mk II loudspeaker late last year, it wasn't exactly shocking news. After all, two other members of Magico's S Series, the S1 and the S5 models, had been updated to Mk II status and the top-of-the-series S7 already incorporated the diamond-coated beryllium tweeter and nanographene midrange cone that represent Magico's latest thinking on driver design. So, the important changes seen with the S3 Mk II—compared to the original S3, which first shipped in early 2014—parallel those found in the new S1 Mk II, reviewed in Issue 270. In addition to the 1" MDD7 dome tweeter, 6" M390G XG graphene midrange, and a pair of new 9" M905G graphene bass drivers, the top and bottom pieces of the sealed box enclosure have been revised. Although the size and shape of the speakers hasn't changed much—on end, the profile is still that of a rounded trapezoid, wider in front than behind—the cabinet is now more effectively braced, with bolts extending through the ½" aluminum shell to connect to stabilizing internal braces. As with the

original S3, the main component of the Mk II's monocoque enclosure is a single piece of aircraft-grade aluminum, produced at a factory in Ohio that makes the largest such extrusions in the world. (The metal part for both original and Mk II S3 is 16" in diameter; the Ohio plant can now manufacture an 18" extrusion.) The mid-range driver has its own internal compartment and a new German-sourced damping material, known at Magico as "angel hair," is employed in the sub-enclosure. There is, as well, a foam/vinyl adhesive that coats the inner surface of the metal shell, plus some strategically deployed "stuffing," also new. The crossover has been re-configured to elevate the speaker's impedance and make the S3 Mk II easier to drive than its predecessor.

As with other Magico speakers, the S3 Mk II is available in two finishes, the finely textured anodized M-Cast option and the high-gloss M-Coat—both in a choice of six colors. The pewter M-Cast S3s I'm listening to now arrived in sturdy cardboard boxes; the M-Coat S3s are shipped standing up in wooden crates to assure that nothing can rub against the speaker



Equipment Report Magico S3 Mk II

and mar the high-gloss paint. Magico founder and CEO Alon Wolf allowed that the additional expense of fabricating wooden crates and the consequential increase in shipping weight are a significant part of the price differential between M-Cast and M-Coat versions, around \$4000. Magico provides highly detailed instructions for safely unpacking the speakers with the owner's guide emphasizing that two people are needed to get these 170-pound beasts out of their boxes. If you end up with a punctured woofer or a crushed finger, you have no one to blame but yourself. *[I ended up with a crushed finger trying to move the Magico M Pros—and I had two people helping out.—JV]*

Magico also provides specific advice regarding positioning its loudspeakers. It's suggested that the S3s be initially placed about 20 inches from the front wall and then moved out toward the listener in six- to eight-inch increments until the speakers' bass performance is optimized. Equally detailed instructions follow for siting the S3s vis-à-vis the sidewalls, and for toe-in. In my 15' x 15' room (a hallway off one sidewall obviates serious standing wave issues) the S3s wound up 24" from the wall behind them and about 8' apart, center-to-center. The front of each speaker was approximately 9' from my ears; toe-in was such that imaginary lines extended from the front baffles intersected a foot behind my head. Once positioned, the supplied spikes were attached to the four outrigger extensions of the enclosure's bottom piece, and the loudspeakers were carefully leveled. In my case, the spikes pierced the carpet and underlying soundproofing material to make contact with the concrete slab beneath. Magico does

provide metal discs to receive the points of the spikes if the S3 Mk IIs are situated on a hard surface that you don't want to damage. There's also the option of replacing the spikes with Magico's pricey QPods that are machined from aluminum, steel, and copper into a structure said to have exceptional vibration-dissipating properties. The speaker's metal grilles are held in place by an invisible magnet system—the User's Guide describes them as "optional" so it's safe to assume that Magico feels that you should do your serious listening without the grilles on.

The S3 Mk IIs were assessed using much of the same associated equipment I used to put the S1 Mk IIs through their paces last year. Mostly, either a pair of David Berning Quadrature Z amplifiers (200Wpc) or two Pass XA 60.8 monoblocks provided amplification. Continuing upstream, the control center was my usual Anthem D2v. Only digital sources were used, including an Oppo 93 disc player (functioning as a transport) and the Baetis Reference 2 music computer, which played files stored on a Synology NAS. Both sent PCM output to the DACs in the Anthem; non-converted DSD files were also played through a T+A DAC 8 DSD. I also had on hand an Aurender A10 (review in progress) that's equipped to handle MQA-encoded files, as streamed from Tidal. The bulk of the interconnects and speaker cables were Transparent, save for a high-performing yet quite reasonably-priced Revelation AES/EBU wire employed between Baetis and Anthem. As usual, I ran DSP room correction with the Anthem's ARC software and, after inspecting the room response curves, used equalization up to 2kHz.

Considering the usual sonic metrics, the

Magico S3 Mk IIs performed exceptionally well. (See sidebar for Alon Wolf's perspective on how S Series loudspeakers contrast with the company's more complex Q Series models.) High-frequency musical information was open, airy, and non-fatiguing in the fashion of a good electrostatic, but with better dispersion. Upper register *divisi* violins at the beginning of the Act 1 Prelude to Wagner's *Lohengrin* had the kind of texture one appreciates in life—there was a clear sense of many unique instruments being played, rather than a synthesizer-like homogeneity. With a recording of a Balinese gamelan ensemble of flutes, gongs, and a range of metallophones, the Magicos reproduced the singular overtone structure of these instruments very characteristically. Tonal neutrality and accuracy were apparent in the critical midband. It wasn't difficult to distinguish a Stradivarius from a Guarneri del Gesù violin, Renée Fleming in 1996 from Renée Fleming in 2016, or a bass clarinet played at the very top of its *tessitura* from a regular B-flat clarinet operating in the middle of its range. Top-to-bottom tonal balance was preserved through the Magicos—darker recordings vs. more brightly lit ones maintained their yin vs. yang qualities.

Bass was immensely satisfying in its impact, speed, and pitch definition. With organ recordings possessing prodigious low-frequency energy—Jean Guillou's two-CD Franck set for Dorian, for instance—the S3 Mk IIs remained articulate when the deepest pedal stops were called into service, an especially impressive feat given that the recording has a great deal of room sound, having been recorded in a large Parisian cathedral. Lesser speakers, even those

that claim low-end extension into the mid-20s (Hz), can render this challenging material as an undifferentiated rumble. Electric bass had plenty of punch and percussive slam, but only when it was present on the original tape—these loudspeakers do not editorialize. Certainly, you won't regret what a high-powered amplifier will do for bass heft and mass but the 60Wpc Passes didn't find the S3s to be an especially difficult load, in terms of generating orchestral weight or rock 'n' roll gutsiness. Even in my smallish room, by the way, the S3 Mk IIs did very well with a subwoofer (Magico's S Sub, in this case). Alon Wolf feels strongly that subwoofers are meant to be used with full-range main speakers—he

SPECS & PRICING

Type: Three-way, sealed-box enclosure
Driver complement: One 1" diamond-coated beryllium dome tweeter, one 6" nanographene midrange cone, two 9" nanographene bass cones
Frequency response: 24Hz–50kHz
Impedance: 4 ohms
Sensitivity: 88 dB
Dimensions: 12" x 48" x 12"
Weight: 170 lbs.
Price: \$28,000 (M-Cast finish), \$32,000 (M-Coat finish)

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Equipment Report Magico S3 Mk II

maintains that attempts to integrate one with a smaller loudspeaker will inevitably “pollute” that speaker’s output. Though I did experiment with rolling off the S3s in the 50–60Hz range and letting the S Sub operate up to 60Hz or so, the best results, by far, were achieved when the S3s ran full-range and a high-pass filter for the sub was applied at 40Hz. Authoritative power was added to the bottom octave and spatial cues about the recording space were better demonstrated.

Even in my smallish room, the S3 Mk IIs did very well with a subwoofer (Magico’s S Sub, in this case).

When it comes to spatiality, I won’t trot out the old saw that these speakers “disappear” in the way small, stand-mounted mini-monitors can—although in a larger room than mine, they might. Still, the soundstage was broad and continuous, and depth was more than satisfactory. In the third movement of Mahler’s Symphony No. 3, the off-stage “post horn” (actually a flugelhorn) really sounded like it was coming from a distant place, on Michael Tilson Thomas’s 2002 live recording. The sound of the instrument was soft, not because the soloist was playing softly but because he was far away. The S3 Mk IIs maintain their coherence when the music gets complex and loud, whether it’s the Finale to the Saint-Saëns *Organ* Symphony or one of Gordon Goodwin’s exuberant big band arrangements.

So there you have my assessment of the S3 Mk II’s sonic attributes, parameter by param-

eter. But can that truly tell you what you need to know about a loudspeaker’s character? Is its overall performance more or less than the sum of its parts? If you’re not careful, you may end up characterizing the Magico S3 Mk II’s sound as *analytical*. That would be a mistake, as this is a word that carries a negative connotation in an audio context—*analytical*, as in cold, clinical, hyper-detailed, or even etched. That’s not what I hear with the new S3, and with other current Magicos. Rather, I hear them as *revealing*, in the sense of displaying fully the endless range of musical expression.

Well into the review period, I listened to an album I’ve enjoyed for 40 years, Todd Rundgren’s *Something/Anything*—that musical polymath’s best-selling release over a long and artistically expansive career. Three of the four sides of the original LPs were all Todd: He played every instrument and sang every vocal track, a *tour de force* that displayed the workings of an exceptionally creative, yet disciplined, musical mind. The songs are good (“I Saw the Light” was Rundgren’s biggest hit), but there’s something a little stiff and mechanical about those three sides of the album, as much as one admires the artist for putting it all together. Side 4, however, has Todd performing live in an NYC studio with a group of instrumentalists and singers who were clearly enjoying themselves. The effect is profoundly different: The songs here seem much richer and more emotionally meaningful. The Magicos, manifesting a degree of truthfulness that’s unusual with audio gear, communicated the joyfulness of collaborative music making in contrast to the solitary, if *über*-competent efforts that comprise the bulk of *Something/Anything*.

I’d seen somewhere that Alon Wolf has described the S3s as occupying the “sweet spot” of the entire Magico loudspeaker line—a product range that begins with the \$16,500 S1 and ascends to the \$229,000 Q7 MkII, a product that’s obviously out of reach to all but a tiny number of individuals. I asked Wolf to elaborate. “I’m fully aware of the price categories that our products are in,” he said. “Although I know that we give incredible value for the price, knowing how much it costs to actually build these things,

it does become a different market above a certain number, which is around \$30,000. The S3 Mk II sits right below that with performance that can easily be compared to speakers that cost three times as much. There is a lot of value in that. People really respond and we can see it in sales. It’s the question of performance vs. value that creates the ‘sweet spot’ for it.”

Sounds like a promising business plan to me. The Magico S3 Mk II is now my loudspeaker reference. **tas**

Alon Wolf on the Magico S Series vs. the Q Series: “I like to spread the love.”

■ **The platform for the Magico Q series loudspeakers—that is, the enclosure—is significantly more difficult to manufacture than the S Series monocoque cabinet and this, of course, is a big part of the higher cost of these models. How much of an advantage does the “heroic” design of the Q series speakers provide?**

It is a stiffer enclosure because we are able to create a much better coupling to the braces in these loudspeakers. They’re much stiffer which means the resonant frequency goes much higher which is easier to damp. The end result is a quieter cabinet—the noise floor is lower. You do get an advantage there. However, what you *don’t* get (which you do get with the S Series monocoque) is reduced diffraction. You have a lot of edges. To build one [a Q Series speaker] that has no edges at all is extremely costly. This is what we’re doing

with the new M6, though most of that cabinet is made out of carbon fiber. You want to try to do *that* with aluminum? Good luck! So there is an advantage to the S Series in that arena. There are advantages to both designs.

So the S Series isn’t just “Q-lite”?

To me, the idea of just “reducing” is not good enough. I always try to give something to whatever model it is, no matter how much “less expensive” (I don’t want to say “cheap,” because none of them are), so that they can stand up for themselves. I think about Porsche. The Cayman—the mid-engine—is not a 911. But it handles better, even though it is cheaper. It’s not a 911, which is what a Porsche is supposed to be, but you always kind of feel: “Hey, you know what? My car handles better than yours!” I like to spread the love as much as possible.

Equipment Report

Von Schweikert Audio Endeavor E-5

Living Large

Andrew Quint

In the 1986 film *Ruthless People*, Judge Reinhold plays Ken, who works as a salesman in an audio store, the kind with boxes of cheap receivers stacked on the floor. In walks a gum-smacking heavy metal enthusiast, maybe 19, who is looking for speakers. Ken senses an easy mark and his presentation is pitch-perfect. “You know, when it comes to great stereo, you can’t beat big speakers. I’m talking about *big* speakers with *big* woofers.”

After quickly walking him past the models with eight, ten, and twelve-inch bass drivers, Ken steers the wide-eyed kid into the store’s inner sanctum where there stands an enormous, hideously ugly box with flashing lights and the biggest woofer cone you’ve ever seen: “Check it out, my man! The flagship of the entire Dominator line, the MX-10—thirty inches of thigh-slapping, blood-pumping nuclear brain damage! So what if it’s as

big as a Subaru and costs as much? You’ll never have to trade this in; this is going to be with you for the rest of your life. And when you die, they can *bury* you in it!”

Comedic hyperbole, of course, but who among us at some point in our audiophile journey hasn’t imagined owning large loudspeakers that can begin to suggest the scale and dynamics of live music? There are three principal barriers to purchasing big speakers, however. In increasing order of importance they are: appearance, cost, and—perhaps most critically—the requirement for a large space to put them in, the kind of domestic environment most of us don’t have. You just can’t put a large speaker in a modest-sized room, right? I’m here to tell you that maybe you can.

Leif Swanson is a musician (a guitarist) who developed a strong interest in the design and manufacture of sound reinforcement systems. By the mid-2000s,

Swanson owned a CNC shop in Riverside, California, and was building big PA enclosures for pro sound companies. It was during this period that Swanson was approached to construct cabinets for Von Schweikert Audio, which also happens to be located in Riverside [see sidebar]. Over the course of a decade, Albert Von Schweikert schooled Swanson in numerous aspects of mechanical and electrical theory. Along with Albert and his son Damon, Swanson participated in the design of every VSA product for more than eight years. Swanson started his own loudspeaker company, Endeavor Audio, and the elder Von Schweikert was impressed with his work. In September of 2015, VSA acquired Endeavor Audio and all of its designs: the two current EA models, the E-3 MkII and the E-5 are now their own “line” within the Von Schweikert range. Going forward, those speakers will wear the VSA badge.



Equipment Report Von Schweikert Audio Endeavor E-5

The \$35,000 Endeavor E-5 is a big speaker but it's really more accurate to characterize it as a *tall* speaker. The cabinet is 66" vertically and the aluminum plinth it rests on plus the carpet-piercing spikes add another 2" to the total height. However, the front baffle is just 9" wide, tapering to 5" at the rear, and the speaker is only 15" deep. With the seven drivers per side exposed, the E-5 will not disappear into any décor outside of an audio store (though with their black cloth grilles in place, they are less obtrusive). Standard finishes are high-gloss black or metallic silver and other colors are available as options.

SPECS & PRICING

Type: Three-way, vented box enclosure

Driver complement: One 1" beryllium dome tweeter, two 6.5" Kevlar cone midrange, four 7" aluminum cone woofers

Frequency response: 27Hz–40kHz, +/-2dB

Impedance: 8 ohms

Sensitivity: 91dB

Recommended minimum amplifier power: 60 watts

Dimensions: 9" x 66" x 15"

Weight: 135 lbs.

Price: \$35,000

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The E-5's driver complement includes, at the vertical center of the loudspeaker, a 1" beryllium tweeter and a pair of 6.5" Kevlar midrange cones in a D'Appolito configuration. The tweeter is the same one used in the VSA VR-55, a modified ScanSpeak model that permits Swanson to utilize the driver's full upper-range frequency response. Employing this device, he feels, results in less listener fatigue than with other metallic tweeters. Above and below the midrange/tweeter/midrange transducers are pairs of anodized aluminum woofers that are 7" in diameter. The woofers (and midrange drivers) all sport a phase plug that, in addition to making phase behavior consistent throughout the cone's diameter, also aides in efficient heat dissipation which, in turn, is responsible for the high power-handling capability of these relatively diminutive drivers.

For the enclosure, Leif Swanson's goal was to identify "a single composite material that cut and bonded easily, but would have no audible panel resonance." He came across a composite used in the construction industry that was tweaked for his application. The material is a cellular matrix composed of long fibrous tubes filled with a viscous resin, Swanson explained to me, that's "inherently self-damped. A honeycomb structure is evident when a cross-section is viewed under a microscope and it's rigid enough to be used as a cabinet wall, but will not ring." Complementing the physical properties of the enclosure material, the E-5 employs VSA's proprietary "Triple Wall" technology—artificial stone is bonded with an absorptive material to the inner surface of the cabinet. The three layers of the enclosure therefore have dif-

ferent resonant frequencies, which makes the box even more inert. The cellular matrix material is also used internally to form chambers for the midrange drivers that are sealed off from the spaces the woofers inhabit. What appear to be two ports on the rear of the speaker, near the top and bottom of the cabinet, are actually aperiodic vents, a decades-old Dynaudio invention that relieves pressure on the woofers and facilitates the fastest possible motion of those drivers. "To my thinking," says Swanson, "we have achieved the best of both worlds—the low coloration of a sealed system combined with the higher dynamic range of a ported system."

The crossovers' circuit boards are built in-house and are hand-wired with Teflon-coated single-crystal copper. The design employs Linkwitz-Riley filters; there are eight versions of this filter and Swanson arduously tried each one with the E-5's drivers to decide which was best. A single pair of robust binding posts that will accept spades or banana plugs is located near the bottom of the speaker.

The E-5s arrived in two substantial wooden crates. Though it definitely takes at least two people to get each speaker out of its box, set-up is otherwise straightforward. Once uncrated, the E-5 is turned upside down so that its plinth can be bolted on, and then righted. After the final position (or something close to it) has been settled on, the four top-adjusting spikes are easily installed by tilting the speaker slightly—another two-person operation. Anticipating that the E-5s will need to lean back somewhat to assure that the tweeters are aimed at the primary listener's ears, the rear two spikes are shorter than the front pair. My room is 15' x 15'

with a 10'-to-12' ceiling height—with every speaker review, I remind the reader that there is a hallway leading off one sidewall near the front of the room and standing waves haven't been an issue with any of the numerous loudspeakers I've tried in the space—the E-5s ended up 8' 6" apart (center-to-center) and canted in towards the listening position. At their closest, the speakers were 18" from the shelves behind them and the distance from the front baffle to the sweet spot was about 10'. Mostly, amplification was provided by David Berning Quadrature Z monoblocks, though the lower-powered Pass Labs XA60.8s saw some service as well. I used my usual Anthem D2v processor and also T+A's DAC 8 DSD, the baby brother of the PDP 3000 HV that Robert Harley reviewed in Issue 268. Digital sources were an Oppo 93, used as a transport, and the Baetis Reference 2 computer.

Hearing music through the VSA Endeavor E-5 is like sitting down in front of a 110" video screen for the first time. If you are someone who goes for Row D seats at orchestra concerts or fights his way forward to stand in front of the stage at Tipitina's in New Orleans, this loudspeaker deserves your closest consideration. Their presentation is vivid, bold, excitingly realistic, and highly involving. There's no point in using them for background music; with these speakers, you're all in.

Naturally, large-scale music of all stripes—late Romantic and twentieth-century orchestral repertoire, balls-to-the-wall rock, the most exuberant big band recordings—would be expected to thrive via the E-5s, and I wasn't disappointed. Gustav Mahler's Symphony No. 3 begins with eight French horns playing fortissimo, in uni-

Equipment Report Von Schweikert Audio Endeavor E-5

son, a mighty and heroic theme (in the score, it's marked *entschieden*, or "resolute") and the sense of restrained power, that these eight musicians were part of a much larger orchestral organism, was palpable—an impression amply confirmed over the next 107 minutes with Michael Tilson Thomas's performance with the San Francisco Symphony. Likewise, the impact of Gordon Goodwin's highly virtuosic Big Phat Band, executing their leader's challenging arrangements on *Act Your Age* was more than just suggestive of the actual experience of hearing five saxes, four trumpets, four trombones, and an amplified rhythm section playing full-out. And, when there were no witnesses around, I put on Billy Idol's "White Wedding" and was instantly transported back to a sweatier, more hormonally driven time in my life.

Swanson doesn't view the Endeavor E-5s as a difficult amplifier load, and recommends 50Wpc as a satisfactory minimum. However, he does allow that since there are seven drivers per side to set in motion, "you will need some current to push the drivers at loud volume levels." Indeed, I found that while the sound was quite impressive with the 60Wpc Pass XA60.8 amplifiers, the speakers performed at their best with the sort of program material noted above when the 200Wpc David Berning amps provided the necessary muscle for playback at enthusiastic levels.

Of course, scaling that's exaggerated isn't a desirable thing—who wants giant flutes and violins, or pianos that are ten feet wide?—and here I learned a valuable lesson. I picked out several recordings of much more modest musical forces—a string quartet (the Hagan Quartet playing the slow movement of Beethoven's

Op. 18, No. 3) and Joni Mitchell's classic album *Blue*, for which the singer accompanies herself on only guitar or piano for several selections. Initially, I *did* hear some bloating of the vocal and/or instrumental images. The quartet was standing up playing enlarged violins, viola, and cello; Mitchell's voice and guitar on "Little Green" were plus-size. Then, an astute audiophile friend, over for a listen, pointed at the 58" video monitor mounted high on the wall behind the speakers, positioned from 62" to 97" above the floor. I got a stepladder and draped a small blanket over the screen and, *voilà*; the image height and size anomalies were eliminated. I'd not had speakers nearly this tall in my room previously and, evidently, a highly reflective surface behind them made a difference that had not been apparent with shorter speakers.

The E-5's bass is exceptionally articulate, fast, and tight. Swanson isn't the first designer to recognize the advantage of having many smaller, widely spaced low-frequency drivers. (The ultimate expression may be the Audio Kinesis Swarm subwoofer system—see REG's review in Issue 252.) Having four 7" woofers, two high up and two near the floor on each tower, contributes to very smooth bass response, even in a relatively small space. As always, I performed DSP room-correction measurements, utilizing the Anthem's ARC software, and based on the resulting room response curves, correction was needed only up to 300Hz, the least I've required with any loudspeaker to date. Having an enclosure that behaves largely like a sealed box also facilitates ideal positioning of the speakers for even bass response, as well as the best possible soundstaging and imaging. The E-5s do not

create bass that isn't there on the mastertape. Many favorite rock albums from the 1970s and 80s lack true deep bass—I'm thinking of some Genesis recordings, say "No Reply at All" from *Abacab*, where much of the electric bass part is played on the instrument's upper strings—with the Endeavors, that musical element is lithe and tuneful. On the other hand, the bass drum pulse that continues throughout "Udu Chant" (as heard on the superbly recorded DVD-A *The Best of Mickey Hart*) has middle-of-the-earth extension yet still maintains definition and clarity. Unless the E-5s are used in a home theater setting and fighter jets and angry dinosaurs are involved, I can't imagine a subwoofer will be desired except, maybe, in the largest rooms.

In terms of timbral accuracy, the speakers performed very well. On the "Old Italian Violin Test" (see the Magico S1 Mk II review in Issue 270 for details) the E-5s get a solid B-plus—there was no problem distinguishing a Stradivarius from a Guarneri del Gesù, and some parsing of different examples of the two instrument makers' fiddles was possible as well. Female voices were richly characterized. A belated discovery for me is the singer/songwriter Sarah Jarosz. In addition to the emotional acuity of her songs, another reason I like her, I think, is because she sounds more than a little like a young Emmylou Harris. The Endeavors told me what was similar about their voices, and what was different.

The E-5s excelled with the presentation of spatial information, typically a forte of minimonitors. Swanson attributes this to several factors, the narrow baffle and the height of the speakers included. "In many concentric array speakers,

the overall image size can be huge. The complicated part is getting the voices and instruments to be reproduced to scale, as well as in their accurate positions." Swanson has evidently figured it out. The soundstage for an orchestra extends continuously in front of the listener: On the Pentatone SACD reissue of Kurt Masur's reading of the Brahms Serenade No. 1, woodwinds were precisely localized and the second violins were clearly sitting interior to the firsts. I'm used to listening to the Mickey Hart cut noted earlier in multichannel, and the sense of an atmospherically vast space was apparent with just two Endeavors.

I enjoyed my time with the Von Schweikert Audio Endeavor E-5s immensely. The E-5s meet their design objectives and offer a majestic, full-scale representation of complex and dynamic musical material. Although they will most certainly perform well in a large space, they manage the feat in a more typical, less capacious domestic listening environment. The pack of contending high-end loudspeakers begins to thin when you reach the \$30,000 price point, and the VSA Endeavor E-5s should definitely be on the short list for anyone with \$30–\$40k budgeted for speakers.

As for the Dominator MX-10s in *Ruthless People*, following Ken's *tour de force* of salesmanship, the young headbanger declares, "I want it!" But then the customer's plainly dressed pregnant teenaged wife walks into the demo room, and Ken, good soul that he is, conscientiously takes the couple instead to hear something much smaller and less costly. But, presumably, that's not you. Give the VSA Endeavor E-5s an audition. You could be living large.

Equipment Report Von Schweikert Audio Endeavor E-5

Leif Swanson on His Path from Pro Audio to High-End Loudspeaker Design

Is designing and manufacturing for the high-end market different than developing pro audio products?

In my experience, most established PA companies are concerned mainly with high output and reliability factors. High-quality (audiophile) sound does not seem to be a priority. My wife is a professional vocalist, so I started to focus on designing speakers to be as faithful to her voice as possible. High output was not a huge concern to me in the beginning. I was more focused on the harmonic structure of voices and acoustic instruments. Although I didn't realize this at the time, my primary focus was the same as what a high-end designer should be concerned with. I have the same goals whether designing for high-end or pro audio. I spent years experimenting and perfecting methods to eliminate cabinet resonances and the "sound" of the woofers, midranges, and compression drivers. Pro audio has come a long way since I first started so many years ago. At some point, my interest in high-end audio speakers [and pro audio] came together—I saw them both as simply the accurate reproduction of sound. We still on occasion are contracted to design and build full line array systems for commercial sound reinforcement companies.

How did the merger with Von Schweikert come about?

In 2016, Damon was appointed CEO and took over the business from his dad, which allowed Albert to focus purely on research and develop-

ment. Damon has a very clear vision for the future of VSA. Familiar with what I was doing with Endeavor Audio, Damon wanted to incorporate that into his long-range strategy, specifically the E-3 and E-5 designs for the VSA product line, as well as my skills as a partner with him in design and management. It was a good fit as Damon and I are roughly the same age and have always worked very well together. This all took place within two months of his posting to the role of CEO and we've been a collaborative team ever since.

Do you view your approach to loudspeaker design as similar or complementary?

I would like to think both. Albert or Damon may give you a different answer—but maybe not. Albert and I have a lot in common: We are both life-long professional musicians, we both love audio, and we share an obsessive passion for high-quality speakers. Albert watched me design what was to become Endeavor's first model, the E-3, and told me that he felt I was going through the same thought process that he had used to develop his original VR-4. Although Albert has always said I was very talented, I simply didn't have the technical background he did, so he began to mentor me in the one area where I needed it most, the crossover. You can develop the best cabinet and transducers but destroy the sound by not getting the circuit perfected. There are hundreds of different possibilities that a crossover circuit can take. You can design many types of circuits that measure



perfectly with the drivers and cabinet, yet there is no magic in that particular design.

Damon, Albert, and I have designed all the models as a team for the last eight years. While we were designing the custom one-off Ultra VR-111's, it became evident to all of us that we needed to incorporate this new technology into our production line. It was then that we decided to develop the Ultra flagship line. After choosing the drivers and the configuration, Damon went to work on the industrial design. Once that was

completed, we worked on the interior for bracing and to determine the cubic volume needed for optimum performance. Albert and I together designed many different crossover circuits. We use numerous methods throughout this process, including computer design programs. But in the end, it is Albert, Damon, and I working through the final voicing process. It's a unique experience as a designer to work with a collaborative team, and reach that point of confidence when we all know the design is correct. **tbs**

Equipment Report

Zellaton Reference MkII

Overnight Success

Jonathan Valin

Over the last twenty-five years I've heard a lot of fine equipment at trade shows around the world. Only twice have I been stopped in my tracks by a sound so uncannily realistic it literally made me do a double take. This happened, a decade or so ago, at CES with the Scaena Iso-Linear loudspeaker array. And again, just three years past, in Munich with an earlier version of the speakers I'm about to discuss, the Zellaton Reference MkIIs. In both cases I was so amazed that, one by one, I tracked down every other member of our staff and dragged him back with me to hear what I'd heard. It should go without saying that, in both cases, I immediately asked for review samples.

Alas, the Scaenas didn't fulfill their promise in my listening room (not wholly the speakers' fault, BTW), but the Zellaton References, now in their MkII iterations, are a different story. Before I tell that story, you should know that the Reference MkIIs are not for everyone, and I don't just mean because of their incredibly high price tag (\$150k per pair). Unlike several other truly great loudspeakers (e.g., the \$129k Magico M Pros and the \$70k Magico M3s), the Reference MkIIs are

targeted quite specifically at one kind of listener and one only—the kind this magazine was dedicated to at its founding. If your taste runs to classical music, large-scale or small, or acoustic music from jazz to pop, then the Zellatons have certain virtues that other cone transducers—even other far more expensive cone transducers—don't have (or don't have to the same extent). If, on the other hand, you're into rock, electronica, or other types of hard-driving amplified music and simply can't live without the whip-crack transients and midbass slam that certain speakers deliver in abundance, you can do better (or, at least, substantially different) than the Reference MkIIs for a *lot* less money.

So, why would anybody in his or her right mind contemplate purchasing speakers that cost a fortune and have somewhat limited appeal? Well, for the two or three of you who are still reading with genuine interest (or morbid curiosity), let me see if I can come up with an answer.

To begin with, the Zellaton Reference MkIIs don't sound like any other dynamic loudspeakers I'm familiar with. Indeed, at their best, they don't sound like loudspeakers at all. They simply haven't got the usual metal, plastic, paper, ce-



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ramic, diamond, or carbon-fiber cone-in-a-box sonic signature. For better (and a bit of worse, as you'll see), they are almost as colorless as the air in your listening room. Indeed, if you were to blindfold yourself (as a few of my on-line critics would prefer I do—and gag myself while I'm at it) and then guess what you were listening to, you would probably say an unusually neutral, three-dimensional, deep-reaching, full-bodied electrostat, *or*, with select recordings of voices and instruments played back at the right volume levels, the real thing.

To explain why the Zellaton drivers are so exceptionally low in material coloration and so seamlessly matched from woofer through tweeter that they sound like a single-driver 'stat (or the real deal) requires a bit of a history lesson. And, as it turns out, only a few other companies still extant have a longer history than Zellaton.

Even though you've likely never heard of this little German marque (based in Munich), its pedigree dates back to June 9, 1930, when its founder, German engineer and physicist Dr. Emil Podszus, filed a patent on what was then the *first* "sandwich" cone driver.

To quote from my *Hi-Fi+* colleague Alan Sircom's excellent article on Zellaton (<http://www.hifiplus.com/articles/meet-your-maker-zellaton/>): "Podszus began working on loudspeaker drive units back...when electrical recording and replay were still in their infancy. Materials science of the 1930s was in its infancy too; materials we take for granted today, like PVC and polystyrene, were at the forefront of technological progress at the time, and inter-war Germany was one of the great centers of excellence in plastics development. In this period of intense growth,

Dr. Emil Podszus set himself the task of improving the performance of loudspeaker units, both in terms of high-performance audio and the more pressing issue of loudspeakers within telephones.

"His solution was to make a drive unit that coupled a very light diaphragm with a carefully optimized foam substrate, to produce a loudspeaker with the speed and stiffness required for audio reproduction. The difficulty faced with this design—it transpired—was that it doesn't 'scale' well. Where pioneering plastics technologists in the 1930s quickly found a way to mass-produce their materials, the need to create a foam substrate of varying size across the driver meant Emil Podszus' [sandwich cone] remained essentially a bespoke design that could only be produced in tiny numbers. A very high performance design, undoubtedly, but one that precluded being supplied to the audio mass market. This kept the Podszus name out of the mainstream audio world, but the Zellaton brand that came out of this technology was resilient. Dr. Emil handed the concepts down to his son Kurt, who then subsequently passed the baton down to his son Manuel."

Manuel Podszus is still making his grandfather's drivers—and still making them by hand in a process so painstakingly exacting that it takes several weeks to complete each cone (all materials and adhesives are also subjected to several *months* of testing and optimization). It is commonplace today for loudspeaker manufacturers to brag about their high-tech tweeters, midranges, and woofers, but, frankly, a good deal of the fabrication and assembly of those drivers is farmed out to specialty companies that have the

machinery to produce parts precisely to order—and in sufficient quantity. This is *not* the way Zellaton works. It makes diaphragms the way Patek Philippe makes watches.

The Reference MkII is a three-way floorstanding loudspeaker with a single 2" true cone tweeter (not a dome or an inverted dome but a cone), a single 7" mid/woofer (which, by itself, covers the range from 250Hz to 6.5kHz—part of the reason why the Reference MkII sounds so much like a single-driver speaker), and three 9" woofers, all housed in a unique, gorgeously finished, multi-layered, matrix-braced, *open-backed* enclosure (see below for more details). Every single one of the Reference's drivers uses Emil Podszus' sandwich cone (which his grandson Manuel has improved by "using modern materials and sophisticated, purpose-designed processes without changing the basic formulation that has been employed for decades"). Utilizing a single type of driver made of precisely the same materials—rather than a mix of cones and domes made of a variety of materials, as is the case with almost every other dynamic or hybrid loudspeaker I know of—is another reason why the Zellaton Reference MkII sounds so remarkably 'stat-like and of a piece.

What is a Zellaton driver? Essentially, it is a three-piece sandwich cone comprising a micro-thin layer of aluminum film (0.006mm thick in the case of the tweeter) atop a layer of ultra-stiff aerated foam (still hand-made and hand-cured using Emil Podszus' "top-secret" formula), and backed by a proprietary layer of treated paper. Zellaton cones are incredibly light (the Zellaton tweeter's diaphragm weighs approximately 0.16 grams!) but also incredibly stiff, giving them

what is claimed to be "ideal pulse response." All of the Reference's drivers also use computer-optimized magnet systems (pure iron with 20,000 gauss magnetic flux, in the case of the cone tweeter) with a "largely linear field along the entire height of the pole plate"; proprietary spiders and surrounds (which have a softer "feel" than other surrounds I'm familiar with—just touch one of the woofers' surrounds and see for yourself); and high-temperature voice coils on titanium-film formers. Each driver is "subjected to multiple control measurements and fine adjustments," with its frequency response logged and documented and pairs matched to the highest tolerances. The drivers are linked to each other via crossover networks that use ultra-high-end Duelund Coherent Audio caps, coils, and resistors, and wired with ultra-high-end Schnerzinger cable.

The Reference MkII's enclosures are just as handcrafted as their drivers. Intricate in design, damping, bracing, composition, and finish, their multi-layered wooden walls vary in thickness from 34mm to 50mm. At the rear, the enclosures are mostly open from top to bottom—an unusual configuration (nowadays) that reduces or eliminates compression of the tweeter, midrange, and woofers' backwaves, and gives the Zelatons something very like the dipolar radiation pattern and easy, boxless openness of membrane speakers—another reason why the Reference MkII's sound like 'stats on steroids.

Of course, the main reason that the Zellaton Reference MkII's are reminiscent of electrostats is the forehead-slapping realism with which they reproduce voices and so many acoustic instruments. This is in equal parts the result of

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extremely high resolution (virtually as high as you can get at low to moderately loud levels with cones), extremely lifelike reproduction of timbre, extremely natural and *linear* reproduction of transients (with none of the edge or “zip” of metal domes and none of the subsequent timbral, dynamic, and imaging discontinuities between the midrange and the upper octaves—every instrument speaks with the same voice no matter where in its range it plays, just as in life), and extremely low driver/box coloration with none of the usual sense of the box or the back-wave of the drivers selectively adding spurious, spring-like energy to the presentation, which, despite the manifest increase in thrills this “super-charging” gives the sound, is not something one—or, at least, this one—hears in a concert or recital hall.

With really great recordings of acoustic music, the result is a truly remarkable sense of being in the presence of actual vocalists and instrumentalists. As I’ve noted before, this level of realism—where a voice or an instrument is conjured up so completely that the mind does a double take—is not something we are used to from stereo systems. We expect hi-fi’s to sound at least a little like hi-fi’s. It is what they are, after all—and hell, we’re looking right at them. In spite of this, at its best the Zellaton Reference MkII makes you forget where the sound is coming from.

All this talk about Zellatons and electrostats raises an interesting question: Why not just buy a ‘stat or hybrid ‘stat instead? After all, even the best of such speakers costs far less than a pair of Reference MkIIs.

Well...I can think of several reasons. First, true full-range electrostats are giant monoliths that

require a whole lot of space around them to strut their stuff. (Even smaller ‘stats tend to have considerable width and height.) For all their sonic similarities, the svelte, four-foot-tall Zellaton Reference MkIIs are relatively demure in size and far more stylish-looking than most ‘stats, and will slot with far greater ease into a lot more listening rooms, from small to relatively big. Second,

while some large electrostatic panels can do low bass, most can’t (and the sheer square footage of those that can tends to excite room modes like nobody’s business, making them a challenge to set up). The Zellaton Reference MkIIs have excellent low-end extension (down into the 20Hz range), neutral color, and superb bottom-octave definition (with none of the room-induced bal-

looning of certain lower-octave notes that you can so often get with ‘stats). Plus—thanks to their unique Podszus drivers and open cabinet design—they have the free-flowing three-dimensional bass of actual fiddles, pianos, and low-pitched brasses and winds. Third, they not only have more three-dimensional body in the bass than a typical ‘stat; they also have that three-di-

SPECS & PRICING

Type: Three-way dynamic loudspeaker

Drivers: One 2" cone tweeter, one 7" mid/woofer, three 9" woofers

Frequency response: 22Hz–40kHz

Nominal impedance: 4 ohms

Sensitivity: 89dB/1W/1m

Recommended power: 50W–600W

Dimensions: 17.7" x 51.57" x 27.95"

Weight: 275.5 lbs. per side

Price: \$150,000 per pair

AUDIOARTS (U.S. Importer)

210 Fifth Avenue.
New York, NY 10010
(212) 260-2939
audioarts.co

JV’s Reference System

Loudspeakers: Magico M Project, Magico M3, Raidho D-1, Avantgarde Zero 1, MartinLogan CLX, Magnepan .7, Magnepan 1.7, Magnepan 30.7

Subwoofers: JL Audio Gotham (pair), Magico QSub 15 (pair)

Linestage preamps: Soullution 725, Constellation Altair II, Siltech SAGA System

C1, Air Tight ATE-2001 Reference

Phonostage preamps: Soullution 755, Constellation Perseus, Audio Consulting Silver Rock Toroidal, Innovative Cohesion Engineering Raptor

Power amplifiers: Soullution 711, Constellation Hercules II Stereo, Air Tight 3211, Air Tight ATM-2001, Zanden Audio Systems Model 9600, Siltech SAGA System V1/P1, Odyssey Audio Stratos

Analog sources: Acoustic Signature Invictus/T-9000, Walker Audio Proscenium Black Diamond Mk V, TW Acoustic Black Knight/TW Raven 10.5, Continuum Audio Labs Obsidian with Viper tonearm, AMG Viella 12

Tape deck: United Home Audio Ultimate 1 OPS

Phono cartridges: Clearaudio Goldfinger Statement, Air Tight Opus 1, Ortofon MC Anna, Ortofon MC A90

Digital sources: Berkeley Alpha DAC 2, MSB The Reference DAC

Cables and interconnects: Crystal Cable Absolute Dream, Synergistic Research Galileo UEF, Ansuz Acoustics Diamond

Power cords: Crystal Cable Absolute Dream, Synergistic Research Galileo UEF, Ansuz Acoustics Diamond

Power conditioners: Synergistic Research Galileo LE, Technical Brain

Support systems: Critical Mass Systems MAXXUM and QXK equipment racks and amp stands

Room treatments: Stein Music H2 Harmonizer System, Synergistic Research UEF Acoustic Panels/Atmosphere/ UEF Acoustic Dot system, Synergistic Research ART system, Shakti Hallographs (6), Zanden Acoustic panels, A/V Room Services Metu acoustic panels and traps, ASC Tube Traps

Accessories: Symposium Isis and Ultra equipment platforms, Symposium Rollerblocks and Fat Padz, Walker Prologue Reference equipment and amp stands, Walker Valid Points and Resonance Control discs, Clearaudio Double Matrix Professional Sonic record cleaner, Synergistic Research RED Quantum fuses, HiFi-Tuning silver/gold fuses

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mensionality in the midrange and lower treble. This is partly just a property of cones, which tend to sound more “rooted,” less “evanescent” than electrostats. But it is also a distinctive virtue of the Podszus drivers, which have a dimensionality and naturalness of timbre that is rare even among ultra-high-end speakers.

So, you’re probably asking, why did I call speakers capable of such a fabulous magic trick “limited in appeal?” Well, almost by design (dipole radiation pattern, cones that are almost as light as membrane drivers and that aren’t gaining any backwave leverage from their enclosure), Zellatons don’t pack all the dynamic punch of ported or sealed-enclosure loudspeakers. (This is another way in which they resemble electrostats.) While big timp or kickdrum strikes will shake the room with the Zellatons, they won’t shake it the way, oh, Magicos or Raidhos do. Ditto for rock drumkit-and-Fender-bass lines, which are superbly defined in timbre and duration, but are subdued (in comparison to the best dynamic speakers) when it comes to clout.

Nor do the Zellatons have all the energy on hard upper-midrange and treble transients that speakers with metal-dome tweeters or ribbons

often have. Indeed, the Reference MkII’s true cone tweeter sounds considerably softer and less extended than beryllium or diamond tweeters. (It also sounds more of a piece with the midrange and bass, which is precisely the trade-off that Manuel Podszus was willing to make when he designed this remarkable driver.) For acoustic music, this softness is generally a plus. The complaint, often raised in this magazine, that metal/diamond-dome tweeters produce too much sonic “edge enhancement,” exaggerating transient detail in a way that one never hears in a concert or recital hall or a large studio (where treble-range notes are typically softened by frictional losses), will never be raised about the Zellaton Reference MkIIs. In the treble, they make music sound like it’s being played in a hall. That said, the speakers do reduce the shimmer and impact of struck instruments, like bells and cymbals, and slightly soften the attacks of brass, wind, and percussion.

So, what is the bottom line here? Clearly, the Zellatons will not be the right speakers for “as you like it” listeners—or for any listeners looking primarily for visceral thrills and chills (and, let’s face it, a lot of you quite reasonably are looking for these very things). They will be far more satisfactory to “fidelity to source” listeners (or at least to those who are willing to give up some upper-midrange/treble energy and extension), and will be nearly ideal for (wealthy) absolute sound fans, who will find in them a unique combination of the speed, resolution, and single-driver coherence of a great electrostat and the color, weight, body, and bass extension of a great dynamic speaker.

I’ll tell you this: On well-recorded voice (such as Sarah Vaughan’s fabulous contralto on *Sar-*

ah Vaughan & The Jimmy Reeves Quartet [Mainstream] or Ol’ Blue Eyes’ whiskey-colored baritone on *Live at the Sands* [MoFi/Universal]), small ensemble classical (such as the Tashi rendition of Ingolf Dahl’s delightful *Concerto a Tre* [RCA], or violinist Paul Zukofsky and pianist Gilbert Kalish’s thrilling performances of George Crumb’s bravura *Four Nocturnes for Violin and Piano* [Mainstream]), large-scale classical (such as the explosively dynamic Johanos/Dallas recording of Rachmaninoff’s *Symphonic Dances* [Analogue Productions/Turnabout] or the famous Reiner/CSO performance of Russian orchestral showpieces, *Festival* [RCA]), or folk, blues, and pop (such as the great Son House LP *Father of Folk Blues* [Analogue Productions/Columbia], Taj Ma-

hal’s gruff and tender *Recycling the Blues & Other Related Stuff* [Analogue Productions/Columbia], and Pete Townshend, Ronnie Lane, Eric Clapton, John Entwistle, and Charlie Watts’ still delightful, mostly acoustic romp *Rough Mix* [Polydor]), the Zellaton Reference MkIIs regularly disappear, making singers, instruments, entire ensembles sound as if they’d somehow magically popped up in the room with you from some kink or curvature in time. It’s a helluva feat—one that our founder, Mr. Pearson, would’ve admired (as I most certainly do).

If you love acoustic music—classical, jazz, or pop—and have the shekels, auditioning the Zellaton Reference MkIIs would be a wise and rewarding move. **tas**

Driving the Zellaton Reference MkIIs

Unlike several other superb dynamic loudspeakers and most electrostats, the Reference MkIIs are not particularly picky about where they get their power. I’ve had excellent results with a broad spectrum of solid-state amplifiers, ranging from MBL’s surprisingly excellent \$15k Class D N51 integrated amplifier (which outputs 380W into 4 ohms) to my benchmark \$65k Solution 711 stereo amplifier (300W into 4 ohms) and \$95k Constellation Hercules Stereo II (750W into 4 ohms).

What was a little surprising to me (although it probably shouldn’t have been, given that I first heard the References in Munich powered by glass audio) was how well these speakers fared with modestly powerful tube gear. Air Tight’s

fabulous new \$70k 3211 monoblock amplifiers (30W Class A and up to 120W Class AB into 4 ohms from a pair of directly heated triode 211s) proved to be a particularly magical combination, with grip and definition in the bottom octaves that, for once, weren’t put to shame by Solutio’s standard-setting low-end performance.

The Zellatons are transparent enough to readily sort out Class D and Class AB solid-state from Class A/AB triode tubes, but they are also undemanding enough to make each gain strategy sound quite winning. After years of living with picky loudspeakers (Magicos, Raidhos, Martin-Logan CLXes, etc.), it is an added pleasure to find one that is not.

Equipment Report

YG Acoustics Sonja 2.2

Serving the Music

Kirk Midtskog

Rarely does a high-end manufacturer make a new product available for review well in advance of its official release. Usually a new product is announced at an audio show like Munich High End, and its market delivery is targeted for several months after the announcement. Yoav Geva, principal designer at YG Acoustics, was way ahead of schedule in the case of the Sonja 2.2. He and his manufacturing team were able to make an advanced production pair available exclusively to TAS several months before the speaker's official release, scheduled—as of this writing—for sometime in December, 2017, most likely at special showings hosted by YG and Bill Parish at GTT Audio.

I reviewed the original Sonja 1.2 in Issue 256. As good as that speaker still is, the new 2.2 is better in some significant ways. I will cover the engineering changes that are responsible for the increased performance later—such as a brand-new kind of dome tweeter—but let me sum-

marize the primary sonic improvements as follows: higher resolution of fine detail coupled with an increase in overall “ease,” a bit more bass heft, better definition of complex musical lines during demanding musical passages, and an expanded and more continuously rendered soundstage such that the speakers blend into the soundscape even more seamlessly than before. I didn't believe such improvements were possible to the extent YG has wrought, given the 1.2's already outstanding performance, but the company has indeed done just that. The Sonja 2.2 is worthy of serious consideration for anyone in the market at its \$76,800 price level—and even higher, for that matter.

This price segment of the market has been filling up with more products for some time now, and the upper end pricing is rising even further. \$500k+ speakers and \$150k+ turntables are now well within price frontiers, just like \$5 million Manhattan condos and \$100k automo-

biles are not considered unusual anymore. I don't condone it, nor do I play at that those price levels, personally. I am merely characterizing what seems to be trend in the broader “luxury” market. Having said that, I do not believe the 2.2's \$76,800 price is unduly elevated simply because others are doing it. YG designs and manufactures high-quality speakers in the U.S. where labor and other costs are higher than, say, Asia, and it makes the vast majority of its products' constituent parts at its factory just outside of Denver, Colorado. Driver membranes, cabinets, toroidal inductors, internal braces, joiners, and even custom binding posts are all manufactured in-house. YG uses high-grade raw materials for the parts it manufactures and top-quality parts from vendors such as Mundorf (capacitors and inductors) for the components it must source from others, all of which increase costs.

What are some of the other costs? YG machines the vast majority of its speak-



Equipment Report YG Acoustics Sonja 2.2

ers from aircraft grade (6061-T651) aluminum billet—to a 20-micron (0.0008”) tolerance in some applications. Many of the billets are large and heavy, so raw material stock and shipping costs are high. The various milling and turning machines needed to meet YG’s capacity and exacting demands are expensive, over \$2 million combined thus far. The costs of the skilled labor to program and maintain the CNC (computer numeric control) machines and the consumables (tool heads, bits, etc.) are considerable. YG machines driver cones from solid aluminum blocks, which it calls “BilletCore.” Each BilletCore radially- and concentrically-ribbed driver cone takes about four hours to mill on a five-axis CNC milling and turning machine imported from Germany, a Gildemeister CTX Beta 1250 TC.

Background Technology

YG’s principal defining technological difference lies in its crossovers and how they are implemented in a very tightly controlled interplay among the drivers and other parts of the finished loudspeaker. Yoav Geva founded YG Acoustics based on this unique—as far as I know—crossover technology, which YG claims comes closer to a sort of ideal in multi-driver loudspeaker design than most others, simultaneously achieving near-zero relative phase and near-flat frequency response. Apparently, either frequency response or phase angle performance is usually sacrificed for the other in most other designs. Geva’s “DualCoherent” crossover—based on an algorithm he developed from signal processing in a completely different application—serves as the basis from which the rest of YG’s engineering follows. In order for the crossover to work

as intended, though, a very high level of precision in all aspects of the design is required; hence, YG’s emphasis on high-quality parts and attention to every detail in its engineering and manufacturing. It is also why YG uses so much machined aluminum. It has good strength-to-weight ratio, relatively high resistance to corrosion and high temperature, the ability to be made into a wide variety of custom shapes to precise tolerances, and ideal resonance-damping properties when properly constructed. (For more information about the company, please see the YG Acoustics section in *The Absolute Sound’s Illustrated History of High-End Audio, Volume One: Loudspeakers* or read past YG reviews in TAS.)

Product Description

The only obvious visual difference between the Sonja 1 and 2 versions is in the rear panel binding post arrangement. Otherwise, the dimensions are the same, as are the number and sizes of the drivers and the configuration of the cabinet modules. For readers who are not familiar with the Sonja, the next two paragraphs are an edited description taken from my Sonja 1.2 review, updated to show the current Sonja 2.2 particulars and some additional details. (Readers who are already familiar with the speaker may want to skip the next two paragraphs.)

The Sonja 2.2 is a two-module design (main unit and bass unit) and is now available only as a fully passive system; the former powered bass module option is no longer offered. Consumers may opt for the Sonja 2.3, which adds a different bass module, bringing the price from \$76,800 to \$112,800. The three-module

configuration increases the height from 51” to 70” and the weight from 271 to 481 pounds. The main, upper module houses two 6” aluminum BilletCore mid-woofers (unchanged), and a brand-new 1” waveguide-mounted “BilletDome” silk and airframe dome tweeter in a D’Appolito (MTM) arrangement. (I will cover more on this groundbreaking, patent-pending tweeter below.) The crossover point remains at 65Hz between the bass module and main module and at 1.75kHz between the mid/bass drivers and the tweeter. The two-way, 124-pound main, upper module (known as Sonja 2.1) can be purchased separately as a stand-mounted monitor (for \$40,800) to which the bass module can be added later to form the three-way Sonja 2.2 system reviewed here. The 2.2 bass module has one BilletCore 10.25” driver, which is positioned fairly low in its gently curved, tapered cabinet. YG found that this location maximized consistent bass performance through the driver’s proximity to the floor, in addition to minimizing cabinet resonances.

Each module has an inner cabinet, which is mounted inside an outer cabinet. They are not merely double-layered as such. Each box has its own joints and can function as a stand-alone cabinet. This extra manufacturing complexity must surely add significantly to the overall cost, but YG says it makes each complete cabinet much more rigid and better damped than either an equivalently thick single-layered or a shared-joint, double-layered enclosure. Sonja 2, Sonja XV Jr., and XV (YG’s \$265,900 four-tower flagship) are the only models in the line with this cabinet-in-cabinet construction. The new BilletDome tweeter is also currently only avail-

able in Sonja models. YG does not use any batting or other soft materials inside its cabinets to dampen the drivers’ backwaves. YG says such materials cause mechanical loss and degrade performance. All internal damping is handled by precise placement of braces and by an unspecified material in a proprietary method of pinpoint resonance control that YG calls FocusedElimination. Incidentally, the other speaker with which I am familiar that also does not contain soft internal damping material (or only a bare minimum of it), like those from Arabesque and Gamut, share a dynamic vibrancy with YG speakers.

New Version

The new Sonja 2.2 has three main changes (and one minor one) over the previous 1.2. First, and most significantly, all Sonja 2 models have a new kind of tweeter. Geva has merged a soft-dome membrane with a supporting lightweight, rigid, acoustically transparent frame made from—you guessed it—precision-machined aluminum billet. YG’s new BilletDome soft-dome/frame tweeter actually represents a technical breakthrough in tweeter design for which the company is applying for a patent. Soft domes can sound very good, but they are simply not stiff enough to withstand the acceleration forces exerted on them while playing at higher frequencies and at higher amplitudes without deforming, resulting in distortion. Many metal-dome tweeters (regular or inverted) can also sound quite good and are generally stronger and more uniformly piston-like in their motion, but they are also known for “ringing” at high frequencies, thus creating unwanted resonances and a different sort

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of distortion. Even if the ringing can be shown to be above the limits of human hearing, many listeners can still discern a harshness in some speakers with metal tweeters, especially during demanding music passages. These are basic generalities, of course. I am leaving out other tweeter types, such as ribbons, electrostats, and magnetostats because I am simply not qualified

to discuss them. (Ceramic and diamond-coated domes also have their pros and cons, but, again, I am not qualified to speak to them.) After nearly two years of R&D, Geva successfully bonded a high-quality silk dome membrane over a strong and very lightweight (30 milligrams) “airframe.” This apparently makes the resulting tweeter stronger than the strongest all-metal tweeter

but without a metallic ringing quality. YG has done acceleration tests (based on pressure measurements) of titanium and beryllium tweeters and can demonstrate that its BilletDome tweeter withstands about twice as many G-forces as a titanium tweeter and about 38% more than a beryllium one. The airframe is shaped to be acoustically transparent, very strong, and light enough so the that combined moving mass of the soft dome and its airframe are roughly equivalent to that of a metal dome. I will say, I have heard some great-sounding speakers with treated metal dome tweeters such as the upper-level Focal models—and I tend to be agnostic about specific materials in general—but the YG BilletDome tweeter sounds fabulous in the Sonja 2.2 and Sonja XV.

Second, the crossover was changed to accommodate the new tweeter’s electrical and acoustic properties, and also to allow the speaker to perform more efficiently in the lower frequencies. YG says that rather than having the speaker favor mainly higher-powered, high-current amplifiers, a greater variety of amps can now extract more of the Sonja’s available bass extension.

Third, the bass module cabinet is now 25 pounds lighter and also stiffer. According to YG, “the new construction is 8% lighter and over 10% stronger, which leads to an overall 20% improvement in the enclosure’s strength-to-weight ratio.”

The fourth change is more a matter of rear-panel cosmetics and user convenience than a performance-enhancing update. The older 1.2 has three pairs of binding posts. The new 2.2 has two pairs and is the only readily

apparent visual difference between Sonja 1.2 and 2.2 (unless you look closely at the tweeter). The back of the Sonja 2.2 is cleaner looking because the two modules’ binding posts are now in matching insets that meet each other at the modules’ junctures.

Sonja 1 owners may upgrade their speakers (not including the cabinet update) to “Sonja 2 technology,” as YG phrases it, for \$9400 (2.1) \$14,800 (2.2), and \$16,800 (2.3) respectively. YG will also upgrade the cabinet, but it requires more modifications and an additional charge.

Listening

In my review of the original 1.2, I wrote the following to frame my overall impression, “the Sonja 1.2 is simply stunning—dynamic range, frequency extension, tonal purity, transparency, soundstaging, and imaging...all stunning and sometimes goosebump-inducing and involuntary grin-forming as it calmly goes about its musical business. The Sonja 1.2 does not have an easily identifiable dominant sonic character such as ‘liveliness’ or ‘silkeness,’ nor does it have an apparent bottom-up or top-down tonal balance. Rather, the 1.2 seems to simply convey the content of the recordings it is tasked to play back—and the characteristics of the gear with which it is partnered, of course—without much apparent imposition of its own.”

That summary still applies to the new 2.2 but is augmented by even greater resolution, ease, and general facility. The sonic sum of the Sonja 2 changes seem to amount to more than their updated constituent parts would initially indicate, although the new BilletDome tweeter certainly is an obvious technological advancement. The

SPECS & PRICING

Driver complement: One 1” YG BilletDome tweeter, two 6” YG BilletCore mid-woofers (main module), one 10.25” YG BilletCore woofer (bass module)

Frequency response:

Usable output below 20Hz to above 40kHz

Sensitivity: 88dB/2.83V/1m anechoic

Impedance: 4 ohms nominal, 3 ohms minimum

Recommended amplifier power: Minimum, 60 high-current watts

Crossover points: 65Hz and 1.75kHz

Cabinet: Aircraft-grade milled aluminum

Dimensions: 13” x 51” x 25”

Weight: 271 lbs. each

Price: \$76,800 per pair, available in black finish (silver by special request)

YG ACOUSTICS LLC

4941 Allison, St., Unit 10
Arvada, CO 80002
(801) 726-3887
yg-acoustics.com

Associated Equipment

Analog source: Basis Debut V turntable and Vector 4 tonearm, Benz-Micro LP-S MR cartridge

Digital sources: Ayre C-5xeMP universal disc player, Hegel Mohican CDP, HP Envy 15t running JRiver MC-20, Hegel HD30 DAC

Phonostage: Moon by Simaudio 610LP

Linestages: Ayre K-1xe, Hegel P30

Integrated amplifier: Hegel H360

Power amplifiers: Gamut M250i, Hegel H30

Speakers: Dynaudio Confidence C1 Signature, YG Acoustics Sonja 1.2

Cables: Shunyata ZiTron Anaconda signal cables, Nordost Heimdall 2 USB, AudioQuest Coffee USB and Hawk Eye SPDIF, Shunyata Anaconda SPDIF, Shunyata Sigma power cords

A/C power: Two 20-amp dedicated lines, Shunyata SR-Z1 receptacles, Shunyata Triton v3, and Typhon power conditioners

Room treatments: PrimeAcoustic Z-foam panels and DIY panels

Equipment Report YG Acoustics Sonja 2.2

level of resolution of fine detail is improved. Initial transients and timbre are better fleshed out. Decays and spatial cues are clearer and easier to follow. Loud peaks are more explosive while also sounding more composed or “cleaner.” In short, music simply sounds more present and impactful—as the recordings themselves allow. A real bonus with the new version’s increase in fine resolution is that it is not accompanied by a tonal emphasis shift, which can make a speaker sound as if it is forcing details on the listener, a flaw too often associated with speakers with “high-resolution” ambitions. In fact, the Sonja 2.2’s greatest strength, in my opinion, is its uncanny level of resolution and its lack of apparent artifice or strain. One can more easily relax and enjoy the music as it unfolds because there is so little hardness in the upper frequencies. “Detail and ease” seems to be a theme that a select group of excellent speakers embody to a much greater extent than merely good speakers do. Count the Sonja 2.2 among that select group.

The outer extent of the soundscape is also expanded, especially horizontally. This expansion is not overwhelmingly better than with the previous version, in which soundstaging was already a strong point, but it does impart an impression of greater openness. Recording and upstream system quality permitting, the stage extends well outside the cabinets in a room-boundary-defying display that helps mitigate the limitations of my smallish 12.5’ x 17’ room. Compared to most other speakers, the soundstage sounds as if the YGs were placed about two feet farther apart and in a slightly larger room than they actually are. Individual

images within the larger soundscape are focused, not in an exaggerated, hyped-up way, but in a manner that simply makes subtle musical elements more discernible. On the Stravinsky *Song of the Nightingale* LP [Oue/Minnesota, RR], I could easily visualize the orchestral sections arrayed before me, and there was enough information to convincingly portray individual instruments within those sections. Overall soundstage depth and height were also strong points, as were individual image depth and image density. Perhaps the most salient soundstaging characteristic lay in the continuousness of its entire sound envelope such that the speakers are sometimes not discernible as the source of the sound. On some recordings, like the Classic Records LP reissue of the Prokofiev *Lieutenant Kije* [Reiner/CSO, RCA], it is as if the 2.2s just happen to occupy the same part of the room where the soundscape exists, so complete is the apparent detachment of the sound from the speakers.

Complex passages sound cogent and discernible. The timpani part in the RR *Nightingale* uses flams and short rolls in the opening section of the “Chinese March” movement as if to say, “brrrum...brrrum...brrrum” instead of “boom.... boom...boom.” Details like these emerge readily through the 2.2 but can become swallowed up in a less differentiated mass of sound through less revealing speakers. Subtle fingers-on-strings or singers’ lip sounds in small, intimate music come through very clearly, thereby allowing a higher level of the human expressiveness in the music to be readily conveyed to the listener. Again, nothing sounds forced to achieve this lovely resolution. Music unfolds in

a balanced way—tonally, dynamically, harmonically, and visually proportionally realistic within its overall soundscape.

Basically, the Sonja 2.2 carries through whatever the characteristics of the upstream system give it and does so with a kind of assuring competency. Of course, if you play a bad recording or a system mismatch exists upstream, the 2.2 will let you know. Neither of the two Sonja models I have lived with fall into the “twitchy racehorse” category of speakers, requiring only a relatively narrow selection of partnering electronics and cabling to make them rewarding to listen to over the long haul. On the contrary, I find the 1.2 and now the 2.2 to be a great all-rounders with both tonal neutrality and affording flexibility in system-matching. The only caveat on this point is that—even though the crossover has been updated to accommodate less powerful amplifiers—I would still recommend using an amplifier with at least 100 watts (YG recommends at least 60), and I would still favor high-current solid-state amplifiers or higher-powered tube amps over other types.

As already mentioned, the new version has a bit more low-end weight. The characteristic YG bass speed and articulation are still there, but the low end is now just filled in a little better. Dynamic punch is also a touch better. Some of this dynamic precision may come from the easier load presented to the powering amplifier via the 2.2 crossover adjustment, but it may also stem from the new tweeter. It is simply able to handle the acceleration forces better. Even though much of our sense of dynamic force comes from power and speed in the bass region, the upper frequency range has to keep up and maintain

its composure as well, or the whole illusion of a grand dynamic sweep won’t be convincing. The Sonja 2.2 is just a little more exciting to listen to than the 1.2—not that the 1.2 was a slouch by any means. Rock and pop music both have a hair more drive, and orchestral crescendos have a bit more impact.

Like many sealed-cabinet (air suspension) designs, the Sonja 2.2’s bass performance favors agility, tunefulness, and pitch-definition over raw bass power and the “room loading” quality more typically associated with ported (bass-reflex) designs. The 2.2’s lower frequency extension is indeed very low—full-range for all intents and purposes in my setup—but it does not overtly “pressurize” the room with gut-moving bass like some similarly sized ported speakers do. Very low notes on electronica by artists like Björk and Aphex Twin are projected into the room with exhilarating impact, but they are not overblown or out of control. YG lists the frequency range as, “usable output extends from below 20Hz to above 40kHz.” I presume this means the listed bass response takes into account how the speaker interacts with typical domestic room boundaries and may be more meaningful than traditional -/+3dB anechoic chamber specifications. All I can say here is that bass extension and power are excellent in my setup—as are bass tunefulness and articulation. I have also heard the older Sonja 1.2 in a few other rooms—usually larger than mine—and the bass performance never sounded deficient in those systems.

Just like the Sonja 1.2, the 2.2 does not have an obvious sonic personality. Some recordings sound a bit calmer and more “organized,” less strained and jumbled, than they do through

Equipment Report **YG Acoustics Sonja 2.2**

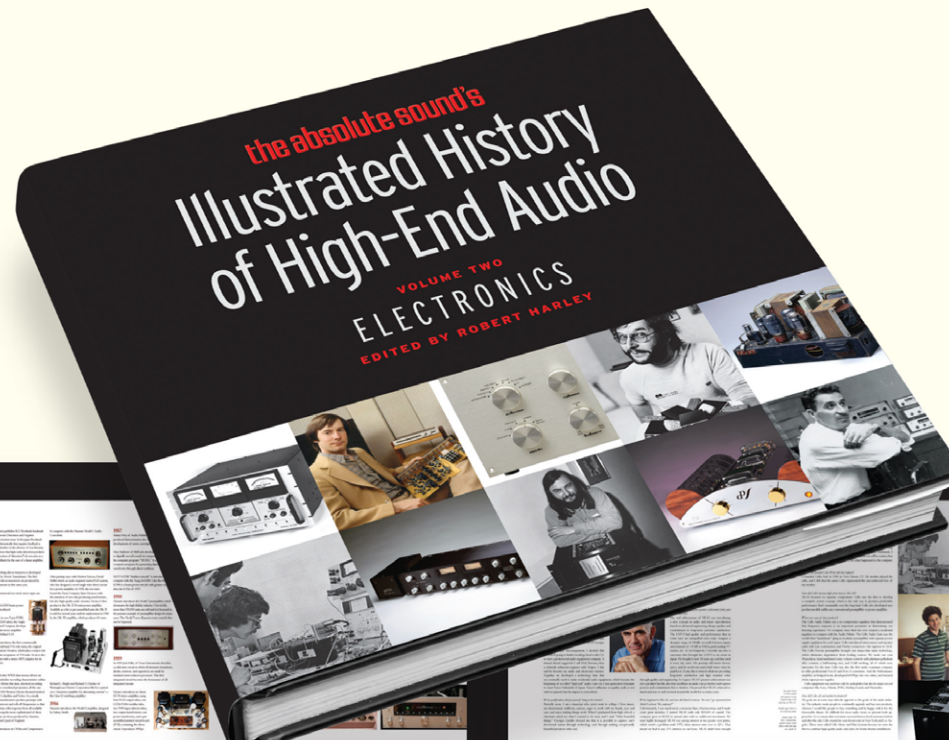
many other speakers. So, this clean and organized quality is about as close to a sonic personality as I can determine. Other than that, the sound I heard through the 2.2 seemed to be more determined by the upstream gear than by the speaker's own intrinsic sonic signature. The word calm might imply polite or even boring to some readers. The Sonja 2.2 is not at all sedate. On the contrary, the Sonja 2.2 allows music's innate artistic qualities to be expressed in large measure. Subtle, contemplative music like some of the Third Stream material on the ECM label sounds evocative and moving, not merely moody and slightly quirky. Hard-driving rock selections from bands such as Tool take on near-frightening acceleration through their sheer intensity. Classical music sounds rewarding in its timbral complexity and structural richness. The Sonja 2.2 does not favor—nor is it limited to—a particular kind or scale of music, at least not in the confines of my room and even in some larger ones. If you really like the big stuff, played on a grand scale, and you have the spacious room and the rest of the system to support it, you'll need a bigger speaker. (This is where the YG dealer will steer you towards the Sonja 2.3 or Sonja XV models.) For most listeners, though, I believe the 2.2 will be all that is needed. The technology YG likes to cite in its marketing material, like ToroAir (toroidal inductors), ForgeCore (driver motor system), and ViceCoil (vise-like housing for large inductors) draw attention to its differentiating engineering elements, but at the end of the day, the product needs to serve music reproduction, and, in my experience, the Sonja 2.2 does so admirably.

Considerations

The nearly 275-pound weight of each speaker may deter some music lovers. Unloading, assembling, and placing the Sonja 2.2 is definitely at least a two-person job. (Your dealer will arrange to send one or two people out to your site to install them.) While the 2.2 does not dominate a room like many large speakers do, it is still a medium/large, all-metal floorstander, so it may not please some folks' aesthetic sensibilities. As mentioned, the speaker favors high-current solid-state amplifiers or higher-powered tube amps over their lower-powered cousins. To really take advantage of the resolving and dynamic abilities of the Sonja 2.2, it helps to use the best partnering gear and cabling one can assemble, which also adds to the cost of ownership. Some audiophiles may prefer the bass quality of a similarly sized ported speaker. I find the 2.2's bass extension, impact, and definition to be flawless in my setup.

Conclusion

What I had said about the original Sonja 1.2 in my concluding remarks in Issue 256 also applies to the new 2.2: "The Sonja 1.2 is revealing without sounding exaggerated. It is dynamically alive without sounding forced. It is tonally neutral without sounding clinical." How can I top that sort of praise? I am now in the slightly awkward position of having to say, essentially, "Yes, what I said then, and now more...more detail, more dynamic ease, more expressiveness, more bass weight, more soundstage continuousness." The Sonja 2.2 is a speaker that serves the music, no matter what kind, with great facility and aplomb. And again, the new version gets my highest recommendation. **TAS**



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Equipment Report

Wilson Audio Yvette

Minor Miracle

Jim Hannon

My association with Wilson Audio products goes back several decades to the first Wilson Audio Tiny Tot (WATT). When I first heard this speaker, I was amazed by its resolution of fine detail, its openness and transparency, its wide and focused soundstaging, and its crystalline clarity. Its time-alignment and inert cabinet really helped reduce smearing. I owned both the WATT 1 and WATT 2 but never added the Puppy—marrying my early WATTs initially to Entec subwoofers and, eventually, to the woofer towers of the Infinity IRS Beta before the Puppy was introduced. I parted with my WATTs in favor of dipole speaker systems such as the Infinity Beta and the Quads (from the originals to the ESL-63s with full Crosby mods).

The WATT was originally designed by Dave Wilson as a location monitor for recordings, but I—like many other audiophiles—used it as a mini-monitor in my primary system. However, I was never able to integrate it seamlessly with subwoofers, and its somewhat analytical, “tell-it-like-it-is” presentation, which is so good for monitoring recordings, proved to be aurally fatiguing in extended listening sessions. While

later WATT iterations ameliorated many of my initial objections—and the Puppy was a much better match than the subs I had employed—I never returned to the WATT or its successors. However, Peter McGrath of Wilson Audio has showcased many of his brilliant recordings for me on various Wilson speakers at industry shows over the years, so I’ve kept pace with the evolution of the company’s loudspeakers.

At the 2016 RMAF, I heard the Wilson Audio Yvette (which replaces the Wilson Sophia 3 rather than for the WATT/Puppy), and was very impressed. Here was a single-enclosure, full-range loudspeaker that offered a harmonic richness—an improvement over the sterility of the original WATT—without its losing any of the compelling sonic attributes that first drew me to the WATT. I was so taken by the Yvette’s remarkable performance, particularly on demanding solo piano recordings, that I gave it my “Best of Show” award when it was demo’d in a system with VTL electronics, Brinkmann/dCS front ends, and Nordost Odin 2 cables. I was anxious to hear what the Yvette could do in my own listening room with somewhat more modest electronics and cables.



Equipment Report Wilson Audio Yvette

The evolution of Wilson Audio and its loudspeakers has been well documented in these pages. For example, see Jacob Heilbrunn's insightful review of the WAMM Master Chronosonic in Issue 276, or the company profile of Wilson Audio in *The Absolute Sound's Illustrated History of High-End Audio, Volume 1: Loudspeakers*. Dave and Sheryl Lee Wilson, and now son Daryl, have built a company that has enjoyed enviable and well-deserved success. Assembling a top-flight group of professionals over the years who share the Wilsons' vision has been a key factor in that success. On a recent trip to the Wilson headquarters in Provo, Utah, I was surprised to learn that top Wilson lieutenants Peter McGrath and John Giolas had owned high-end audio dealerships, and several others on staff also had worked in audio retail. I suspect this is one of the reasons the company places such an emphasis on first-rate dealer training and customer support.

From the outset, accuracy in the time-domain as well as extremely low enclosure resonance have been hallmarks of Wilson designs. The same holds true for the latest loudspeakers, for which Dave's son Daryl served as lead designer and continued to improve performance in these areas. Moreover, Daryl's Yvette and Alexx designs have benefited from being developed alongside Dave Wilson's masterpiece, the WAMM Master Chronosonic, whose micro-adjustments of individual driver positioning mark the ultimate manifestation of time-domain accuracy in a multiway speaker system.

Dating back to the original WATT, Wilson enclosures have been extremely inert—to help minimize spurious vibrations that can smear

the sound and reduce clarity. As mentioned above, the Yvette's enclosure is designed for time-domain accuracy and extremely low resonance. In contrast to the WATT/Puppy, the Yvette employs a single enclosure built from proprietary Wilson-developed composites—its third generation X-material, as well as S-material developed specifically for enhanced midrange performance. A replacement for the Sophia 3, the Yvette is about the same size as the Sophia, though slightly shorter and a bit deeper, it weighs ten pounds more due to its more "ambitious bracing." A laser vibrometer, which measures minute mechanical vibrations, helped the Yvette's design team create a significantly less resonant cabinet. Another plus is that the Yvette's resistor-tuning system is more accessible and uses improved hardware over that found in the Sophia 3. The actual volume for the woofer is larger in the Yvette due to angled bracing behind the midrange driver that adds internal space for the woofer. However, the Yvette has slightly (1dB) lower sensitivity than the Sophia 3 and a dip to 2.94 ohms versus the 3.1 ohms minimum for the Sophia 3.

The Yvette has certainly benefited from advances in Wilson's far costlier and more massive loudspeakers. I heard the Wilson Alexx (designed by Daryl Wilson) at an off-site dealer location during the 2016 Munich Show and gave it my "Best Sound in Munich" award. The Yvette uses the same Mk III version of the Convergent Synergy Tweeter found in the Alexx and the Sasha Series 2. In contrast to the Sophia's inverted titanium dome tweeter, the Yvette uses a sealed, one-inch silk dome optimized for time-domain performance and dispersion; it's

situated on its own baffle made of X-material. Each of the Yvette's other drivers are also positioned on separate baffles and angled to optimize time alignment and dispersion. Its 10-inch rear-ported woofer is "a cousin" of the 10-inch woofer found in both the Alexx and the WAMM, and its rear-vented 7-inch midrange is the same midrange unit found in Wilson's formidable Alexandria XLF. The Yvette uses a venting system similar to that of the XLF, Alexx, Alexia, and Sasha Series 2.

These marvelous drivers are housed in a single non-resonant enclosure built to the most exacting standards I've seen in the industry. During my factory visit, I was surprised by the minute measurements and frequent inspections taken throughout the manufacturing process of the Yvette. The slightest variation from the standard resulted in the enclosure being rejected. This degree of precision and attention to detail rivals that of a medical instruments company.

On the same visit, I had the pleasure of hearing the formidable WAMM at David Wilson's house and was stunned by its overall sonic excellence. It showed me just how close we've come to bringing the concert hall into the living room, and underscored the importance of accuracy in the time domain. Transients from its multiple drivers arrive at the same time for amazing clarity, coherence, and realism. Although it lacks the WAMM's precise and adjustable individual driver positioning to optimize time alignment, the Yvette's fixed-position-driver approach can yield very good time-domain accuracy with careful speaker placement, which is key to the Yvette's superlative performance.

The Sound

The first thing that struck me about the Yvette, particularly compared with the original WATT, was its harmonic richness. Gone was the sterility that had led to aural fatigue with my WATTS. Fortunately, this richness does not come at the expense of fine detail retrieval, nor does it blur the leading edge of transients.

What initially drew me to the Yvette was its ability to reproduce the full power and range of a concert grand piano on demanding recordings, one of the most difficult tests for any loudspeaker. The absence of time-domain and enclosure smearing helps the Yvette replicate the piano accurately, coherently, cleanly, and with realistic timbre. The bottom end is reproduced with power and authority and provides a solid foundation to the music, and the singing tone of the piano on good recordings is remarkably well preserved. Additionally, one can hear bass details that are often obscured by other loudspeakers, including many that cost significantly more.

I enjoyed listening to a wide range of piano recordings, from Horowitz playing Mozart sonatas [Deutsche Grammophon] to the brilliant reissue of Reference Recordings' *Nojima Plays Liszt*. In each case, the piano was reproduced with natural timbre, lifelike clarity, and clean transient attacks. Particularly on the Liszt recording, the Yvette reminded me that the piano is most correctly classified as a percussion instrument, as one can clearly hear the hammers striking the strings, as well as other fine details such as fingernails hitting the ivories and the movements of the pedals, which one can most certainly hear in a live performance. Even when the most powerful chords were struck on fortissimos, the

Equipment Report Wilson Audio Yvette

Yvette hung together sonically without distortion, dynamic compression, or stridency. The speaker also told me a lot about the recording venue, as well as the brand of piano used. In short, the Yvette reproduced the piano with more lifelike realism than any loudspeaker I have had in my house.

Proper time-alignment of its drivers and freedom from enclosure smearing made listening to other percussion instruments on the Yvette a real treat as well. Snare drums had snap, timpani had explosive impact, and cymbals shimmered without sizzling. It made listening to all kinds of music—from rock to jazz to power orchestral—more engaging and thrilling.

Like its larger Wilson brethren, the Yvette has terrific dynamic impact without overhang, and its drivers appear to start and stop “on a dime.” It also sounds much bigger than it looks. I did not expect such overall excellence from a speaker with such a relatively small footprint. In practice, I found myself turning the volume down a bit, because the Yvette has such wide and startling dynamic swings. Surprisingly, it maintained its composure on dynamic peaks without sounding stressed or strident whether I was listening to Janis Joplin on *Cheap Thrills* [Mobile Fidelity], Stravinsky’s *The Rite of Spring* [Reference Recordings], or Harry James and his big band on *Still Harry After All These Years* [Sheffield Labs].

Another pleasant surprise was the Yvette’s bass performance. Given its relatively compact size, it was more extended than I thought it would be (rated as –3dB at 20Hz), and with a good amplifier, like the BAT VK-76SE monoblocks, or the Hegel HD80 integrated, the bass was articulate,

well controlled, and lifelike, as exhibited by Scott LaFaro’s bass fiddle on the brilliant MoFi reissue of the *Bill Evans Trio: Sunday at the Village Vanguard*. With the Yvette, this live recording put me in the club, *sans* the cigarette smoke.

Here’s a speaker that is quite coherent with seamless transitions between drivers. On both male and female vocals, it’s difficult to tell where one driver stops and the other starts. Its coherency and clarity also help the Yvette achieve a high degree of transparency. Like some of the finest mini-monitors, the Yvette virtually disappears, and instruments are very well focused across a broad soundstage.

Much like my beloved Quads, the Yvette is great for long-term listening. Indeed, with its abundance of sonic strengths, it almost compels one to listen far longer than anticipated. While I spent most of my time with classical and jazz recordings, the Yvette can also really rock. Recordings of James Brown, Jimi Hendrix, and Led Zepelin had terrific rhythmic drive and felt quite at home with the Yvette. It acquits itself quite well with any music you’re likely to throw at it.

Because time-domain accuracy is one of the Yvette’s greatest strengths, you will not enjoy this level of performance without precise setup, and perhaps some listening position flexibility. Fortunately, Peter McGrath set the Yvette up for me using his wonderful original recordings. It is quite a meticulous process, with seemingly small differences in placement yielding dramatically different results. I did have to move my usual listening seat about a foot closer to achieve the best sound. Each Wilson dealer goes through a rigorous training program so he can set up speakers using the same approach as Peter did for me.

SPECS & PRICING

Type: Three-way, rear-ported floorstanding loudspeaker

Driver complement: One 1" tweeter, one 7" midrange, one 10" woofer

Frequency response: 20Hz–25kHz +/-3dB

Sensitivity: 86dB

Impedance: 4 ohms

Maximum SPL: 115dB

Dimensions: 13.25" x 41" x 20 1/16"

Weight: 175 lbs.

Price: \$25,500 (in standard colors)

WILSON AUDIO

SPECIALTIES

2233 Mountain Vista Lane
Provo, UT 84606
(801) 377-2233
wilsonaudio.com

ASSOCIATED EQUIPMENT

United Home Audio UHA-Phase 12 tape deck; Merrill-Williams R.E.A.L.101 turntable with Tri-planer U-II and Kiseki Purple Heart cartridge; Audio Alchemy PPA-1 phono preamplifier with PS-5 power supply; Mod-Wright-Oppo BDP-105 digital player; Mytek Brooklyn DAC; MFA Venusian (Frankland modified) and BAT VK-33SE preamplifiers; Hegel HD80 integrated amplifier; BAT VK76SE and PrimaLuna DiaLogue HP monoblock amplifiers; Magnepan 3.7i and Quad ESL-57 (PK modified) loudspeakers; Silver Circle Audio TCHAIK6 power conditioner; Shunyata Research Alpha Digital power cable; Nordost Tyr2 cables and power cords; AudioQuest Niagara interconnects and Metro speaker cables; Critical Mass Systems amplifier stands, etc.

The Yvette’s superlative capabilities are difficult to fault, but it falls slightly short of the best in a few areas. Like almost every loudspeaker in my experience, it lacks the pellucid midrange performance of the Zellaton or the original Quad, although it is very open and engaging. The Yvette certainly outdistances the Quad in dynamic range and punch. While the Yvette doesn’t have the awesome bass extension or impact of the WAMM Master Chronosonic, it has a definite family resemblance. Most will be stunned by its concussive impact, and bass extension and articulation. Admittedly, I could have used even more extension and air on the organ’s pedal tones on Saint-Saens’ Sympho-

ny No. 3 [Reference Recordings], but what the Yvette rendered was quite satisfying.

The Yvette represents some of Wilson Audio’s best work to date. Its time-domain accuracy really helps the multiple drivers sound surprisingly coherent, clear, and natural. It features even better resolution, clarity, and transparency than its predecessors of similar size, and it packs a surprisingly powerful dynamic punch for such a relatively small-footprint loudspeaker. If your room and listening position allow you to get the full benefit of the Yvette’s time-domain accuracy, it’s a lot like hearing the amazing WAMM but on a somewhat smaller scale, thus making the Yvette a great value. **tas**

Equipment Report

Magico M3

When I Paint My Masterpiece

Jonathan Valin

The reason for this: The M3 is the most lifelike (and least “cones-in-a-box-like”) cone speaker I’ve had in my home, and while I recently heard a Magico that betters it (and every other dynamic speaker I’ve come across)—the brand-new M6—that paragon costs a hundred thousand dollars more than the M3, is much larger and heavier than the M3 (making it potentially less of the near-perfect match that the smaller, more compact Magico is for my medium-sized room), and doesn’t better the M3 in all (or even most) ways. Indeed, these two M Series speakers are sonically so much alike that I’m going to begin this review (as I began my recent online blog about the M6) by repeating some of what I wrote about their forebear—Magico’s limited-edition, tenth-anniversary M Project loudspeaker—as neither the M3 nor the M6 would exist without it. After this, I will talk about how the M3 differs from its predecessor and how those differences affect its sonic presentation.

The M Project

So...let’s talk a little Magico history.

As you probably know, I’ve been following

the progress of this skyrocket of a company from the moment I first heard the original Mini in 2006. Since then, Magico has gone from titanium-sandwich drivers, ring-radiator tweeters, and stacked-birch enclosures to nanotech carbon-fiber drivers, beryllium dome tweeters, and massive aluminum enclosures to what has become the current M Series platform of graphene carbon drivers, diamond-coated beryllium dome tweeters, and carbon-fiber-and-aluminum enclosures. What has stayed the same, however, is Wolf and Co.’s ongoing pursuit of perfection.

Of course, the first of many thorny issues with such a quest—which is certainly what Magico is on—is what is meant by “perfection.” For Magico the answer to this question is, and has always been, the lowering of distortions of every measurable kind. Every advance that the company has made has been accompanied by an audible reduction in noise (from drivers, crossovers, and cabinets) and a concomitant increase in resolution and transparency. For Magico, the perfect speaker would be no speaker (or no sense of one)—a pure, uncolored conduit from source to listening room.



This said, not everyone has loved Magico’s ultra-transparent, ultra-neutral, ultra-low-distortion sound (or has bought into its pursuit of measurements-based perfection). Let’s face it: One man’s neutral, low in distortion, and transparent is another’s cool, lean, and

analytical. And cool, lean, and analytical is precisely the way some listeners have heard Magico Qs.

To be fair to their critics, Magicos in general are not warm, cuddly, forgiving speakers, like some Raidhos or Wilsons. They appeal to

Equipment Report **Magico M3**

listeners who value transparency to sources—or what others call “accuracy”—above all else. If a source is well recorded, Magico Q Series loudspeakers come as close to the real thing as any speakers on the market, now or in the past. If it is not, well, they tell you so—not in an overly insistent way, but nonetheless in a straightforward one.

I happen to like this kind of “just the facts, ma’am” honesty, but I’m in the minority. Most listeners, I think, prefer drama to documentary. They want a transducer that thrills them the way music—live or canned—thrills them, and could care less about how much coloration it takes to consistently deliver those goosebumps or how close the result comes to the sound of acoustic instruments in a real space. I call this (majority) group “as you like it” listeners, but it’s just as fair, and less faintly pejorative, to call them “musicality-first” ones.

In between the accuracy and musicality listeners is “the absolute sound” contingent, whose search for those recordings and components that best preserve the sound of acoustic instruments in a real space was the ideal upon which TAS was founded. To an extent, both of the other streams feed into this central pool, albeit on a kind of a contingency basis. Accuracy-first listeners are searching for the recordings and equipment that deliver the most convincing semblance of the real thing, too, provided that they don’t also turn sow’s ears into silk purses by grossly coloring the sound. Though they may not have an overriding interest in acoustic instruments played in real venues (i.e., in classical or acoustic pop and jazz), musicality-first listeners are also delighted

when something sounds “real,” because when something sounds “real” (while at the same time sounding beautiful and exciting) it just adds to the thrill quotient.

It has been my contention that no listener is purely one of these three types: that a delight in accuracy, musicality, and realism are common to all listeners, although one of these three “biases” tends to predominate (or at least it does most of the time). The trouble is that it is next to impossible to find a single transducer that will please all three palates in equal measure. So where does a lover of Béla Bartók, Ray Brown, and The Beatles go to get the essential piece/performance/venue/recording detail, the lifelike tone color, weight, and transient response, the thrilling dynamic range, particularly in the bass, and the sheer SPLs that each of these composers and musicians requires in significantly different proportions?

Until Magico’s introduction of its five-driver, three-way M Project loudspeaker in 2014, I didn’t think there was a single-transducer answer to that question. But the M Pro came close to being The One—or at least closer than the other dynamic loudspeakers I was then familiar with. Though Magico claimed that the M Project didn’t measure substantially differently than its other speakers—and on a global level this was clearly true—on a local level the differences between it and other Magicos were plain to hear.

Once mounted on its MPod feet (a must, BTW), the M Pro simply didn’t sound like its Q or S brethren—or at least it didn’t sound like them when it came to tonality. Oh, the M Pro had the same standard-setting (for dynamic drivers) low-level resolution of timbres and textures

and the same lightning reflexes with transients as the Q Series speakers—and even lower distortion—but overall it was substantially fuller, richer, darker, and more powerful than the Qs, making for a presentation that was far more likely to appeal to musicality-first listeners, without entailing sacrifices that would limit its appeal to Magico’s traditional audience—the transparency-to-source and absolute sound crowds. Indeed, the M-Pro’s appeal to both of the latter was only increased, thanks to its denser and more lifelike tone color.

What had changed? In two words, “the box.” The M Project was the first statement Magico (since the M5) that did not use an all-aluminum enclosure. It was also the first statement Magico with an aerodynamic shape.

How this was accomplished without sacrificing the resonance-canceling blend of mass, stiffness, and damping of all-aluminum boxes involved a neat (and costly) bit of engineering. The M Project enclosure had a newly designed curved shape that tapered gradually from front to back, eliminating the parallel walls and sharp, potentially diffractive edges of Magico’s traditionally “squared-off” aluminum enclosures. Instead of employing thick aluminum plates for sidewalls, the M Project used sidepieces of carbon fiber (one of the stiffest, strongest materials around). According to Magico, these curved carbon-fiber sidewalls minimized internal resonances and greatly reduced the amount of internal damping required.

In addition to its curved side plates, the massive aluminum front and rear baffles were milled into curves, while the equally massive

(two-inch-thick) aluminum top and bottom plates were also CNC-machined to have edgeless contours. In other words, the M Project enclosure was designed to have the lowest number of potentially diffractive surfaces of any statement Magico since the Mini and Mini II.

Judging from the sound, top to bottom, it was obvious that Magico M Pro’s new enclosure was a better idea. The phenomenal clarity in the bass and power range and the remarkable resolution in the midband and the treble owed more than a little to this cabinet, which was simply allowing the drivers to sound more “freestanding” and less like drivers in a box.

The M3

Like the M Project, the new M3 is a five-driver, three-way floorstanding loudspeaker with a sculpted carbon-fiber-and-aluminum box. While the driver complement is similar to that of the M Pro (one 28mm diamond-coated beryllium tweeter, one 6” graphene-Nano-Tec carbon midrange, and three 7” graphene Nano-Tec carbon woofers), the drivers themselves have been improved (for which, see below). More importantly, the enclosure has been considerably improved, making for what Magico claims is its quietest cabinet ever. Derived from the Pro (with an added fillip taken from the S Series and a new innovation in driver coupling), the M3’s box uses Magico’s traditional, massive, damped aluminum front, rear, and bottom panels and its elaborate, bolted-together, aluminum lattice-work/substructure inside the cabinet, but adds curved carbon-fiber side panels à la the M Pro and a brand-new aluminum top cap that has a machined-in curve to it (not found in the M Pro).

Equipment Report Magico M3

The physical result is the most aerodynamic, diffraction-free enclosure Magico has come up with, and the sonic result is a disappearing act that really has to be heard to be believed.

The M3s (and the M6s) come closer to the boxless openness of a great planar loudspeaker (such as the TAS 2018 Product of the Year award-winning Maggie 30.7s) than any cone speaker I've auditioned. Indeed, we're so used to hearing the boxes in boxed speakers adding their own generally darker, often veiled and aggressive signature to the sound of the drivers, and to diffraction compounding this signature, that it comes as a shock *not* to hear these things—to hear the drivers only (or primarily), rather than the drivers interpreted by the box. On a truly neutral, full-range recording, like the fine Pentatone SACD of Stravinsky's *L'Histoire du Soldat* with Paavo Järvi conducting the Deutsche Kammerphilharmonie Bremen played back through the superb MSB Select DAC tricked out with a Femto 33 clock and other power-conditioning goodies (yes, Mr. Valin is now also listening to digital), it is as if someone has sucked all the darkness (a box/driver coloration that I've always felt has been falsely associated with "ambiance retrieval") out of the soundfield, leaving the deep quiet and colorless air of the venue in its place, while also preserving (indeed, clarifying) the bloom of instruments into that space and the reverberant pattern of the hall. You simply have to hear this neutralizing and clarifying effect to appreciate how close the M3 comes to the sound of a boxless planar—while still retaining the virtues of the highest-linearity, lowest-distortion cones. It's like having the best of

both transducer worlds.

There is an additional benefit to Magico's best-ever, lowest-diffraction enclosure that can be heard in the seamless blend between the M3's tweeter and midrange and the natural warmth of timbres (orchestral strings, such as those on the great RCA recording *Rhapsodies* with Stokowski and the RCA Symphony of the Air, are breathtakingly gorgeous), though this may also be due to refinements in the driver complement. Indeed, while similar to the M Pro, the M3 uses somewhat more sophisticated drivers than the Pro—its three 7" woofers, have later-gen graphene diaphragms (said to be 20% lighter and 300% stiffer than the nanotube-carbon cone material used in the Pro)—and a new and improved driver mounting system that employs a solid copper gasket to maximize coupling to the chassis and minimize the transference of resonances. Though the other drivers in the M3 are the same as those in the Pro—the larger (28mm) diamond-coated beryllium tweeter (also used in Q7 Mk II) and the 6" graphene-diaphragm midrange, Magico has incorporated a polymer sub-enclosure, derived from the S Series, for the midrange unit, which is said to enhance control and articulation (not that Magicos ever wanted for such things).

The fact that the M3 uses three 7-inch woofers, rather than the three 10-inches found in the M Pro and the M6, makes for a reduction in power-range fullness and low-bass extension vis-à-vis the Pro or the 6, though the difference can be mitigated by adding a pair of QSub 15s to the package, crossed over around 45–60Hz. (For all sorts of reasons, I'm all in favor of using really good subwoofers, like the Magico Qs or

the JL Audio Gotham IIs, with *full-range* loudspeakers.) With the QSubs in and the Soundation 711 or the Constellation Hercules II driving the entire shebang, I would be hard pressed to say that I hear a substantial difference in the low end between the M3s and the M Pros (also coupled with subs) on a powerful, deep-reaching pop cut like "I'm the Man to Be" from EL VY's *Return to the Moon* or Dire Straits' "So Far Away" from *Brothers in Arms*. No, you won't get all the midbass slam from *any* Magico that you may be used to from ported loudspeakers, but you will still get goosebump-raising power, below-20Hz extension, lifelike tone color unobscured by port resonance, and the peerless transparency and resolution of a standard-settingly-neutral sealed box.

In my blog about the M3's big brother, the M6, I called that speaker the least present (in the sense of box or driver colorations), the most transparent, the most delicately detailed and simultaneously powerful and realistic Magico yet. The truth is I could say the *exact* same thing about the M3—the only differences between the two being that image height is slightly truncated and, as noted, midbass slam and low-bass extension are reduced in the smaller speaker (at least they are when it is used without subs). Nonetheless, as was the case with the M6, to hear a great LP of a vocalist, like Dean Martin on the exceptional Analogue Productions reissue of *Dream with Dean*, through the M3 is not just to hear a wonderful singer singing wonderful songs in wonderful sound. It is to hear Dean Martin, gone now almost 23 years, live again—there in front of you, standing in the studio he was recorded in, with that U47

hanging a few inches above his face. It is to bring back the past wholly intact. (To be fair to my new digital setup, I get the same "back-from-the-past" goosebumps listening to Harry Connick Jr.'s voice, Branford Marsalis' tenor sax, and the truly magical harmonizing of the two towards the end of "A Nightingale Sang in Berkeley Square" from the 1990 Sony CD *We Are in Love*.)

The M Project was, IMO, the first Magico to add fully lifelike power-range beauty and muscle to Magico's transparent and neutral palette, which made it the first Magico with equal appeal on every kind of music from rock to Rachmaninoff. The M3 and M6 take this all-genre sonic appeal several steps closer to perfection. The M3 is not merely gorgeous and thrilling sounding, though it is both of these things; it and its big brother are also getting the harmonic/dynamic envelope more right than other Magicos I've heard. I assume this is because their "invisible" boxes are letting their improved drivers do their work more accurately. As a result, attacks, sustains, and decays are extremely naturally reproduced, with neither starting transient nor steady-state tone nor stopping transient being overemphasized by resonances added by the enclosure (or by the drivers themselves). This makes for an astonishingly neutral, liquid, open, bloomy, and "organic" presentation, closer to the way instruments sound in life.

Take, for instance, the M3's reproduction of the bass drum in "Marche du soldat" from the aforementioned Pentatone recording of Stravinsky's *L'Histoire*. Used as it is in this movement, as martial punctuation, it should have a sharp attack when it is struck hard (as it

Equipment Report Magico M3

is here), develop clean low-frequency presence (kind of like a sonic “rebound” effect in which you hear the flex of the batter head followed by the barrel-like tone of the sound box), with all tone dying off as soon as the drum is damped by hand or knee or both. The M3 captures this harmonic/dynamic sequence with uncanny realism, without losing grip and definition, “darkening” timbre, or prolonging decay. It gives percussion the crisp, clear, powerful, unsmear sound it has in a concert hall. And it does the same trick with the attack, tone, and decay of every one of the other instruments in the Stravinsky suite—from violin to clarinet to cornet to bassoon to trombone to contrabass.

Although the M Project was (and is) no slouch at staging and imaging, the M3 and M6 also represent a significant advance in both areas—once again, I assume, because of their improved boxes and drivers. Neither has the lifelike image size of something like the Magnepan 30.7 on big instruments such as pianos. But both have better focus and dimensionality, more stage depth and width (not height), and more visceral slam than the Maggies. But then both are a good deal more expensive than the 30.7s (and, let’s be honest, a good deal easier to house and live with in a normal-sized listening room than those giant planars).

The M3 is also “Maggie-like” (or electrostat-like) in other ways: It is a monster when it comes to transient speed and the retrieval of low-level detail—even better than previous Magicos and, as most of you know, Magicos have never wanted for resolution. Once again, I assume this turbo-boost in detail retrieval is owed to the quieter box (and improved drivers). You’re certainly not

SPECS & PRICING

Driver complement: One 1" (28mm) diamond-coated beryllium dome tweeter; one 6" graphene Nano-Tec midrange; three 7" graphene Nano-Tec woofers
Sensitivity: 91dB
Impedance: 4 ohms
Frequency response: 24Hz–50kHz
Recommended power: 20–500 watts
Dimensions: 13" x 48" x 19"
Weight: 320 lbs. each
Price: \$75,000 per pair (optional MPod 3-point stand, \$9600)

MAGICO, LLC

3170 Corporate Place
 Hayward, CA 94545
 (510) 649-9700
 magico.net

JV’s Reference System

Loudspeakers: Magico M Project, Magico M3, Raidho D-1, Zellaton Reference Mk II, Avantgarde Zero 1, MartinLogan CLX, Magnepan .7, Magnepan 1.7, Magnepan 30.7
Subwoofers: JL Audio Gotham (pair), Magico QSub 15 (pair)

going to miss anything with these babies. Harry Connick’s very soft finger snaps towards the close of “Berkeley Square,” the rush of breath through the mouthpiece as Branford Marsalis holds onto that last note on the same song...you name it, and it’s unmistakably there. But, thanks to the M Series’ fuller power range and better-blended tweeter, it’s there without the sulfur

Linestage preamps: Soullution 725, Constellation Altair II, Siltech SAGA System C1, Air Tight ATE-2001 Reference

Phonostage preamps: Soullution 755, Constellation Perseus, Audio Consulting Silver Rock Toroidal, Innovative Cohesion Engineering Raptor

Power amplifiers: Soullution 711, Constellation Hercules II Stereo, Air Tight 3211, Air Tight ATM-2001, Zanden Audio Systems Model 9600, Siltech SAGA System V1/P1, Odyssey Audio Stratos

Analog sources: Acoustic Signature Invictus/T-9000, Walker Audio Proscenium Black Diamond Mk V, TW Acoustic Black Knight/TW Raven 10.5, Continuum Audio Labs Obsidian with Viper tonearm, AMG Viella 12

Tape deck: United Home Audio Ultimate 1 OPS

Phono cartridges: Clearaudio Goldfinger Statement, Air Tight Opus 1, Ortofon MC Anna, Ortofon MC A90

Digital sources: Berkeley Alpha DAC 2, MSB The Reference DAC

Cables and interconnects: Crystal Cable Absolute Dream, Synergistic Research Galileo

UEF, Ansuz Acoustics Diamond

Power cords: Crystal Cable Absolute Dream, Synergistic Research Galileo UEF, Ansuz Acoustics Diamond

Power conditioner: Synergistic Research Galileo LE, Technical Brain

Support systems: Critical Mass Systems MAXXUM and QXK equipment racks and amp stands

Room treatments: Stein Music H2 Harmonizer system, Synergistic Research UEF Acoustic Panels/Atmosphere XL4/UEF Acoustic Dot system, Synergistic Research ART system, Shakti Hallographs (6), Zanden Acoustic panels, A/V Room Services Metu acoustic panels and traps, ASC Tube Traps

Accessories: Symposium Isis and Ultra equipment platforms, Symposium Rollerblocks and Fat Padz, Walker Prologue Reference equipment and amp stands, Walker Valid Points and Resonance Control discs, Clearaudio Double Matrix Professional Sonic record cleaner, Synergistic Research RED Quantum fuses, HiFi-Tuning silver/gold fuses

of the analytical—with the fuller, more natural color and dimensionality of the real thing.

Conclusion

The bottom line here is simple. Had I not heard the M6, I would’ve said that Magico’s Alon Wolf and Yair Tammam had painted their masterpiece with the M3. Truth is I still think they have. (The

M6 is virtually the same picture, only on a larger canvas with slightly denser brushstrokes and a slightly richer palette.)

If your stereo lives in a smallish to medium-sized room (as mine does), and you have a *piñata* full of *dineros*, and you hanker for the best (the most accurate, the most lifelike, the most enjoyable) sound money can buy, the Magico

Equipment Report Magico M3

M3 would be at the top of my very short list of contenders. It would be the dynamic speaker I would purchase had I the dough, blending, as it does so well, the boxless openness, speed, resolution, transparency, and seamlessness of the best planars with the color, power, and dimensionality of cones. If you have a larger room and unlimited funds...well, then the \$172k M6 is every bit as much of a must-listen as the M3. (I do not know how the M6 fares in small-to-medium-sized rooms, though I may find out later in the year.)

Obviously the M3 gets my highest recommendation. It is as good a dynamic loudspeaker as you can buy. Do remember, though, that to elicit the very best from one of the most accurate and realistic transducers on the market you'll need electronics that are just as high in resolution and as low in distortion/coloration as the M3s. In my experience that means something solid-state from the Swiss contingent (i.e., Soudation or CH Precision) or from the best American marques (Constellation, D'Agostino, etc.). I haven't tried the M3s with tubes, but Magicos typically don't fare as well with glass bottles as they do with silicon semiconductors (Convergent Audio Technology being the exception). All of this means that M3s aren't just a loudspeaker purchase; they are a *system* purchase (including cabling, BTW). In other words, they are for the wealthy.

The rest of us will just have to "make do" with our Maggie 30.7s or Vandersteen Quatro Wood CTs or MartinLogan CLXes or (judging from what I heard at CES) KLH Model Nines. It's not such a terrible fate, you know.

Five Questions for Alon Wolf

Building the lowest-noise enclosures has always been a prime Magico goal. You started with flat-topped, boat-tail-curved birch ply and aluminum boxes with the Minis, migrated to more traditionally squared-off damped aluminum enclosures with the Qs, re-introduced curved side panels in the two-piece S's, and starting with the M Project have now turned to gently arched carbon-fiber side panels with (in the M3 and M6) edgelessly rounded aluminum faceplates, top plates, bottom plates, and spines. This progression in materials and geometry raises several questions.

First, although damped aluminum has been a constant for front and back panels, you have played with other materials for the side panels. What led you to settle on carbon fiber? What advantages does it have that aluminum (presumably) doesn't? Does mating disparate materials create acoustical issues, in the way of different material colorations (and if so, how are those dealt with)? Do you use the same elaborately bolted together "skeleton" found in the Q Series for internally bracing your new box?

Second, the M3 and the M6 are almost elliptical in shape—your most aerodynamic efforts (and your handsomest designs, IMO) yet. Since smooth edges and curved surfaces (sides, tops, bottoms, and backs) obviously reduce diffraction (and with it the sense of hearing a speaker in a box), why did it take you so long to implement this geometry in your top-line

enclosures? In addition to considerably lowering diffraction, what else have you gained? And does your new box measure any differently than your previous efforts?

It has always been my goal to build a diffractionless enclosure. I actually built my first, organically shaped, edgeless loudspeaker over 25 years ago. The problem, however, always lies in the materials used to build such a box. In order to achieve these kinds of shapes, you can resort to either molding, which is typically done with materials that are simply not stiff or rigid enough to be properly used as a loudspeaker enclosure (although metal can be used as well, but at immense cost, poor finish, and unreconciled damping challenges), or machined, or extruded (so that the aluminum parts can be more easily dampened). We have done the latter, to various degrees, in both the Q (a rounded front baffle), and S (sides and tops) Series. In the new M3 and M6, through the latest advance in composites, we finally found the perfect solution to this tremendous challenge. A skin that is both extremely stiff and well damped, moldable to any shape we design. The only "weak" spot for such a structure is bolt coupling. You really don't want to bolt directly, or through inserts, anything that requires high-torque fastening. For that, as in the past, we use our unique aluminum clamping apparatus, where the drivers are bolted directly to the



aluminum plates encapsulating the carbon skin. The aluminum then, by means of our unique rods contraption, sandwiches the carbon without the need of direct bolting. With the M3 and M6 we came as close as possible to building an "invisible box," which is the ideal loudspeaker enclosure.

Much is made of time and phase alignment in loudspeakers. We see everything from DSP'd

Equipment Report Magico M3

Five Questions for Alon Wolf (cont'd.)

drivers to fixed staggered arrays to articulating boxes capable of minute adjustments. How does Magico handle the issue of time and phase alignment?

The notion of time/phase alignment coherence, at least as it is advanced in today's high-end loudspeaker marketing schemes, is extremely misleading (I will address the shortcomings of the concept in a passive design first).

Trying to keep things simple, let me just highlight the two *must* conditions where such concepts are even probable: 1) first-order acoustical crossover, i.e. a perfect 6dB-per-octave acoustical slope from the designated bandpass; and 2) a physical alignment of the drivers' acoustical centers, which, unless a concentric driver is used, is only possible for one point in space at a time. Only if both conditions are met, is time/phase coherency even probable. Just moving drivers around will not suffice to achieve time coherency. In fact, such designs will ensure a "non-optimal condition" at any point due to the fact that, if a first-order crossover is not used, any driver movement will require crossover realignment to keep the proper phase relations among drivers at the crossover points.

There have been honest attempts at such designs, including some that do meet the basic conditions; however, even if these criteria are met, the compromises needed to be taken to achieve these conditions are detrimental to overall sound quality.

Staggering drivers, in order to align them, in a stepped baffle creates tremendous amounts of diffraction. Unlike time/phase coherency, which has never been proven to be a factor in perceived sound quality, diffraction has indeed been proven to be a big detraction.

A 6dB-per-octave acoustical slope requires a very complex XO, with many parts, which also cause degradation in sound quality and introduce time delays (that is why the actual notion

of a truly time-coherent passive loudspeaker is questionable). A simpler XO is possible using non-pistonc drivers, at the cost of losing low-level information and increasing distortion due to non-pistonc cone movement. Moreover, with 6dB-per-octave slopes in a typical three-way design, the bass drivers will be only ~18dB down at 2kHz, playing right into tweeter territory. Not to mention the tweeter playing into the bass region.

The unavoidable inherent trade-offs of such [time-and-phase-aligned] design are significant:

- 1) Big increases in IMD (intermodulation distortion), which clearly affects sound quality.
- 2) Increased 2nd and 3rd harmonic distortion due to shallow crossover slopes.
- 3) Drivers firing at the listening position asymmetrically—i.e., off-axis (the need to "tilt" drivers to aim at the listening position).
- 4) Limited vertical dispersion.
- 5) Reduced power handling.

So, weighing all these trade-offs against the fact that it has never been proven that time alignment is essential to sound quality, time/phase alignment as a goal in loudspeaker design is easy to pass.

When it comes to DSP, see below...

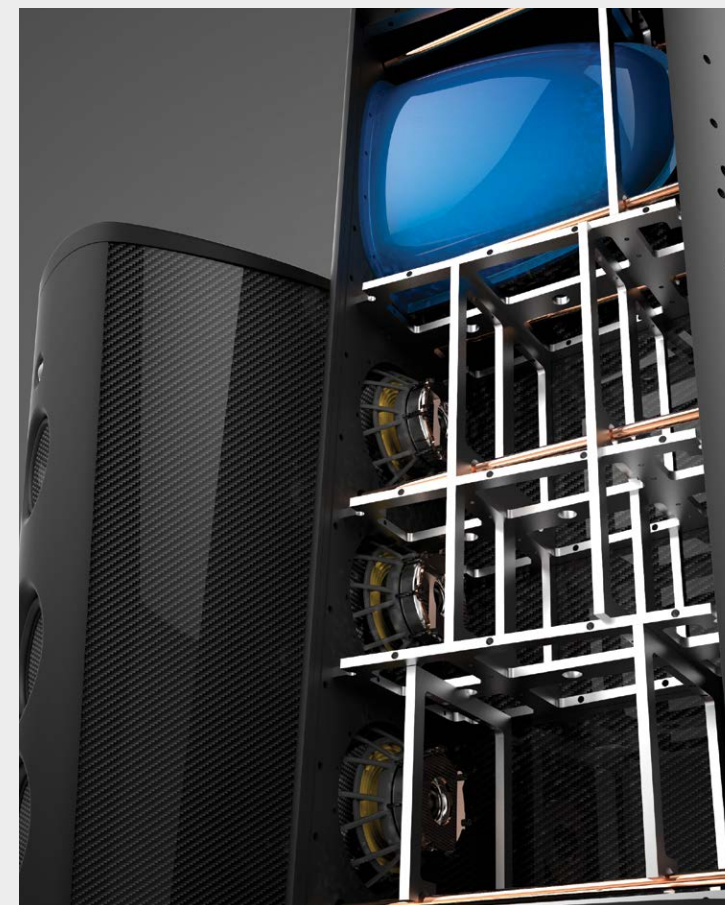
DSP'd and/or powered loudspeakers are a small but growing sector in the market. Do you see advantages to either or both that cannot be gained by conventional means? And do you see Magico eventually proceeding in either or both of these directions?

We use DSP in our subs in order to have better room integration than what is possible in a passive system. However, we have yet to hear any form of DSP that can preserve the basic qualities and transparency of a truly well-designed high-end system.

Rest assured that we will continue to look.

The M3 and M6 are your finest efforts yet—and the best dynamic loudspeakers I've heard. How are you going to top them?

I have no idea. tas



Our Top Picks Floorstanding >\$10k



Wilson Audio Sabrina

\$15,900

The Sabrina is the smallest and least expensive floorstander in the Wilson line. Entry-level, maybe, but with no observable shortcuts. Its sonic character is marked by a commanding and linear top-to-bottom energy. It's a ripe sound, a relaxed sound, with a slightly warmer signature that may surprise the brand's followers. It's a Wilson, of course, so it's animated by remarkable dynamic energy, extreme low-level resolution, and a sense that it willfully wants to drive music forward rather than let it passively lay back. The Sabrina artfully combines low-level resolution with the most delicate bass dynamics. Unsurpassed in a smaller listening room, this sweetheart is pound for pound the best Wilson Audio loudspeaker available today. NG, 256



Magico S1 Mk II

\$16,500

There was a time when Magico's enclosures were made primarily of wood; now they're all aluminum, every model. For both the S Series and Q Series, Alon Wolf has his "platform" established and continues to advance the performance of the drivers and other components he puts into these optimized enclosures. The two-way, sealed-box Magico S1 Mk II floorstander is indeed as much a Magico as the S7 or the Q7, and must be a top consideration for anyone in the market for a loudspeaker up to \$20k. As the saying goes, it "comes from good stock." AQ, 270



Legacy Aeris with Wavelet Processor

\$22,975

The combination of the frequency-and time-domain-optimized 4.5-way Aeris loudspeaker and its companion Wavelet DSP processor/crossover provides some of the most musically realistic sound reviewer AHC has ever encountered. This duo takes digital processing and room correction a vital step forward, and show that a DSP'd speaker can reach levels that are even competitive with the best purist speakers, and some that sell for far higher prices. AHC, 269



Piega Coax C 711

\$25,000

This floorstander from Switzerland boasts one of the most impressive drivers in all of high-end audio: a coaxial ribbon of Piega's own design and construction. Mounting a ribbon tweeter inside a ribbon midrange gives this driver perfect coherence no matter what the listening position or height. This coherence combines with the manifold virtues of Piega's ribbons—tremendous speed, clarity, transparency, resolution—to create a speaker that, above 400Hz, has few equals at any price. Four woofers (two active and two passive) in an extruded and braced enclosure couple seamlessly to the coaxial ribbon. RH, review forthcoming

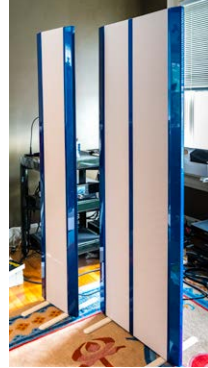
Our Top Picks Floorstanding >\$10k



Wilson Audio Yvette

\$25,000

The Wilson Audio Yvette is a three-way, single-enclosure floorstander utilizing drivers, or driver technology, developed for Wilson's much larger and more costly reference products. Like the latest-generation Wilson speakers, the Yvette has a richer tonal palette, featuring even better resolution, clarity, and transparency than its predecessors of similar size. The Yvette packs a surprisingly powerful dynamic punch for such a relatively small-footprint loudspeaker, with extended, detailed, and controlled bass. JH, 280



Magnepan 30.7

\$29,000

Maggie has introduced a new, two-panel flagship loudspeaker (two panels per side—one housing the quasi-ribbon midrange and ribbon tweeter, the other the quasi-ribbon upper bass and lower bass drivers), replete with the company's latest technologies and at a price that should make other speaker makers blush. This is, quite simply, the most top-to-bottom coherent, highest-resolution, most astonishingly lifelike planar loudspeaker JV has ever heard (from Maggie or anyone else). On acoustic music of any kind, it is very nearly peerlessly realistic (especially through the midband), making almost everything else he's familiar with sound a little less jaw-droppingly "there." They are also among the best deals Maggie has offered. They cost \$29k the pair—not chump change, we grant you, but compared to the price of the six-figure speakers they so successfully compete against, it makes them one of the greatest bargains in ultra-high-end history. JV/JM, 279



Paradigm Persona 9H

\$35,000

Good things do come in relatively small packages, although this is a nearly 300-pound speaker that is 51" high. It uses four new ultra-high-excursion woofers, two 700-watt amps, and ARC-2 digital room compensation to produce incredibly deep, accurate bass at to 19Hz (and going as low as 15Hz). It also features an advanced beryllium tweeter and midrange driver, and provides equally outstanding midrange and treble performance in every aspect. Detail, dynamics, depth, and imaging are all excellent. Sensitivity is 96dB, allowing use with even low-power triodes and providing an exceptional sense of life with more powerful amps. AHC, 272



Kharma Elegance dB11-S

\$54,000

This reference-quality, three-way, four-driver floorstander uses a newly developed beryllium tweeter that is exemplary in its sonic purity and control, and a 7" carbon-composite midrange driver that employs Kharma's new sandwich-cone technology, designed to push break-up frequencies as far up as possible, thereby eliminating colorations in the drivers' working range. Two 10" aluminum woofers complete the package, housed, together with the other drivers, in a handsome yet inert cabinet. This is an extraordinary speaker with wonderful coherence, terrific low-level detail, gorgeous timbre, smooth yet extended highs, and surprisingly explosive bass. JH, 256

Our Top Picks Floorstanding >\$10k



Von Schweikert Audio VR-55 Aktive \$60,000

The application of VSA's pioneering (and remarkably cost-effective), patent-pending, noise-reducing cabinet technology combined with specially developed custom-built drivers from Accuton and ScanSpeak results in a level of performance that GW feels breaks new ground in resolution, transparency, and transient response below the \$100,000 mark. The VR-55's resolute yet sweet and extended high frequencies, vibrant and expressive midrange, and astonishingly fast and accurate bass make it a natural at revealing finely detailed pitches, rich harmonics, and accurate textures. GW purchased his review pair as his new reference loudspeaker. GW, 256



Magico M3 \$75,000

Before he heard the fantastic \$172,000 M6, JV would've said that Alon Wolf had painted his masterpiece in this three-way, five-driver floorstander. (Wolf would've said so, too.) Considering that it is almost one hundred grand less than the M6, it remains one of Magico's supreme efforts. Disappearing like a planar, this demure dynamic offers an absolutely superb blend of drivers, thanks, in part, to an improved carbon-fiber-and-aluminum cabinet derived directly from the M Project and, in equal part, to Magico's high-tech diamond-coated beryllium and graphene-carbon cones. Combining Magico's traditional virtues of transparency and ultra-high resolution with a beguiling touch of timbral warmth, the M3 simply sounds more "real" on more music more of the time than previous Magicos (none of which were slouches in this regard). Speakers just don't get much better than this one, and because the M3 is relatively small it will fit perfectly in any size listening room. JV's current dynamic reference. JV, 283



YG Acoustics Sonja 2.2 \$76,800

The Sonja 2.2 is a two-module design (main unit and bass unit) and is now available only as a fully passive system. There are three main changes over the previous Sonja 1.2. First, and most significantly, all Sonja 2 models have a new kind of tweeter, a soft dome with an aluminum frame. Second, the crossover has been changed to accommodate the new tweeter's electrical and acoustic properties and also to allow the speaker to perform more efficiently in the lower frequencies. Third, the bass module cabinet is now 25 pounds lighter and also stiffer. What has been added sonically to the 1.2's already superb performance is even greater resolution, ease, and general felicity. The Sonja 2.2 is a speaker that serves the music, no matter what kind. A major achievement. KM, 279



MartinLogan Neolith \$79,995


MartinLogan swung for the fences with the Neolith, mounting a roughly 4' x 2' XStat electrostatic panel atop an enclosure that houses a front-firing 12" driver and a 1" rear-firing woofer. Once you've heard the transparency, resolution, and sheer sense of nothing between you and the music that the Neolith's big panel delivers, you'll be spoiled for life. Surprisingly, these virtues of electrostats are combined with seamless integration with the bass, resulting in a speaker with full frequency extension and dynamics along with fabulous transparency. The Neolith is beautifully built and finished (available in seven colors), highly flexible in room-matching, and backed by a solid company with 33 years of experience in building electrostatic loudspeakers. An unqualified triumph that competes in the upper echelon of today's best cost-no-object loudspeakers, the Neolith was a prior winner of *The Absolute Sound's* Overall Product of the Year. RH, 259

SUBWOOFERS

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*Click any product name
to read that review*



Equipment Report

JL Audio E-Sub e110

Old Dog, New Trick

Jonathan Valin

It is no secret that I'm not a fan of subwoofers. In my experience they take away more in transparency and coherence than they pay back in low-end extension and power-handling, especially when they are mated to bass-shy two-ways or any kind of planar, 'stat, ribbon, or quasi-ribbon. (Ironically, subwoofers work best—or at least better—with speakers that don't really need them, i.e., with dynamic speakers that already have good bass extension.) Thus, it may come as a surprise to learn that I really like JLAudio's e110 sub, even when it is paired with a two-way. It certainly came as a surprise to me.

The e110's price tag may also come as a surprise—\$1500 in what JL calls its “black ash” finish, and \$1700 in the gloss-black version sent to me. This isn't exactly cheap for a single ten-inch driver in a small (13.5" x 14.25" x 16.5"), hefty (53-pound), sturdy box, but it isn't Thor's Hammer or JL Audio Gotham (or even REL Series R) territory, either.

What you get for that grand-and-a-half is a highly engineered loudspeaker that incorporates many of the patented Finite Element Analysis-based technologies that JL Audio has been introducing since 1997—such as

its Dynamic Motor Analysis program for computer-optimizing driver design, its Vented Reinforcement Collar driver-mount system, its Floating Cone Attachment method of driver construction, and its Engineered Lead-Wire System for internal wiring. You also get a built-in, proprietary Class D amplifier (powered by a proprietary switch-mode power supply) said to be capable of 1200W RMS; a genuine two-way (high-pass and low-pass), built-in, active crossover using a fourth-order (24dB/octave, 80dB/decade) Linkwitz-Riley filter, equipped with variable gain, variable crossover-frequency, and variable phase controls, as well as a polarity (absolute-phase) switch; a ten-inch JL Audio woofer with dual spiders and a linear motor system engineered to provide equal force over the driver's entire excursion range (with both positive and negative current flowing through the coils) at any applied power level up to the built-in amp's peak; and a sealed box whose entire front panel is actually the steel mounting flange of the E-Sub's driver assembly (the back plate of the driver is threaded and bolted to the thick rear wall of the enclosure). In sum, the e110 represents a lot of technology for the money.

As anyone who's fiddled with subs knows, setup is at least half the battle when it comes to getting the most out of a subwoofed system, and I can honestly say that JL Audio (for whom subwoofers are a long-time labor of love) provides some of the sanest instructions and most useful tools for optimizing its subs I've seen—*provided* that you first acquire the right software. That software, which was sent to me separately by JL Audio (it doesn't come with the sub—and I think it should), is the *Sounddoctor Test CD V 2.6.1*, available (for \$18) on-line at <http://www.sounddoctor.com/testcd/index.htm>.

Without this CD (or something similar) you will just be making educated guesses when it comes to certain key adjustments, which means, of course, that you will be haunted by second and third guesses since you'll never be quite sure whether your first guess was “right.” With the Sounddoctor CD (and the Radio Shack SPL

meter for which it is optimized) you can dial certain parameters in with confidence, giving you a “textbook accurate” baseline, from which you can depart or to which you can return as you season the sound—and you *will* season the sound—by ear.

The first step in the set-up process is finding the spots where the subs are happiest in your listening room. What JL and Sounddoctor suggest is to place one sub at your listening position, facing forward, then plug a CD player directly into the sub's RCA inputs (using the CD player's analog outputs), and play back Tracks 22, 23, and 24 of the Sounddoctor CD, which con-



Equipment Report JL Audio E-Sub e110

tain music with very deep bass. As these tracks are playing, you crawl around the perimeter of your room listening for those areas where the bass sounds weak and thin or those where it sounds boomy and ill-defined (usually in the corners). According to JL, you should also find certain spots where the porridge is just right, and these are where the subs go.

To be honest, this “crawl-around” method is rather hit-and-miss. It also assumes that the subs will sound better somewhere along the perimeters of the room, which hasn’t always been the case in my experience. Typically, I’ve found that for the transparency and coherence I prefer (as opposed to ultimate slam and extension) subs fare better close by the main speakers, immediately to the outside or the inside (or both, as explained in the sidebar) of the speakers’ enclosure and roughly parallel to their drivers, although the subs’ exact location vis-à-vis the mains and the sidewalls needs to be adjusted by ear.

Far more hit than miss are JL’s suggestions for getting the subs and the mains in phase. A subwoofer’s phase control is intended to adjust the “arrival time” of the sub’s output so that its driver and the main speaker’s woofer or mid/woofer or bass panel are pushing and pulling together throughout the frequency range covered by both units. The question is how can you tell when the drivers of both speakers are in maximum sync? With the appropriate tracks on the Sounddoctor CD and the e110’s continuously adjustable phase control, finding the answer to this often-perplexing question is a snap.

For the record, JL Audio recommends the same method that Robert Harley recommends

in *The Complete Guide to High-End Audio*: Reversing polarity on the main speakers, playing a test tone at the crossover frequency (Tracks 2 through 17 on the Sounddoctor CD give you one-minute test tones ranging from 20Hz to 120Hz at 5Hz and 10Hz intervals), and adjusting the continuously variable phase control for the least amount of bass. As Robert explains it: “The technique works because it’s easier to hear the maximum null than it is to hear the maximum peak. When the phase control is set perfectly, the main speaker’s woofers will move out when the subwoofer cone is moving in, cancelling each other. When the main speaker’s correct polarity is restored, the main speakers and the subwoofer are maximally in-phase.”

Similarly the sub’s volume level can be optimally set by playing back Tracks 18 and 19 on the Sounddoctor CD. Track 18 contains “contoured” high-frequency noise (i.e., a test signal with no low-frequency information that has been contoured for the Radio Shack SPL meter). What you do is adjust the volume of your pre-amp so that your Radio Shack meter reads 85dB (slow, C-weighted) while Track 18 is playing. Track 19 contains “contoured” low-frequency noise (i.e., a test signal with only low-frequency information that has also been contoured for the Radio Shack SPL meter). Playing this track back, you adjust the level control on the e110 subwoofer so that your meter once again reads 85dB SPL (slow, C-weighted). In theory, your e110 subs are now matched in level with your main speakers.

Of course, this doesn’t mean that your system will sound as coherent or as transparent as it does without subwoofers—or that the sub’s lev-

SPECS & PRICING

Enclosure type: Sealed

Driver: 10"

Effective piston area: 58.78 square inches

Effective displacement: 131 cubic inches

Frequency response (anechoic): 25–116Hz +/-1.5dB, -3dB at 23Hz, -10dB at 18Hz

Amplifier power: 1200 W RMS (short-term)

Dimensions: 13.5" x 14.24" x 16.51"

Weight: 52.7 lbs.

Price: \$1500 in ash, \$1700 in gloss

JL AUDIO, INC.

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Miramar, FL 33025-3962

(954) 443-1100

jlaudio.com

JV’s Reference System

Loudspeakers: Raidho D-5, Raidho D-1, Estelon X Diamond, MartinLogan CLX, Magnepan 1.7, Magnepan 3.7, Magnepan 20.7

Linestage preamps: Soultion 520, Constellation Virgo, Audio Research Reference 10, Siltech SAGA System C1, Zanden 3100

Phonostage preamps: Audio Research Corporation Reference Phono 10, Innovative Cohesion Engineering Raptor, Soultion 520, Zanden 120, Constellation Perseus

Power amplifiers: Soultion 501 and 701, Siltech SAGA System V1/P1, Audio Research Reference 250, Lamm ML2.2, Zanden 8120

Analog source: Walker Audio Proscenium Black Diamond Mk V record player, AMG Viella 12

Phono cartridges: Clearaudio Goldfinger Statement, Ortofon MC A90, Ortofon MC Anna

Digital source: Berkeley Alpha DAC 2

Cable and interconnect: Synergistic Research Galileo and Galileo LE, Crystal Cable Absolute Dream

Power cords: Synergistic Research Galileo LE, Crystal Cable Absolute Dream

Power conditioner: Synergistics Research Power Cell 10 SE Mk III, Synergistic Research Transporter Ultra SE, Technical Brain

Accessories: Synergistic ART system, Shakti Hallographs (6), A/V Room Services Metu panels and traps, ASC Tube Traps, Critical Mass MAXXUM equipment and amp stands, Symposium Isis and Ultra equipment platforms, Symposium Rollerblocks and Fat Padz, Walker Prologue Reference equipment and amp stands, Walker Valid Points and Resonance Control discs, Clearaudio Double Matrix SE record cleaner, HiFi-Tuning silver/gold fuses

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el will not need further tweaking by ear. Getting a relatively seamless blend *and* tight, powerful, high-resolution, high-definition bass depends on several other equally important factors: the crossover frequency that you choose between subs and mains, the quality of the subwoofer itself (including its amp, controls, and crossover), and above all else your own listening preferences.

The question of crossover frequency is hotly debated. JL Audio recommends that crossover be set at 80Hz or higher, regardless of main speaker. And it is true that setting the sub at a higher crossover frequency can make for a more seamless sound. Alas, it can also make for a substantially *different* sound than what you're used to from your main speakers alone.

Let's face it: You've spent a lot of time and a lot of money on your loudspeakers. Presumably, you picked them from a myriad of others because you prefer the way they sound on the music you typically listen to. This doesn't mean, of course, that you think they are perfect. (Or why opt for subwoofers?) What it does mean, I think, is that their essential qualities satisfy you—that you are pleased with what we used to call, in The HP Era, their “character.”

There is no surer-fire way of changing a loudspeaker's character than crossing it over to a powered subwoofer at too high a frequency. With first- or second-order crossovers the problem is generally that the subs continue to play (albeit at reduced levels) into the power range and the midrange, audibly masking the very qualities of timbre, resolution, speed, and dynamic nuance that led you to buy your main speakers in the first place. With steeper crossover slopes, such

as the 24dB/octave Linkwitz-Riley filters in the e110's crossover, this should be less of a problem. (The theoretical advantage of fourth-order Linkwitz-Riley filters is that because of their steep roll-off at the high and low cutoff frequencies their gain at crossover is closer to 0dB.) And yet...crossing the e110s over at 80Hz or higher *isn't* less of a problem. Here it's not so much that the sub is still playing beyond the crossover point, masking the main speaker's virtues; rather it's that the sub's own character (including the character of its amplifier and crossover) becomes more audible and predominant the higher up you cross it over, since the sub is literally playing more of the music.

Many people don't seem to be as sensitive to this “change of sonic character” as I am, and can live happily with the added bass-range power and extension (and concomitant added breadth and width of soundstage) at what they presumably consider a reasonable cost in tonality and transparency. Speaking for myself, I would far rather live without the deepest bass than audibly sacrifice the characteristic sound of my main speakers.

For me, then, the secret to subwoofer satisfaction is to find a way to cross the subs over that doesn't markedly change the character of the main speakers—or that changes it only in the sense of extending its virtues into the bottom octaves. With the e110s this means a lower crossover point (lower than 80Hz).

Although the speaker that I am using with the e110—Raidho's superb stand-mounted D-1 (review forthcoming, recommendation already the highest)—is a two-way, it has remarkably satisfying mid-to-upper bass. Flattish down to the

50Hz–55Hz range its ported 4.5" mid/bass driver (which uses a diamond diaphragm) manages to give the psychoacoustic impression of going lower than it does because of its naturally full and high-resolution reproduction of the power range, where first and second harmonics live (as do a whole lot of fundamentals).

Because the D-1 doesn't really cry out for a subwoofer and because I simply love the beau-

tiful and lifelike way it sounds (which, reduced image size and dynamic power notwithstanding, comes very close to—and in certain respects exceeds—the sound of my reference Raidho C-4.1s), I picked it for this experiment, knowing full well that I would easily hear any changes in its character, and knowing, as well, that in the past I have not been able to mate super-high-resolution two-ways to subwoofers

How Many Subs: One, Two, or...Four?

Unless you're restricted by budget or space, two woofers are the way to go. Though in the old days low bass was summed to mono on LPs, that isn't always the case with today's high-res sources (or with reissued stereo recordings from the so-called Golden Age). A single centrally located sub tends to “pull” bass-range instruments toward it, constricting soundstage breadth and changing the perceived location of instruments at the sides of the stage. For the widest and deepest soundfield and the most faithful-to-source imaging, two subs are definitely better than one.

However, there is a new wrinkle in low-bass management called “swarm” or “distributed bass” subwoofering. The logic behind the “swarm” is simple and elegant. With one or two subwoofers you are inevitably prisoner to the room-induced dips and peaks in response that (no matter how thoroughly you've “crawled around” the periphery of your listening space) accompany the locations you've finally settled on. But what if you were to add two or four more subwoofers (i.e., a swarm) to the original pair, asymmetrically positioning each sub throughout the room? Proponents of swarm subwoofering argue that the combined average of the different peaks and dips at the different locations of each sub will smooth out overall bass response. Voilà: no giant mid-to-upper-bass humps, no need for digital signal correction.

Now I don't know whether this idea always works in practice as it should in theory, but I do know this: When I added a second pair of e110s to my setup (one on the outside of each D-1 and one on the inside at slightly different locations vis-à-vis the mains) I got even more fabulous sound. I'm not saying that you have to buy a second pair of e110s to get the exemplary sonics I talk about in this review. One pair will do quite nicely, thank you. But...if you want to carry this sub/satellite system even closer to the sound of those ultra-expensive Big Boys, a second pair of e110s will do the trick. **JV**

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without substantial sonic penalties. And at a crossover point of 80Hz—with all other parameters (placement, phase, level) set to theoretical correctness (and then tweaked by ear to my own preference)—the changes in the Raidho's character were marked. Despite the much deeper, more generous bass, the D-1 simply no longer sounded like the speaker I'd fallen in love with.

However...moving the e110's crossover point down to 70Hz and subsequently to just below 60Hz, where the D-1 is still playing strongly, made for a blend that was so unexpectedly magical—and so much *in* character—that it was almost as if the D-1 had developed several more octaves of bass on its own.

At a crossover point of around 57–58Hz (this is an educated guess as the scale on the e110's crossover-frequency control, though graduated, isn't graduated finely enough to say for sure), the bottom bass—and this little sub goes deep, down only 3dB at 23Hz—acquired the same tonal and dynamic character, the same dark, rich, lifelike timbre, sensational transient speed, and ultra-fine resolution of texture and articulation in the low bass that the D-1 has on its own in the mid-to-upper bass, power range, midrange, and treble. At the same time bottom-end pitch-definition, impact, and extension were dramatically improved.

It was as if (and I scarcely exaggerate) a blanket that had been thrown over the deepest bass octaves had suddenly been lifted, revealing an astonishing wealth of previously unheard information—and revealing it with a clarity and definition that I don't quite hear even with my reference Raidho C-4.1s (though, as you will see, there are other aspects of the bass that the

C-4.1s are far better at reproducing).

I could give you musical example after example of the e110/D-1's virtues, but it is simpler to sum them up like this: In the bottom bass this combination reveals *low-level* details about pitch, timbre, intensity, and duration more clearly and more often than *any* loudspeaker I've heard, no matter how expensive or sophisticated. This is an ear- and mind-bogglingly high-resolution system. (It kind of makes me wonder what JL Audio's top-line sub—the \$12k Gotham, with dual 13.5" woofs—is capable of, although, when it comes to matching the speed and resolution of a great two-way, there is something to be said for a "quick" ten-inch driver.)

While hearing a fresh bonanza of low-level information about an instrument and the way it is being played is enormously satisfying (and contributes greatly to the sense of being in the presence of that instrument), let me quickly point out that bass-range instruments in particular aren't just about texture and articulation. They are also about power and impact, and here the e110/D-1 combo is *not* the most revealing speaker system I've heard. To be fair, this isn't the e110's fault. A two-way—even a great one like the Raidho D-1—and a ten-inch sub simply can't move air in the bass and power range the way a big multiway can; nor can such a combo image with the more-lifelike size (particularly image height) of a big multiway.

There is this, as well. My decision to place the subs nearby the mains and to cross over at a lower-than-recommended frequency in order to more fully preserve the character of the D-1s comes with a slight additional price in imaging and power. With the reinforcement provided by a

nearer-to-the-wall placement and a higher crossover point, the e110/D-1 seems to size bass instruments—indeed all instruments—more consistently from their top octaves to their bottom ones. With the closer-to-the-speaker positioning and lower crossover point, some instruments seem to shrink a bit in size as they descend in pitch, so that a four-string contrabass, for example, isn't as big and expansive sounding on its lowest notes (E1 and C1, 41Hz or circa 33Hz) as it is higher up in its frequency range.

This slight "funnel-like" effect in imaging is accompanied by a *small* loss of impact on big, powerful instruments and orchestral tuttis. I don't want to oversell this point. The e110/D-1 is *plenty* powerful, capable of genuine room-shaking temblors on really deep synth or bass drum, and punch-in-the-chest sock on toms or kickdrum. As two-way-based systems go, this one is a veritable dynamo. But...when it comes to pure wallop it ain't a Wilson XLF or a Magico Q7 or a Raidho D-5.

But then the Raidho D-1 and e110 subs don't cost what these giants cost, and don't take up the real estate that these giants do, and (if configured optimally—for which see the sidebar) don't give *anything* away in col-

or, speed, definition, or resolution to the biggest of these Big Boys. For one-sixth (or less) of the system cost, you can live like a Robert Harley (or, yeah, like a Jonathan Valin)—with a loudspeaker that comes so close to the very best that you'll scarcely notice the difference. I scarcely do...and I do live like a Jonathan Valin.

The E-Sub e110 is a no-brainer highest recommendation if ever I heard one. And remember this is coming from someone who hates subwoofers (or used to). **tas**



Equipment Report

REL T7i

The I Has It

Neil Gader

It might be a common perception, but a subwoofer's role isn't limited to just adding an octave or so of bass response and going boom. Ideally it should be all about the quantity and *quality* of low frequencies that restore a bass-shy system to a musical equilibrium—a balance that permits the full breadth of the recording to be realized. In short it's not just how much but how well. If this sounds like a distinction in search of a difference, then you'll need to spend some time with the REL T7i.

As many enthusiasts are aware, REL makes some of the classiest subwoofers in the high end. The T7i is no exception. Finished in a deep, glossy black (white is also available), and discreetly appointed with solid aluminum accents, the T7i is not much larger than a postage stamp (OK, at about a square foot it's a *little* bigger than that). The T7i does its business with a forward-firing 8" driver which is backed up by a bottom-firing 10" passive radiator. This alignment is a reversal over its predecessor, the T7, which placed the active woofer in the downward position with the passive firing forward.

As REL woofer-in-chief John Hunter described

to me, the new T lineup benefitted from the development of the Series S line. The Series S reminded him not only of the importance of both a lighter/stiffer driver but of the issue of self-quieting, which Hunter describes as design and engineering "intended to produce a cone/driver that starts and stops well and immediately quiets down and does not continue ringing." Basically, no overshoot. And, given the choice between lighter and stiffer, stiffer was the big winner sonically. Nonetheless, the T7i still employs a composite of lighter-weight paper—REL even took the carbon black out of the paper because it added 1.4 grams per cone (who knew?). For stiffening the cone, REL designed specially prepared alloy center caps that overlap much of the surface area of the diaphragm. This innovation improved damping and resulted in slightly less weight and almost three times the rigidity. Additionally, cabinet depth was added to properly dissipate the backwave. And cabinet wall mass was increased to a full one inch. The fine Class AB 200W amp was left unchanged.

The back panel houses rotary settings for output plus the tiniest 39-step increments for adjusting the crossover over a range of 30–

120Hz. There are dual low-level RCA inputs, plus an LFE, but the high-level input is and has always been the preferred installation. A lengthy Neutrik connector is provided for this purpose. It carries within its jacketing four wires for connection to an amplifier's speaker taps. Famously, REL subs do not use high-pass filters—the main speaker's performance envelope will remain unaltered. There's a phase

toggle, as well.

Corner placement is suggested by REL to begin, facing on a room diagonal. This not only maximizes room gain but allows "for the most linear low bass wave launch...the ability to tune the sub to the axial node of the room, or longest throw distance." In my small room, this procedure works but don't be shy about experimenting.



Equipment Report REL T7i

I ran the T7i with a range of compact loudspeakers that included the B&W 805 D3, Revel Concerta2 M16, Elac Uni-Fi UB5 (reviews forthcoming) plus my own ATC SCM20SL pro-monitor. These all have varying amounts of bass extension, roll-off characteristics, and sensitivity—differences that were easily compensated for with the T7i crossover and output settings. The low 84dB sensitivity of the sealed-box ATC, for example, required bringing up the output slightly, while the deeper extension and superior efficiency of the ported B&W necessitated a lower crossover setting and a slight reduction in output.

I evaluated the T7i like I do all subwoofers—an interwoven, three-perspective approach of assessing extension, integration, and musicality. In extension the REL was as good as its word, descending with authority into the low thirty-cycle range and perceptibly lower as it rolls off. Not quite the full bottom octave (20Hz) but true sub-bass territory, nonetheless, and an achievement for such a small sub.

Sonically, each of the T7i/speaker combinations I listened to registered as more present, with greater weight and wider dynamic impact, and perhaps, most importantly improved dimensional and ambient information. The opening riff on Michael Jackson's "Billie Jean" was especially instructive. The establishing groove, a tandem of kickdrum and bass guitar lays the groundwork for this iconic mega-hit. Operating without the REL, bass response was articulate and fast, but dynamically a bit restrained and lacking in the hip-gyrating impulse of the dance floor. Adding the REL to the system raised the sound and weight of this riff into a different category of im-

pact, expressiveness, and bloom. Similarly, the marvelous "Duetto" from Stravinsky's *Pulcinella* required the T7i to reproduce the thick, grumbling mood and timbral details of trombone and doublebass. Without such direct comparisons, it's easy to overlook—and I know I have—the relationship between frequency and dynamics. If the system isn't reproducing the lowest bass frequencies, that range will similarly have its dynamics rolled off as well.

I listened to Tony Bennett's "Just in Time" from the recently released LP Bennett/Brubeck, *The White House Sessions, Live 1962* [Columbia/Impex]. The drummer and bassist have a nice, swinging rhythm line going, but it takes the REL to reveal individual identities. Removing the REL causes the individual textures and timbre of these instruments to meld into one another. This is where the musicality of the T7i comes to the fore. The best subwoofers I've encountered are just as much about detail and definition as they are about extension.

For classical music listeners, the most immediate rewards come in the form of ambient information. A prime example would be the LP of the Copland *Fanfare* [Dallas, Johanos: Analogue Productions], which depends on the explosive kettledrums and trombones to establish the majesty of the piece. Take the REL out of the system, and the cavernous, immersive soundstage becomes a narrower, more generic space.

Or, take the example of a solo 88-key piano. Its lowest note, an A, produces a 27.5Hz tone. (The 97-key Bösendorfer can hit 16.5Hz but that's another matter.) Most of this massive low-frequency energy is radiated by the

huge wooden soundboard that underlies the piano's frame. And this is why most LF-limited loudspeakers sound like tinker-toys trying to reproduce a concert grand. Add the T7i and a piano recording like *Nojima Plays Liszt* [Reference Recordings] takes on powerful

SPECS & PRICING

Drivers: Active drive unit, 8" long-throw; 10" passive radiator

Lower frequency response: 30Hz at -6dB in-room

Inputs: Hi-level Neutrik Speakon, low-level single phono, LFE phono

Dimensions: 12" x 14.3" x 15"

Weight: 36 lbs.

Price: \$999

REL ACOUSTICS NORTH AMERICA

800 Addison St.
Berkeley, CA 94710
(510) 990-6005
rel.net

Associated Equipment

Sota Cosmos Series IV turntable; SME V tonearm; Sumiko Palo Santos cartridge, Ortofon Quintet Black, Ortofon 2M Black; Parasound JC 3+; dCS Puccini Player; Lumin A1/L1 Music Player; Synology NAS; MacBook Pro/Pure Music; Synergistic Atmosphere Level Four, WyWires Platinum, Nordost Frey 2 & Audience Ohno; Audience Au24SE & Kimber Palladian power cords. Audience USB, AudioQuest Carbon firewire; VooDoo Cable Iso-Pod

authority and vitality. The massive aura in and around the piano becomes more present on the stage, the intensity of upper treble transients are more in balance with the instrument.

The T7i faces some serious competition from another REL. It's the Series S/5, which recently garnered my 2016 Golden Ear Award. The comparison reveals the difference between a very fast, small-driver, 30-cycle sub like the T7i, versus the 20Hz, considerably more costly S/5 (\$2500) with big drivers. It comes down to the amount of weight and the foundation-rocking extension of the larger S/5. I could hear the limits of the T7i when reproducing the steady sustain of the deepest pipe organ notes—it was one of the only times it revealed itself as a sound source. The S/5 comparatively got its seismic groove on and poured forth as if connected directly to the Earth's core.

I had the opportunity to add a second T7i to the system and the results, I hate to admit, are pretty addicting. Why more than one? A pair of subs moves more air and can smooth the overall room response as they manage the peaks and nulls within the listening space. They become less prone to our own localization antennae. If your budget allows, adding a second sub is also a great option if the system moves to a larger room.

Has REL managed the impossible? Well, not quite. But that doesn't mean the T7i isn't worth popping a couple of champagne corks over. As a companion in smaller rooms where placement requires discretion, its footprint-to-performance ratio makes it near second-to-none in its category. And that makes it another outright winner from the good lads at REL. **tlb**

Equipment Report

GoldenEar Technology SuperSub XXL

Big Bass in a Small Package

Jacob Heilbrunn

Ever since I heard a Mark Levinson No.334 amp grab the woofers of a Thiel CS3.6 at a friend's house many years ago and reproduce the shuddering whacks of a bass drum on a CD titled *Summon the Heroes*, I've been chasing the deep frequencies. It's not that this CD was particularly well recorded. It wasn't. But the way the Levinson amps delivered the bass region was a revelation. Something was appearing that was fundamentally, palpably satisfying that simply had not been present before. The Thiels, which were notoriously difficult to drive because of their low impedance in the bass, almost sounded like a new loudspeaker. I was really impressed—and my heart sank. I now knew that, no matter how much amplifier muscle you threw at them, my own diminutive Snell E/IV loudspeakers sounded anemic by comparison. They could never compete with what I'd heard.

Since then, I've gone on to own or audition a number of other loudspeakers, ranging from the Magnepan 20.1 to the Wilson XLF. But even using stout amplification was never enough to satisfy me fully. Over the years, I also de-

ployed a variety of subwoofers from manufacturers such as REL, ATC, and JL Audio. One thing I quickly figured out was that I really liked to use a pair of subs in stereo for maximum performance, which is why I used a pair of JL Audio Gothams before switching to a pair of Wilson Hammer of Thor subwoofers. Throughout my listening, I've been fascinated by the effects of room placement, crossover frequency, and phase adjustment. I suppose there are always some downsides to subwoofers, as well: They're pretty much bound to impinge upon the main loudspeakers, and it's really tough to get the blend just right between the two. But the benefits can be enormous not only in the deep bass, but also in a sense of scale and, believe it or not, detail retrieval, even in the treble region. Put otherwise, a good sub can act like a backdrop for a loudspeaker to strut its stuff.

So when Sandy Gross, the impresario of GoldenEar Technology, offered to send me a pair of SuperSub XXLs, I was more than eager to listen to them. About a year ago I reviewed his Triton Five loudspeakers, which sounded quite enticing and powerful. As nifty as they were, how-



ever, I'd have to say that his subwoofers belong in a different category. The XXLs are not good; they're superb.

As with the Triton Five loudspeakers, GoldenEar tries to cram as much technology as possible into a small enclosure in the XXL. With a little effort, you can heft one of these fairly compact babies around and get it situated for optimal performance. I ended up putting them near the loudspeakers, as the owner's manual recommends. With a 1600-watt Class D amplifier powering them, there really is no need to opt for corner placement, which, incidentally, the manual warns against. If anything, I was taken aback by the sheer output of the XXL, which should be able to pressurize any reasonably

sized listening room. The internal amplifier itself is controlled by a 56-bit DSP device with a 192kHz sampling rate. This Programmable Logic State Machine, among other things, equalizes the drivers to ensure linear performance in the bass range, which is no small challenge. The XXL's enclosure is constructed of high-density medite and finished in high-gloss piano-black lacquer. The driver complement consists of two fully inertially balanced 12" long-throw active drivers in the horizontal plane and two fully inertially balanced 12 3/4" x 14 1/2" planar infrasonic radiators in the vertical plane. Double this with a second sub, and you truly have a healthy amount of air displacement (and, boy, are those infrasonic radiators speedy).

Equipment Report GoldenEar Technology SuperSub XXL

Actually, this had been my greatest apprehension about the XXL: Would it be able to deliver enough output to fill my large room? Once I set the subs up, however, I could immediately tell that they could more than deliver the goods.

The inputs to the subs are unbalanced only. In addition, I used the stock cord supplied by GoldenEar. There is no on-off switch for the subwoofer. A blue light on the rear illuminates to alert you that the subwoofer is powered up. In addition, a switch on the rear allows you to toggle between mono use (both left and right channels) with a built-in adjustable low-pass filter on both channels, or for LFE or outside low-pass filtered pass-through input. If you have two subwoofers, you can set it to play back one channel alone, either filtered or unfiltered.

Initially, I ran the XXL without the main loudspeakers to ensure that I could place them optimally. Already I was taken aback by the volume of sound they produced. When mated with my main XLF loudspeakers, I dropped the crossover frequency on the XXLs to 40Hz and set the volume control on them fairly low as well. It's fun to hear subs pumping away, but the old adage holds true: The best sub is one that you can't hear.

What I heard with the XXL was an exceedingly tuneful, pitch accurate, and speedy subwoofer.

There was no smearing or blurring of notes. This is no muffin-top subwoofer, where you hear that old bugaboo—deep bass intruding upon the midrange. Instead, you get a sleek and svelte performer that, when called upon, will also deliver tremendous wallop.

After to listening to a couple of tracks from Madonna, just to hear the sheer grunt of the bass lines, I turned to the venerable *Head Hunters* album from Herbie Hancock. On the opening number "Chameleon," the electronic

bass line, which is set to a funk beat, endows the song with an elemental excitement. Even after listening to the disc for so many years, I really was quite taken by the precision with which the XXL sub not only helped improve the transient pluck of the notes, but also allowed the notes to decay for just a split second longer. There simply was none of the

overhang that sometimes afflicts subwoofers.

To hear the *Head Hunters* SACD sound so distinctive wasn't a revelation, but it did add a sense of realism to the proceedings. I felt as though I were hearing one notch further into the song. On the SACD *Friendship*, which features Clark Terry and Max Roach in a duet, the pounding of the detuned drum heads and the wailing of the virtuosic trumpet runs came through with a ferocity that compelled not

simple respect but awe for these two players.

That same sense of clarity and precision came through on another recording that I've come to cherish, *The Art of Bach*, by the talented piano duo Anderson & Roe. Their recording obviously consists of transcriptions, including one of the Brandenburg Concerto No. 3 arranged by the composer Max Reger, but I feel that, rather like looking through a prism, the two-piano versions open up new musical angles into Bach's compositions. What did the XXL bring to the table? It helped provide a foundation for the deepest piano notes, thereby subjectively improving the sense of a steady tempo on a number of the pieces. This was especially so with stately works such as the opening cantata arranged for piano. It seemed to acquire an even more tranquil and magisterial character. Ditto for a marvelous performance of a Deutsche Grammophon CD of Schumann's violin sonatas performed by the peerless Gidon Kremer and Martha Argerich. Once again, the grand piano just sounded a notch grander with the XXL. At the same time, the quietest notes also sounded a touch more ethereal as though they were emanating from pitch-black backgrounds.

Some of this can surely be ascribed to the XXL's effortless ability to help widen the soundstage. The best way that I can describe this effect is to suggest that the combination of deep notes and concert-hall air and ambiance that a sub like the XXL supplies adds a degree of verisimilitude that a single pair of loudspeakers cannot, no matter how low or how powerful the bass coming out of those speakers is. The stone cold truth is that a pair of subwoofers will add a vital ingredient to the sonic stew that is simply



SPECS & PRICING

Frequency response: 10Hz–200Hz
Drivers: Two 12" long-throw high-output bass; two 13" x 15" quadratic planar infrasonic radiators
Amplifier: 1600-watt ForceField switching amplifier
LFE line-level input: Unfiltered (no low pass)
Right/left line-level input: Variable high-pass from 40Hz–150Hz
Dimensions: 17 3/8" x 19 3/4" x 16 3/8"
Weight: 78 lbs.
Price: \$1999 each

GOLDENEAR TECHNOLOGY
 P.O. Box 141
 Stevenson, MD 21153
 (410) 998-9134
 goldenear.com

impossible to capture otherwise.

This, the latest brainchild from industry veteran Sandy Gross, is the real deal. I must admit to shaking my head at what Gross manages to extract from small packages; somehow he and his engineering team successfully defy the maxim that size matters. The XXL is a diminutive beast that offers a lot of performance for just about any stereo system. No, it doesn't have the cachet of some of its tonier brethren. But for anyone looking for a reasonably priced subwoofer that plunges into the nether regions with musicality and dexterity, volcanic power, and subtlety, the SuperSub XXL is a must-audition. I imagine that it will win over more than a few listeners as much as it did me. TAS

Equipment Report

JL Audio Fathom f113v2 and CR-1 Active Crossover

A Great Subwoofer Made Better

Robert Harley

JL Audio is one of those companies that does one thing and does it well. In JL's case, that "one thing" is designing and building some of the world's best subwoofers. Over its 38-year history, JL has fanatically pursued technological innovation with a single, laser-focused purpose: reproducing the lowermost 2½ octaves with the highest fidelity.

JL Audio holds an astounding 38 patents on woofer design (with six more pending), including those for a particular cone structure, a voice-coil cooling system, and a method of bonding the surround and cone assembly to the voice coil and spider, to name but a few. In addition to these patented proprietary techniques, JL Audio's products are packed with non-patented innovations that are, in my experience, unique in the loudspeaker industry. If you read the extensive technical material on JL Audio's website, you'll get an appreciation for just how geeky and serious these guys are about subwoofers.

The result of this intensive focus on a single product category is a range of subwoofers that deliver reference-class performance. The first

JL Audio subwoofer I heard in my own room was the original Fathom f113, about ten years ago. The system was dual-purpose (stereo and home theater) and equipped with reference-quality components. The f113 performed exceptionally in either two-channel or theater mode, integrating well with my stereo speakers for music listening and providing earth-shaking bass thrills on film soundtracks. A single f113 was markedly better in every way than my previous reference subwoofer, which cost nearly five times more than the f113. The JL not only had more brute-force power; it also had much greater transient fidelity, better pitch definition, and was more refined and articulate. In the subwoofer world, those qualities are usually mutually exclusive. I've been using JL Audio subwoofers ever since. (My colleague Jonathan Valin, who has spent his life abhorring subwoofers, became a convert after hearing JL's flagship Gotham. He now considers a pair of those mighty subs indispensable for music listening, even with large full-range speakers.)

Ten years after launching the Fathom, JL Audio has introduced an improved "v2" version of



this outstanding sub. Two models are available, the \$3700 f112v2 and \$4500 f113v2, the differences being driver size and output power.

What's new in the v2 models? For starters, the power output of the integral amplifier has increased by 20% from 1500W to 1800W in the f112v, and from 2500W to 3000W in the f113v2. I never thought that the originals needed more amplifier, but that extra headroom may

come in handy under extreme conditions. The driver suspension has also been redesigned for greater linearity of movement. More importantly, however, the entire audio circuit has been upgraded for a shorter signal path and lower noise. This line-level processing circuit had been mounted behind the front control panel, requiring long cable runs between the audio jacks on the rear panel and the controls on the

Equipment Report JL Audio Fathom f113v2 and CR-1 Active Crossover

front. Now the circuits are in the back near the input and output jacks. In addition, this audio circuitry is now housed in a cast-aluminum sub-enclosure that is bolted to the rear-panel's massive heatsink, isolating it from noise and vibration. There's also better isolation between the power supply and audio signal circuits. Grounding has also been modified to further lower noise.

However, the most significant improvement is the vastly more sophisticated room-correction system called Digital Automatic Room Optimization (DARO) built into the updated v2 models. This new system is an evolution of JL Audio's Automatic Room Optimization (ARO) circuit first used in the original Fathom. In the earlier model, ARO measured the subwoofer's in-room response (with a supplied calibration microphone) and employed a single digitally controlled analog filter to flatten that response at the listening position. Although ARO removed bass bloat and increased definition, its single filter could only reduce the room's highest response peak. By contrast, the new Digital Automatic Room Optimization in the Fathom v2 employs 18 one-sixth-octave digital filters. DARO provides significantly more precise attenuation of bass peaks, and at more frequencies, removing those peaks with extreme precision. Note that DARO doesn't try to equalize out dips in the frequency response by boosting response at certain frequencies; it simply attenuates the peaks. The difference between a single band of analog filtering and 18 one-sixth-octave DSP filters is night and day.

In addition, calibrating the Fathom v2 is much faster and easier than it was in the original

model. In the first Fathom, you had to juggle the test-signal level during the calibration to get just the right conditions needed by ARO. But DARO is truly a "one-button" operation; the subwoofer output level and microphone gain are adjusted automatically. In addition, the stimulus signal generated by the woofer during calibration is less susceptible to extraneous noise from things like air conditioners. Where ARO calibration would require several tries, accompanied by adjustments between each attempt, DARO works perfectly the first time.

One of the original Fathom's many virtues was the comprehensive and well-thought-out front-panel controls. That hasn't changed in the new models, which are functionally identical. A polarity switch and a continuously variable phase control work in tandem to time-align the subwoofer's output with your main speakers (see sidebar). All subwoofers should have both these controls (realizing correct time alignment with just a 0°/180° polarity switch is a crapshoot). Similarly, the Fathom doesn't just give you a continuously variable crossover frequency (30Hz–120Hz), it also provides adjustable crossover slopes (12dB or 24dB per octave). Again, the extra degree of control allows the subwoofer to better integrate and blend with your main speakers. The low-pass filter can be turned off if you are feeding the Fathom with the LFE output from a home-theater controller or receiver, or if you are using an outboard active crossover such as JL Audio's CR-1.

Yet another thoughtful and useful adjustment is the "ELF Trim." If you've spent any time struggling to set up a subwoofer, you've probably encountered the common condition of too much

very low bass. The subwoofer simply overdrives the room at very low frequencies. The excessive output adds an annoying and amusical thump that makes the subwoofer stand out like a sore thumb rather than disappear. The Fathom's Extreme Low Frequency (ELF) Trim control lets you cut or boost (–12dB to +3dB) at 24Hz to remove the thump.

Finally, the control panel's center is dominated by the level control knob. If you are setting the subwoofer level with a home-theater controller or AVR, the Fathom's level control can be bypassed via a switch.

JL Audio is a proponent of multiple subwoofers, and not just because it wants to sell more subs. Each subwoofer in a distributed subwoofer system drives a room's resonant modes differently, resulting in smoother bass response. Moreover, with two subs in a room, each one has to work only half as hard for the same total acoustic output, ensuring that each subwoofer operates within its linear range while also delivering greater dynamic headroom. For these multi-sub applications, JL has included a method of allowing multiple Fathoms to work together as a unit. One of the Fathoms can be designated the "Master." Changing the Master's level will change the level (and other settings) of the other Fathoms connected to it.

These adjustments and controls are about as extensive and complete as you'll find in a subwoofer. But if you want the next level of fine-tuning, JL Audio makes an active outboard line-level crossover, the CR-1, with a few tricks up its sleeve. The \$3000 CR-1 replaces the Fathom's low-pass filter and offers more precise tuning of the critical transition between

the subwoofer and your main speakers. Specifically, the CR-1 has finer crossover-frequency adjustments, a knob for setting the subwoofer/main speaker balance, and a pair of "damping" controls: one for the signal driving the subwoofer at the crossover frequency, and one for the signal driving the main speakers. These provide a slight boost or cut right at the crossover frequency, giving you that extra ability to get the handoff between subwoofer to main speakers just right. This pair of damping adjustments allows you to surgically dial-in the response at the all-important transition between main speakers and the sub.

The most important aspect of the CR-1, however, is that it not only has not a low-pass filter to

SPECS & PRICING

Driver: One 13.5"

Loading: Sealed

Frequency response: 20Hz–86Hz
+/-1.5dB; 18Hz–127Hz +/-3dB

Integral amplifier power: 3000W RMS
short-term

Inputs: Stereo or mono or dual RCA
jacks; stereo or mono on dual XLR jacks

Adjustments: Level, low-pass filter in/
out, filter slope (12/24dB per octave),
polarity, phase, extreme low-frequency
(ELF) trim (–12dB to +3dB at 24Hz)

Calibration: Digital Automatic Room
Optimization (DARO)

Dimensions: 16.5" x 19.25" x 19.25"

Weight: 133 lbs. (net)

Finish: Gloss black

Price: \$4500

Equipment Report JL Audio Fathom f113v2 and CR-1 Active Crossover

remove mid and high frequencies from the signal driving the subwoofer, but also a high-pass filter to remove bass from the signal driving the main speakers. This is an important difference from the Fathom's integral crossover, which is simply a low-pass filter that removes mid and treble frequencies from the signal driving the subwoofer but has no effect on the signal driving the main speakers. With just a low-pass filter on the subwoofer and the main speakers run full-range, the main speakers and the subwoofer will both reproduce the same signal over some band of frequencies. The outputs from the main speakers and the subwoofer will combine in unpredictable ways, creating peaks and dips in the response. The range of overlap is determined by how low in frequency your main speakers extend and the crossover frequency selected on the subwoofer. Ideally, the subwoofer comes in just as the main speakers are rolling off in the bass. But in practice, this transition is never that simple. Things can get very messy around the crossover point when two disparate speakers, located at different points in the room, are reproducing the same frequency band.

These problems are obviated by employing a line-level crossover (the CR-1) that divides the frequency spectrum into two parts (subwoofer and main-speaker signals) before the power amplifiers. First, adding the CR-1 avoids the overlapping bass problem when the main speakers and sub are both reproducing the same frequency band. Second, keeping bass out of your main speakers and amplifier (the CR-1 operates before the power amplifier) relieves the amp and the speakers of reproducing energetic low frequencies. The dynamic headroom

of both amplifier and speaker is increased. Third, filtering low bass from the signal driving your main speakers reduces woofer excursion, increasing upper-bass clarity.

We'll explore later how the CR-1 performs in the real world, but let's first consider the Fathom f113v2 on its own. I set it up in two rooms, one a small theater system based on PSB T3 speakers in the left and right positions, with the Fathom driven by the LFE output from a Classé home-theater controller (the low-frequency effects output of a controller is a mono mix of the ".1" LFE channel on film soundtracks along with bass from any speakers designated "small" in the home-theater controller's set-up menu.) The second system, in a different room, is a stereo system built around Piega C711 speakers driven by an Esoteric F-03A integrated amplifier.

After finding the right placement for the Fathom and dialing in the crossover frequency, crossover slope, and phase controls, I listened to the system before engaging the DARO room-optimization routine. As expected, the system's bass was deeper and fuller with the Fathom, but the penalty was some smearing, bloat, and boom. Any time you pressurize a room with low frequencies, that energy is going to excite room resonance modes, which you hear as excessive weight, loss of articulation, smeared transients, and tonal colorations. Yet three minutes later all these problems magically vanished; that's how long it takes DARO to measure the response of the Fathom in your room (at that particular subwoofer location, and that particular listening position) and apply the 18 DSP filters to attenuate those response peaks. The transformation is dramatic. By re-

moving midbass bloat, I could hear more low bass, with much greater pitch definition. DARO simply makes you unaware of the subwoofer as a separate entity. The midrange also becomes cleaner, clearer, and less "thick." Transient fidelity improves, with less overhang on kickdrum. Hearing bass start and stop faster better communicates music's rhythm and flow, on a wide range of music. The walking bass line on Errol Garner's "The Man I Love" from *Encores in Hi-Fi* was so much better defined after DARO that I could clearly hear the fascinating rhythmic fluidity between Garner's left and right hands and the beat. It never ceases to amaze me how an audio technology can clarify a musician's intent.

As powerful as DARO is, it's not a panacea. You should still position the subwoofer so that it best integrates with your room before running DARO. Poor placement will introduce large peaks and dips in the response; as noted, DARO only knocks down the peaks and doesn't try to boost the dips. Still, DARO is a significant sonic advance over ARO, and easier to use as well.

The Fathom f113v2, once set up and dialed in, displayed a range of virtues with which I'm very familiar. Even after all these years of using JL subwoofers, I was struck by the Fathom v2's unlikely combination of powerful and effortless extension with unfettered dynamic impact on one hand, and exquisite agility, finesse, timbral resolution, and pitch definition on the other. The Fathom has a remarkable ability to add a subtle weight and bass foundation to some recordings—so subtle that you don't know the sub is working—and then with other music to explode out of nowhere with concussive bass impact and deep extension—the bass drum im-

pacts on the Reference Recordings *The Rite of Spring* in MQA, for example. For fun, I cued up E. Power Biggs performing Bach's Toccata and Fugue in D Minor, a subwoofer guilty pleasure if there ever was one. The Fathom reproduced the lowest pedal tones with tremendous authority and power, accompanied by a complete sense of ease. Moreover, the pedal tones had distinct pitches rather than being low-frequency mush. Another great thing about the Fathom is that you don't hear port artifacts (it's a sealed design) such as chuffing, the onomatopoeical word describing the sound of air rushing in and out of the port. The Fathom delivers low bass with no sense of strain, no smearing of pitch, no dilution of timing information, and no port-induced artifacts. In fact, the Fathom exhibits no single character that imposes itself on the music; instead the Fathom is chameleon-like in its ability to perfectly blend into a wide range of music. Going back to the Bach organ recording, this track also beautifully illustrates how adding a subwoofer increases the sense of space, soundstage depth, and the ability of a system to portray a large acoustic space. This was true even during passages with no low-bass notes; the Fathom still reproduced the subtle low-frequency cues that convey dimensionality and size. Try comparing a system with and without a subwoofer, and you'll discover that virtually all music, regardless of its spectral content, sounds more spacious and open with a subwoofer.

As good as the Fathom f113v2 is, and as well as it integrated with main speakers, the system's overall sound is transformed by adding the CR-1 outboard crossover. Although I'm the first to regard with suspicion the idea of inserting an

Equipment Report JL Audio Fathom f113v2 and CR-1 Active Crossover

active piece of electronics into the signal path, I found that the CR-1 is extremely clean and transparent. If it weren't, the CR-1 would be a non-starter. The signal path to which I inserted it was the Berkeley Alpha Reference Series 2 MQA DAC driven by an Aurender W20, the 30Wpc Esoteric F-03A Class A amplifier, and Piega C711 speakers with their extraordinary and unique coaxial planar-magnetic driver. Although this amplifier and speaker combination is not a powerhouse in terms of scale and impact, it is nonetheless extremely transparent to sources. The CR-1 introduced no noticeable degradation to timbre, soundstaging, or dynamics.

Every time I've added a subwoofer to a system I've felt that the available adjustments were relatively crude tools that allowed me to get close to ideal integration with the main speakers, but involved some guesswork, trial and error, patience, and just plain luck. The CR-1 is an entirely different story. This device provides extremely fine control over the critical hand-off between subwoofer and main speakers. The damping controls, in particular, give you an ultra-precise adjustment over how the sub and main speakers sum at the crossover point. In a remarkably short time, I had dialed-in the CR-1 so that the entire system was perfectly seamless from top to bottom. It's amazing that it took so long for the industry to create a device like this; once you use it you'll find it indispensable.

As I mentioned previously, the CR-1 confers a big advantage by splitting the frequency band with a true high-pass and a low-pass crossover. There's very little overlap between the subwoofer and main speakers around the crossover point, eliminating the unpredictable result of

having two different sources reproducing the same frequency band—the range of frequencies below the crossover point but above the lowest frequency the main speakers will reproduce. The combination of the high-pass and low-pass filter lets you decide, by listening, how much of the bass range is reproduced by the subwoofer and how much by the main speakers. If your main speakers have marginal bass quality below 100Hz, use a higher crossover frequency so that the main speakers never operate below 100Hz. Usually, a higher crossover frequency results in a more audible discontinuity at the crossover point. But the CR-1's extensive controls provide seamless integration even at higher crossover frequencies.

I should mention that there are respected proponents of allowing the main speakers to run full-range and feathering-in the subwoofer so that it simply augments the main speakers' output. Indeed, I've heard such systems sound superb. Although this approach can work well under ideal conditions, you have very little control over how the subwoofer integrates with the main speakers, with less-than-predictable results. Moreover, running the main speakers full-range erases the advantages mentioned earlier of freeing your main speakers and power amplifier from the burden of reproducing bass and the attendant increase in dynamic headroom.

Finally, the CR-1 has an extremely useful knob that very slightly shifts the balance between the main speakers and subwoofer. After you get the subwoofer's level set at what you think is the right volume, the CR-1's "Sub/Sat" adjustment provides fine tuning of the relative levels between subwoofer and main speaker.

The sensitivity of all these adjustments is perfectly tuned; a tiny turn of the knob doesn't produce too much change, yet the knob's entire range is greater than would ever be needed. Between them, the Fathom and CR-1 provide a huge range of adjustments; getting them right is paramount to realizing the products' potential. Fortunately, the two owner's manuals are unusually comprehensive and well-written, guiding you through the set-up process.

Conclusion

The JL Audio Fathom f113v2 is a significant improvement over what I already considered to be the "go-to" subwoofer in the price range. In one sense the Fathom isn't inexpensive; you can find lots of subwoofers for under \$1k. But in another sense the Fathom is an amazing value, delivering reference-class performance for a far less-than-reference-class price. I wouldn't hesitate to add a Fathom f113v2 and CR-1 to the most demanding playback system.

In addition to the specific sonic qualities described, the Fathom and CR-1 greatly elevated

the system's overall sound, not just the bass. The system opened up, with a cleaner midband (the result of removing midbass bloat), punchier dynamics, and an effortless quality on peaks.

I don't know how much improvement the v2's revised driver and increased amplifier power rendered, but I can tell you that the new DARO room-optimization system is a vast improvement over its predecessor in the original Fathom both in sound quality and ease of use.

If you're thinking about adding a subwoofer to your system, I encourage you to audition the Fathom f112v2 or f113v2, with and without the CR-1 crossover. If you own any brand of subwoofer, you need to hear what the CR-1 will do for integrating the sub into your system. And if you're thinking about upgrading your speakers, you may want to first hear how adding a subwoofer can transform the sound of your existing speakers. In my view, no subwoofer anywhere near the price approaches the Fathom f113v2's sound quality, build quality, engineering prowess, and value.



Equipment Report JL Audio Fathom f113v2 and CR-1

Setting a Subwoofer's Phase Control

There's a precise and foolproof method of setting a subwoofer's phase adjustment. To reiterate, the phase adjustment delays the subwoofer's output so that the waveform it produces is time-aligned, or in-phase, with the waveform from the main speakers. This setting is crucial because just above and below the crossover frequency, the subwoofer and main speakers are both reproducing the same signal. If the phase control is set incorrectly, the subwoofer's driver and the main speaker's woofer are out of sync. When that happens the two waves of different phase interact, producing cancellations and reinforcements, causing uneven bass response.

To get started, download a signal generator app, such as f Generator from Apple's App Store. The basic version, which is all we need for this application, is free. The app generates test tones at any frequency you specify, and outputs them from your phone's headphone jack. You'll need an 1/8-inch stereo mini-jack to dual RCA breakout cable to go from your phone to an unused line input on your preamp or integrated amplifier. In the app, generate a sine wave at the same frequency as you've set the subwoofer crossover. Note that you can also play a test CD that includes tracks of the appropriate frequency.

Next, reverse the connections on your main loudspeakers so that the black speaker wire goes to the speaker's red terminal, and the red speaker wire goes to the speaker's black terminal. Do this with both speakers. Now play the test tone from the app at a moderate level. Sit in the listening position and

have a friend rotate the subwoofer's phase control until you hear the *least* amount of bass. The subwoofer's phase control is now set perfectly. Return your speaker connections to their previous (correct) positions: red to red, black to black.

Here's what's happening when you follow this procedure. By reversing the polarity of the main speakers, you're putting them out of phase with the subwoofer. When you play a test signal whose frequency is the same as the subwoofer's crossover point, both the sub and the main speakers will be reproducing that frequency. You'll hear minimum bass when the waves from the main speakers and subwoofers are maximally out of phase. That is, when the main speakers' cones are moving in, the subwoofer's cone is moving out. The two out-of-phase waves cancel each other, producing very little bass. Now, when you return your main speakers to their proper connection (putting them back in phase with the subwoofer), they will be maximally *in-phase* with the subwoofer. This is the most accurate way to set a subwoofer's phase control, because it's easier to hear and identify the point of maximum cancellation than the point of maximum reinforcement. Unless you later move the subwoofer or main speakers, you need to perform this exercise only once. **tas**

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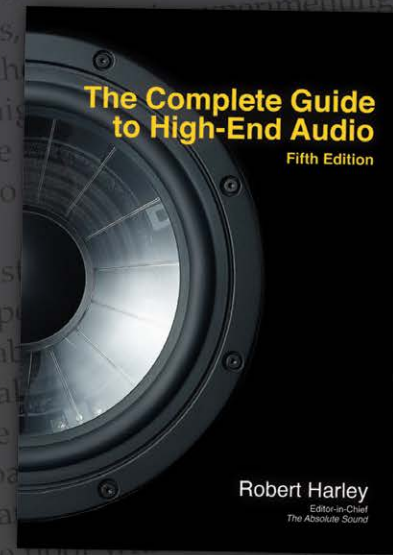
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Equipment Report

Syzygy Acoustics SLF870

Technology Serving Music

Vade Forrester

All Syzygy Acoustics' subwoofers make subwoofering easier by addressing two major problems. First, they eliminate the need for unsightly and expensive interconnect cables, and second, they automatically equalize their output to your room. Syzygy also includes a neat app for your smartphone that serves as a comprehensive remote control.

Syzygy solves the connection problem by using a proprietary wireless link. You no longer have to run an interconnect cable to wherever you decide to place your sub; you can put it anywhere without tripping over wires. (Make that *almost* anywhere. You can't place it behind furniture; apparently, that blocks the wireless signal.) A power cable is still required.

Room equalization is a harder nut to crack, but Syzygy solves that even more brilliantly by providing an iPhone/iPad app that purportedly EQs the sub for your room with the push of a button. How does the Syzygy app accomplish this noteworthy feat? The company's website says that "using unique SoundSculpt Technology, each Syzygy subwoofer essentially makes a

3-D sonic map of its space, and then adjusts its output to smooth out the aural peaks and valleys. It sends out a series of tones that measure the shape and size of your room, the position of the furniture, and how your decor absorbs and reflects sound. This rich acoustical data is captured by your smartphone and sent back to the subwoofer where it is corrected then perfected, ensuring that the sub-bass from the Syzygy subwoofer integrates seamlessly with your speakers and the low-frequency sound arrives at your ears at the correct time. All with a tap of an app." That reminds me of another quote, from author Arthur C. Clarke: "Any sufficiently advanced technology is indistinguishable from magic." Whether it's magic or technology, if it works, I like it. Maybe now they'll figure out a way to automate setting up a tonearm. Why is that so hard? Or a wireless power connection for something more demanding than a smart watch—that should make someone rich.

The \$999 SLF870 subwoofer tops Syzygy's line of four subs. Housed in a 15" cube, the driver uses a 12" proprietary woven-cellulose-fiber diaphragm (pretty fancy for a subwoofer at this

price point) driven by a 1200-watt BASH amplifier. The sealed enclosures are acoustic-suspension designs, which use the air trapped inside them as the spring to restore the cones to their equilibrium position. Compared to a ported enclosure, a sealed system is more linear and has better transient response, but is less sensitive, since it doesn't use the output from the back of the cone. But with 1200 watts of amplifier power, sensitivity is not a problem. Depending on where you screw on the feet, you can aim the driver forward or downward.

The SLF870 is rather plain to look at, but since you probably won't want to look at it, that shouldn't matter. Its rubber feet are less fancy than the metal spikes found on most expensive subwoofers, but I appreciated the protection they afforded my hardwood floors. (They also provide proper spacing from the floor if you orient the drivers facing down.) You can swap the rubber feet out for spikes as a later upgrade.



To connect the SLF870 to your system, you couple a wireless transmitter to your preamp or integrated via RCA unbalanced cables. The transmitter is a 3½" x 3½" x 1¼" black fuzzy box, with two RCA input jacks and a jack for a wall-wart power supply. One transmitter can communicate with and control up to eight subwoofers wirelessly via the subs' built-in receivers. If for some reason you actually like interconnect cables, you can use them instead of the wireless connection, though that seems like

Equipment Report Syzygy Acoustics SLF870

buying a Ferrari and signaling for turns by using hand gestures—a simile that's probably wasted on younger readers.

Compared to most subwoofers, the back panel of the SLF870 is very spare, comprising an RCA jack and some status lights. That's because all its controls are on the smartphone app. Weighing just less than 40 pounds, the SLF870 should be easy to place in your room. You can try it in different locations for maximum output, minimum intrusiveness, or best integration with your main speakers.

The SLF870 uses a fixed 24dB/octave crossover. In my experience, a sharp crossover slope like that makes it easier to match the output of a subwoofer with a main speaker, keeping mid-range frequencies out of the sub and the bass out of the speaker's midrange driver. The crossover frequency is adjustable via the smartphone app. It's very handy to be able to sit at your normal listening position and fine-tune how the SLF870 sounds.

Setting Up and Using the SLF870

Like a tonearm, much of the success of a subwoofer depends on how you set it up. Since the SLF870's technology is new and unfamiliar, I started by reading the well-written and well-illustrated 11-page manual. Most subwoofer set-up suggestions are based on home-theater applications, where the goal is to flex the walls and dump as much bass energy as possible into the room. For an audio system, what's important is seamlessly merging the output of the subwoofer with the output of the main speaker. You shouldn't be able to tell there's a subwoofer in the system; instead, it should sound like the main

speaker has just added an extra octave or two of bass. If the subwoofer's response isn't relatively flat, the challenge of matching its output to that of the main speakers is a lot harder. Then there's the matter of speed. I tried for years to find a subwoofer that would integrate with my Affirm Audio Lumination horn-loaded main speakers, which start to roll off below 50Hz. It wasn't until I tried the original JL Audio Fathom f110 subwoofer that I found an adequate match for my Luminations. In choosing it, I went for speed and integration rather than bass quantity. I initially used two f110s, but found I could get a better integration with a single subwoofer.

The SLF870's truncated rubber cone feet came screwed to the bottom panel, so that the drivers faced forward, which is how I wanted them. I placed the two subwoofers just inside my main speakers, a position dictated by available space more than anything else. My JL Audio subwoofers have a continuously adjustable phase control, which I can use to compensate for different positioning, and I was pleased to find that the SLF870 also have adjustable phase, built into the app. The relative lightness of the SLF870s made the cabinets easy to manhandle into the desired positions. The transmitter offers a choice of either right and left channel inputs on RCA jacks, or a single combined low-frequency effects (LFE) input for amps or receivers designed for 2.1-type speaker systems (two main speakers and one subwoofer). Syzygy thoughtfully provides a set of RCA interconnects, though I suppose an audiophile will toss those and the flimsy power cord in the drawer and use audiophile-approved cables/cords. I did. My linestage provides right and left channel outputs, so that's how I con-

nected it to the transmitter. I checked to be sure my preamp's output impedance could drive the transmitter's 20k-ohm input impedance. It could, just barely. (How hard would it be to design, say, a transmitter with a 50k-ohm input impedance that would be compatible with a wider range of equipment? Just asking.)

Now came the opportunity to try the Syzygy set-up technology. I downloaded the Syzygy sub app from Apple's App Store onto my iPhone 6.

(An Android version of the app is available from Google Play.) I made sure the transmitter was plugged in but not connected to the output of the linestage—that would come later. I ran into several problems setting up the stereo pair of SLF870s, and finally had to call Paul Egan, President of Syzygy Acoustics, for help. It seemed that the manual's instructions were probably OK for a single SLF870, but connecting to a pair of them was more involved. The secret proved

SPECS & PRICING

Type: Wireless subwoofer

Connections supported: Line-level RCA wired connection or proprietary 2.4GHz wireless connection

Driver complement: 12" proprietary woven-cellulose-fiber diaphragm in sealed enclosure

Integral amplifier power: 1200 watts BASH

Dimensions: 15" x 15" x 15"

Weight: 39.8 lbs.

Price: \$999

PRINCETON TECHNOLOGIES GLOBAL, LLC

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Princeton, NJ 08543
syzygyacoustics.com
info@syzygyacoustics.com

Associated Equipment

Speakers: Affirm Audio Lumination speakers; JL Audio Fathom f110 subwoofer

Amplifiers: Berning ZH-230 stereo amplifier

Preamplifier: Audio Research LS28 line-stage

Digital sources: Toshiba Satellite laptop computer running 64-bit Windows 10 Home Premium and JRiver Media Center Version 22 music server software; SOtM SMS-1000SQ network music player with sPS-1000 power supply; QNAP TS-251 NAS; PS Audio DirectStream DAC with Torreys operating system; Mytek Brooklyn DAC (for review)

Interconnects: Audience Au24 e balanced, CablePro Freedom unbalanced, Crimson RM Music Link, High Fidelity Cables CT-1

Speaker cables: Crimson Cables Crimson RM Music Link loudspeaker cables

Power cords: Purist Audio Design Venus-tas, Blue Marble Audio Blue Lightning, Clarity Cables Vortex, Audience power-Chord e, Au24 SE LP powerChord

Digital: Audience Au24 SE USB

Power conditioner and distribution: Audience aR6-T

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to be setting them up one at a time. Plug one SLF870 in and set it up; then unplug it and go through the same set-up routine for the other. The subwoofer you unplug will retain the set-up information. Next, pair the transmitter with the subwoofers, which involves pushing buttons on the subwoofer and the transmitter. If that sounds easy, it is, but it could be even easier if the amplifier controls and connection weren't underneath the subwoofer when the driver is pointing forward. Finally, use the app to mute the subwoofers and plug the RCA interconnects from your linestage, preamp, or integrated amp into the transmitter. I'd strongly suggest buying SLF870s from a dealer who can help install them. Once installed, all you have to do is play music, not fiddle with the subs. They can be set to turn on when a signal is received, or can be left on at all times—they only consume $\frac{1}{3}$ watt when quiescent. If you set them to turn on when a signal is received, the SLF870s will emit a very low frequency *whomp* when they activate. It's not loud, but it gets your attention. I rather liked the reminder that the SLF870s were operating.

After the SLF870s are set up to work in your room and are connected to your main system, you still have to match their output level with the output of the main speakers. Although Syzygy doesn't provide a tool to help with that task, I again turned to my iPhone, using an app called OctaveRTA. This is a spectrum analyzer which uses the iPhone microphone to pick up the sound from your room. I played a recording of pink noise from audiocheck.net, and also a low-frequency sweep, which covers the range from 10Hz to 200Hz. Final tweaking of the adjustments was done by ear. The Syzygy Sub app

serves as a really flexible remote control, allowing you to adjust levels, crossover frequency, phase, and several other parameters. It also lets you apply a DSP adjustment, so even after the app has equalized the response for your room, you can still adjust it if you want a different bass response. Think of the DSP adjustment as a super tone control.

Syzygy recommends 25 hours of break-in, but that's 25 hours playing bass notes—not just turned on. That's one break-in process I don't want running 24/7! The subs do loosen up after breaking in.

I found the subwoofers matched my main speakers when set for a level of around 50 on the app. Other speakers and rooms will require different settings. Adjusting the level with the app was easy—just move a slider. When I adjusted the level for one subwoofer, the other one was also adjusted to the same level. Of course, my initial setting was too high, but I confess I listened to several albums that way, just enjoying the bass energy washing over me. (Does that mean I'm a closet bass-head?) Anyhow, after enjoying the surfeit of bass for a while, I forced myself to act like a responsible reviewer and dialed the sub-level back to match the output of the main speakers. You should be aware that the SLF870's internal crossover is just a low-pass crossover, which keeps the higher frequencies out of the sub. It has no effect on the main speaker, which continues to run full-range. It would be interesting to use an external crossover like the JL Audio CR-1 reviewed by Jonathan Valin in Issue 254. A fully active crossover like that will also filter low frequencies from the signal driving the main speakers,

relieving the speakers of reproducing bass and thus increasing the speaker's dynamic range.

Sound

If you had just installed new subwoofers in your system, what would you play first to show it off? Being a classical music geek, I thought of organ music, specifically Saint-Saëns' Third Symphony (*Organ Symphony*). Although my local symphony orchestra doesn't enjoy a concert hall that sports a pipe organ, a few years ago they managed to stuff the orchestra pit with an electric organ on steroids, which could and sometimes did generate a 32Hz note that shook the concert hall and occasionally overwhelmed the entire orchestra—a memorable experience. Anyhow, I selected an album that contained the *Organ Symphony* and Poulenc's *Organ Concerto*, as well as Barber's *Toccata Festiva*, with Christoph Eschenbach leading the Philadelphia Orchestra, ripped to AIFF format from the CD layer of Ondine ODE 1094-5. Although it's probably not my favorite recording of the *Organ Symphony* (I still prefer the one by Charles Munch and the Boston Symphony on Living Stereo), it's the best-sounding recording of the symphony I have. I played the last movement, the *Maestoso-Allegro*, which has lots of spectacular organ fireworks. The SLF870s didn't quite flex the walls of my room, but they still shook me. There's a passage about 5:15 into the movement where the orchestra, which has been pretty rowdy, drops off into silence leaving the organ playing a very low sustained note. The SLF870s did full justice to that note, reproducing it with excellent pitch and lots of power. Yet the SLF870s validated the success of my efforts

to integrate them seamlessly with the main speakers—I never heard them sounding like separate speakers.

Since it has bass extending to the mid-20Hz range, of course I had to try "Folia: Rodrigo Martínez" from *La Folia 1490-1701*, played by Jordi Savall and his band of Renaissance music specialists and ripped to AIFF from Alia Vox AFA 9805. The SLF870s projected substantial impact and power, yet integrated with the main speakers to project an impression of a realistic drum. Since the main speakers were still being powered by the normal amplifier, from the mid-bass upwards the system still sounded the same.

Another fave is Shelby Lynne's album of Dusty Springfield covers *Just a Little Lovin.'* On the Acoustic Sounds DSD64/DSF download, there's a strong bass underpinning throughout. The title track opens with the bass guitar growling menacingly. The SLF870s played those lower-octave notes with excellent pitch, and although I suspect the bass on the downloaded track is overdone (the LP sounds more realistic), it was a kick to listen to it via the SLF870s—further substantiation that I really am a bass-head. Who knew?

Comparison

I'm not sure how useful it is to compare two 12" subwoofers to a single 10" model, but the latter is what I've been living with for the past several years, so here goes. I was most interested in seeing how the different subwoofers integrated with the main speakers—that's what makes or breaks a subwoofer in a hi-fi system. The JL Audio Fathom f110 subwoofers sold for \$2200 when last produced. They're finished in beautiful piano gloss black lacquer and rest on

SUBWOOFERS

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three very shallow conical rubber feet. Like the SLF870s, the f110 is an acoustic-suspension design. Since it has a 10k-ohm input impedance, less than the minimum recommended by my linestage manufacturer, I use a Benchmark DAC with an analog input as an impedance buffer. The Benchmark has a sufficiently high input impedance to satisfy the linestage, along with a very low output impedance that has no trouble driving the JL Audio. The f110 has a very flexible assortment of controls, although you must pry your butt off the couch to manually adjust them. After lots of experimentation, it was obvious that the steepest available crossover slope, 24dB/octave, was optimum in matching the subwoofer output to the main speaker. In the SLF870, that decision was made for me—one less thing to obsess over.

Through the fast JL Audio subwoofer, the bass on “Folia: Rodrigo Martínez” integrated well with the extremely fast main speakers and projected deep bass with speed and detail, but the SLF870s went noticeably deeper and gave up little, if anything, in matching the main speakers. The Saint-Saëns’ *Organ* Symphony recording isn’t particularly detailed, so the extra energy the SLF870s projected made their portrayal of this piece much more enjoyable. When I played music with no deep bass, the SLF870s didn’t intrude: There was no audible contribution at all—which is as it should be. In other words, there was no artificial boost to the bass frequencies.

It should come as no surprise that the 12” drivers in the SLF870s could project substantially more power at lower frequencies than the single JL Audio 10”. What surprised me is that

I was able to achieve equally good integration with the SLF870s. There was no murky, lumpy bass, just powerful, punchy, detailed bottom octaves that altered (in a good way) my impression of what certain recordings sounded like. Case in point: Bass on *Just a Little Lovin’* was deeper and punchier, as the Syzygy reproduced bass guitar and kick-drums more powerfully.

Bottom Line

The Syzygy SLF870 wireless subwoofers aren’t the only wireless subs available today; they are quite popular in home-theater systems, especially those using soundbars instead of discrete channel speakers. REL offers a wireless connection in its very high-end subwoofers, although at a considerably loftier price. Several other subs offer computer-assisted setup. And in setting up the woofers, I found the technology wasn’t effortless, so I had to call for help. But once the subs were dialed in, they just worked without having to diddle with them. Even when I unplugged them to change equipment, the subs “remembered” the settings. But all those techy features are pointless if the subs don’t sound good, and fortunately, they weren’t just good—they were superb. I was able to achieve a seamless transition, so the subs sounded like a continuous extension of my main speakers. I worried that the wireless connection might cause dropouts, and while I carefully monitored the sound to detect any possible problems, I never heard a single one. That’s how technology *should* work. Style-wise, they may be rather plain, but who really looks at subwoofers? Very highly recommended and a *great* value for the price. **tas**

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