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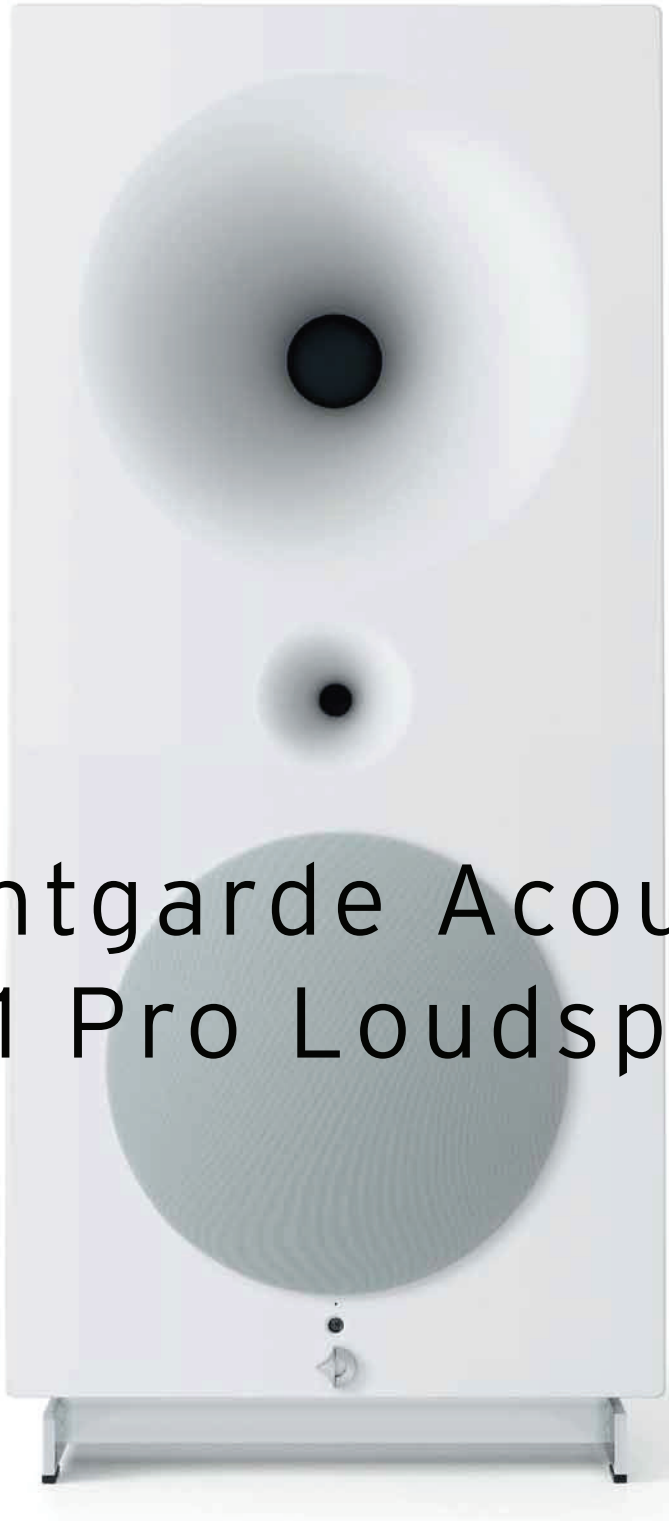
Avantgarde Acoustic Zero 1 Pro Loudspeaker



Before I turn to the subject of this review—Avantgarde Acoustic's fabulous, $16,000, powered, digitally optimized, virtually plug 'n' play Zero 1 horn loudspeaker system, which, to spill the beans in the very first sentence, is far and away the most ingenious and sonically successful compact horn loudspeaker I've ever heard (and in many ways one of the freshest, most brilliantly engineered, and strikingly styled loudspeakers of any kind I've come across in years)—I'm going to talk a bit about horns and my past experience with them. Those of you who feel like I'm taking the long way around the barn, can skip to the chase on page 130 (column two). Those of you who haven't have had much experience with horn loudspeakers may want to read on.

As was the case with subwoofers (until the JLAudio e110 showed up just a few months ago), I've taken a "been there, done that" attitude toward horn loudspeakers for the past decade or two. I gave them a lengthy shot around the close of

Modern Masterpiece

Jonathan Valin

the past millennium—using Avantgarde Acoustic's four-way Trio Compact horn loudspeaker system as my reference for two-and-a-half years. By the end of that time I'd lost sight of all the things that horns do better than other speakers (and they do a whole bunch of things better) in the light of all the things they do worse.

Chief among the original Trio Compact's shortcomings was its inability to consistently turn the one trick I consider most important in any stereo component: disappear as a sound source. Despite its incomparable transient speed, still unexcelled dynamic range, near-'stat-like resolution and tone color, and ability to make certain hard-to-realistically-reproduce instruments and ensembles (such as grand piano and symphony orchestra) seem astonishingly "there," sooner or later the Trio ended up betraying its presence by sounding like three separate tubes yoked to an inferior cone subwoofer. In other words, the Trio lacked the seamless driver-to-driver coherence that is one of the chief prerequisites of a "disappearing act."

Of course, the Trio Compacts I owned were the very first iterations of Avantgarde's strikingly beautiful spherical-horn system, and a good deal has changed in the German company's thinking over the last twenty years (as the Zero 1 and my recent experience with the latest Trio/Basshorn system attest). Even at that, I've never forgotten those occasions on which the original Trio shone. No other speaker I've used as a reference has combined speed of attack, dynamic range, resolution, and beautiful tone color (especially when it was driven by SET amps) in quite the same measures as the Avantgarde Trio Compact. But then no other speaker has had the advantages of horn-loading.

The most mature loudspeaker technology and quite literally the first, horns benefit and to some extent suffer from the enormous amount of research devoted to their design. According to horn guru Dr. Bruce Edgar, there is still a lack of clear consensus about how to build a proper horn (and any number of wrong ideas and dead ends in the literature—not surprising given that horns have been studied and written about for better than a century). What isn't in doubt, and never has been, are a horn's manifold intrinsic strengths, the first and foremost of which is much higher efficiency.

A horn is able to provide higher SPLs (and greater transient speed and dynamic range) at a given listening position and given wattage for two reasons. First, the horn's tapered shape increases the directivity of the driver's wavelaunch, concentrating and intensifying the sound rather in the same way that a flashlight's beam becomes brighter and more intense when that beam is focused rather than diffused. (The horn's tapered shape and consequent highly-directional wavelaunch has the substantial additional benefit of reducing the deleterious effects of room reflections, since, unlike conventional cone or dome drivers or planar dipoles, horns don't radiate substantial amounts of their energy hemispherically or in a figure-eight pattern.)

Second, a horn plays louder, with greater speed and dynamic range, because it more efficiently couples its driver to the air of the room via a phenomenon known as "acoustic impedance matching." Like a megaphone, a horn constricts the area and volume of air that the driver (or human voice, in the case of a megaphone) works "into." As a result of this constriction, the acoustic impedance of the air trapped in the horn's throat (the narrowest part of the horn immediately in front of the driver) comes much closer to the high acoustic impedance of the driver's diaphragm. (When the impedance—the electrical, mechanical, magnetic, or thermal opposition of a system to the flow of energy—of a source and a load are matched, power is transferred maximally.) This superior impedance matching of air and driver allows a horn to generate higher pressures from smaller movements of its diaphragm. Moreover, as the horn's tapered shape gradually increases in area toward its mouth (the widest part of the horn that opens onto the listening room), those high-pressure soundwaves generated in the horn's throat by miniscule vibrations of the driver's diaphragm grow lower in pressure and progressively larger in displacement as they travel down the horn's length, allowing them to couple more efficiently to the low-impedance air of the listening room. A horn-loaded driver is in many ways the ideal acoustical-energy delivery system, typically providing ten times more sound power than a cone speaker would from the same amplifier output.

But playing much louder with much less amplifier power is only one of a horn loudspeaker's inherent virtues. Because

the diaphragm of the driver attached to the horn works so much more efficiently (thanks to increased directionality and acoustic impedance matching), the driver itself has *far* less work to do than a non-horn-loaded driver, such as a typical direct-radiating cone or membrane that has to move air without the benefit of impedance matching. The horn-loaded driver's much smaller excursions mean much lower inertia and distortion, which translate into a blur-less clarity, electrifying speed and pace, and sensational dynamic range that have to be heard to be fully appreciated. No other kind of loudspeaker can move air as efficiently as a horn speaker does—and on powerful instruments or large ensembles the effect can be startlingly realistic.

That's the inherent positive side of horns. The negative side, unfortunately, is also built into them.

Because of horn-loading, the very-high-pressure soundwaves generated in the horn's throat are literally reflected off the throat walls. Any irregularities in those walls (any bumps or dips or material or structural resonances) and any high-Q resonances in the drivers themselves (when a compression driver is run out-of-passband, it decouples from the horn, particularly in its lower frequencies, generating distortion) will add a characteristic turbulence to the signal that ends up being amplified along with the music. The sonic result of this added distortion is the "cupped hands" or "horn coloration" that you typically hear on P.A. systems—like someone talking with his hands so tightly cupped around his mouth that they slightly pinch his nose. Such colorations also have the psychoacoustic side effect of localizing the drivers, making them sound even more like individual tubes than like a coherent loudspeaker system.

No other kind of loudspeaker can move air as efficiently as a horn speaker does—and on powerful instruments or large ensembles the effect can be startlingly realistic.

Additionally, though properly designed horns are inherently phase-correct transducers, the various resonances of the materials the horns are made of and the necessarily (because of the physical size of the tubes) much wider disposition of the drivers in space vis-à-vis each other can make overall time/phase/frequency coherence a dicey proposition. The small cone and dome drivers of a latter-day dynamic loudspeaker are typically located to the exact micrometer on a baffle—to ensure a time/phase/frequency-coherent wavelaunch. Though the positioning of drivers in a horn system is also mathematically precise, the horns' physical size, their inherent resonances, and, paradoxically, their more highly directional wavelaunch tend to work against such coherence at normal seating distances, once again making you increasingly aware that you're listening to separate drivers playing in separate frequency ranges.

Nowhere is this sense of incoherence more prominent than in the bass, which in many contemporary horn systems (such as my

Avantgarde Trio Compact from the late nineties) is often handled by a conventional cone subwoofer. Why not use a separate horn for the bass, you ask? Because the long wavelengths of bass frequencies would necessitate a horn with a mouth the size of a three-or-four-car garage! (Back in the day, Nelson Pass actually turned a large garage in the hills above the Berkeley campus into a horn-loaded woofer, which played so loudly and went so deep that cops from all over the valley were regularly called to his residence to tell him to, uh, "turn it down.")

The other solution to reproducing bass frequencies in a horn system is via a so-called folded horn—a long, zigzag-shaped, flaring duct built inside a cabinet into which a woofer fires. The path-length and flare-rate of the duct determine the low-frequency cut-off point of the horn, although the resonances of the cabinet and of the duct itself can result in the same horn-like colorations in the bass that you often hear in a horn speaker's mids and treble. (Avantgarde currently uses a superior version of a quarter-wave folded horn in its Basshorn system, but that's a story for another day.)

Seamlessly matching a cone subwoofer to an ultra-fast, ultra-clean, ultra-high-sensitivity horn system via conventional means is about as tough a task as you can set yourself in high-end audio. In fact, until I heard the Avantgarde Zero 1s I would've said it was impossible—a fool's errand. Even the best direct-radiating cone subs will seem slightly sluggish off-the-line compared to the super-charged engine of the horn-loaded drivers. Plus, as is the case with any subwoofer, you have the extremely tricky issue of crossover slope/point to negotiate, plus the little matter of dispersion pattern, which is highly directional and relatively room-independent in a horn and (down to a certain frequency) omnidirectional and highly room-dependent in a sub.

My view of a horn system's strengths and weaknesses has not changed much since the Trio Compact days. Oh, I've certainly heard great-sounding horn systems at various trade shows, including several in Munich just a few months ago. (And once again I'm not denying the unique virtues of horn-loaded drivers.) But I've also invariably heard traces of the "cupped hands" colorations and driver-to-driver incoherence that eventually wore me down and out when I owned the original Avantgardes. (I guess I should also note that because of the various phase, time, and frequency-response issues I've already mentioned and the sheer aggregate size of their wavelaunch, horn loudspeakers don't image with great precision—nor, since they don't disperse their sound hemispherically the way point-source direct-radiators do, do they typically soundstage "outside the box." Although the severity of these problems depends on the design of the horn and the level it is played at, certain horns can be as much the poster children for "six-foot-wide" voices and violins and guitars as vintage planars were.)

So…it would seem that to live with a horn loudspeaker system's great virtues you must also live with a horn loudspeaker system's great flaws. This is certainly what I've believed for the past two decades. And then along came the Avantgarde Acoustics Zero 1s.

What's different about the Zero 1s? In a word, everything.

These extremely ingenious speakers were truly designed on a blank slate. They make brilliant use of Digital Age technologies (developed for Avantgarde by Danish DSP guru Thomas Holm) to solve many of the intrinsic problems of horn loudspeakers, and in particular those issues that have been the biggest stumbling blocks for me—coherence and coloration. That they succeed in doing so to an extent I wouldn't have believed possible (had I not heard them) is a wonderment. It is also, I confess, the best argument I've yet come across for using DSP to optimize the performance of a transducer.

What exactly are Zero 1s? They are compact, self-powered (active), high-sensitivity (104dB/1W/1m), three-way loudspeakers with a spherical-horn-loaded tweeter, a spherical-horn-loaded midrange, and a direct-radiating cone woofer. All three drivers are housed in a stunning Bauhaus-like enclosure made of a sandwich of polyurethane foams—one of the coolest-looking objects of audio art I've seen since, well, the Avantgarde Trios. Why did Avantgarde use this foam-sandwich material? Because the random distribution of randomly-sized bubbles in the center section of the sandwich makes the entire structure highly non-resonant and self-damping, plus these plastics can be injected-molded to order, which is precisely what Avantgarde does. Internal bracing is cast into the front and rear casings of the Zero 1 enclosures, while the spherical horns are molded into the baffle, recessed into it in concave fashion, rather than projecting out in front of it. (Polyurethane's ultra-smooth, non-resonant surfaces make an excellent material for a horn, where smoothness, particularly in the throat area, is essential to help prevent turbulence and distortion.)

How do you eliminate crossovers in a three-way loudspeaker? Well, that brings us to the niftiest part of this incredibly nifty loudspeaker.

Each of the Zero 1's three drivers is powered by its own built-in amplifier. Both the tweeter and the midrange use 50W, zero-negative-feedback, Class A solid-state amps, the power supplies of which are identical to the power supply in Avantgarde's flagship XA amplifier. A 400W Class D amplifier is used to power the woofer. (The amps were designed by Avantgarde's resident engineering genius, Matthias Ruff.) All of the amplifiers are directly connected to the drivers' voice coils, without any power-robbing, phase-shifting, passive crossover parts (resistors, coils, caps) in the signal path.

How do you eliminate crossovers in a three-way loudspeaker? Well, that brings us to the niftiest part of this incredibly nifty loudspeaker. As previously noted, Avantgarde commissioned Thomas Holm to develop a digital crossover network using 66-bit FPGAs (Field-Programmable Gate Arrays—essentially computer chips that are designed and programmed to order)—and FIR (Finite Impulse Response) algorithms to optimize the entire speaker's amplitude, impulse, and phase response from about 30Hz (the cutoff frequency of the woofer) to about 20kHz (the cutoff frequency of the tweeter) within a "listening bubble" of about 2m to 4m, with a listening position of approximately 3m being ideal. (A digital crossover is capable of complex,

progressive slopes running from 6dB/octave at crossover to 100dB/octave at a driver's cut-off point; an analog X/O simply couldn't manage this.)

The "price" of all this digital optimization is that you have to come into the Zero 1 via digital or digitized sources, which, after DSP filtration, are converted to analog just ahead of the power amplifiers via three 24-bit/352.8kHz Burr-Brown DACs. The speakers (well one speaker—for which see the sidebar on setup) come with a wide variety of digital inputs (one USB, one TosLink, two SPDIF, and one AES/EBU), all of which (save for the USB) are capable of handling 24-bit/192kHz high-resolution music files. (No—the Zero 1 won't do DSD or double-DSD… yet.) The Zero 1 can also be sourced wirelessly via AirPort Express and offers the option of an A-to-D converter board for those of you (like me) who want to play back LPs or tapes.

With amplification built in, all you have to add to the Zero 1s to make them play is a source and a USB or AES/EBU or SPDIF or TosLink cable. (And you don't even have to add a cable if you choose to source them via an AirPort Express.)

Provided that the speaker's rake angle (which affects the height and directivity of the tweeter), distance from the rear wall, and toe-in are set properly (for which, see "Setting Up the Avantgarde Zero 1s"), Avantgarde claims that the Zero 1s will be virtually plug 'n' play in any room, doing their DSP-optimized magic regardless of the listening room's shape or size or damping. (Remember that because of their intense directionality horn-loaded drivers don't excite room nodes like wide-dispersion point-source drivers, although conventional woofers, such as the one in the Zero 1, can and do.)

To test Avantgarde's bold claim, as soon as they arrived I plopped the Zero 1s down in my living room—an irregularly-shaped space with fourteen-foot ceilings and no room treatment of any kind (I never listen in this room). After attaching their bases and fiddling with the Zero 1s' rake, toe-in, and location vis-à-vis the rearwall as per the instruction manual, I started playing music via a Mac computer connected to Berkeley Audio's superb USB-to-AES converter. To my amazement—and that of my wife Kathy, who, even after all these years, is the least-audiophile person I know—the sound was remarkable. To top this off, Kathy was so smitten by the incredibly cool way these things look that she asked me to return them to the living room after testing, so she can listen to them on a regular basis (unbelievable!).

Before I start dissecting the Zero 1s' sonics, let me make two things clear. First, while the Zero 1s sounded far, far better than any speaker had any right to do in the totally untreated space of my living room, all speakers—including horns—will perform more optimally in a room that, either inherently or by design, has a judicious mix of damped and "live" surfaces. Second, though the Avantgarde Zero 1s have been DSP'd to sound amplitude/impulse/phase-correct within a spacious listening bubble, their response is not intended to be further tailored to a given room via the DSP built into the speakers or by an outboard DSP unit—nor does Avantgarde encourage users to try this. In Avantgarde's opinions such manipulations will only screw up an already painstakingly optimized sound, and whatever "gains" may be heard in certain areas will most certainly be traded off against profound losses in others.

SPECS & PRICING

Type: Three-way active, digitally optimized floorstanding loudspeaker with horn-loaded tweeter, horn-loaded midrange, and dynamic bass
Subwoofer frequency response: 30Hz–250Hz
Midrange horn frequency response: 250Hz–2kHz
Tweeter horn frequency response: 2kHz– 20kHz
Sensitivity: >104dB
Inputs: USB, TosLink, SPDIF, AES/EBU, analog (optional)
Digital processing: 6 channel, 66-bit FPGA up to 100dB/octave; progressive FIR filters; three 24-bit Burr-Brown DACs
Amplification: Two 50W Class A, one 400W Class D
Dimensions: 490 x 1040 x 318 mm
Weight: 30 kg (per speaker)
Price: $16,000

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JV's Reference System
Loudspeakers: Raidho D-5, Raidho D-1, Avantgarde Zero 1, MartinLogan CLX, Magnepan 1.7, Magnepan 3.7, Magnepan 20.7
Linestage preamps: Soulution 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, Soulution 520, Zanden 120
Power amplifiers: Soulution 711, Siltech SAGA System V1/P1, Constellation Centaur, Audio Research Reference 250, Lamm ML2.2, Zanden 8120
Analog source: Walker Audio Proscenium Black Diamond Mk V, TW Acustic Black Knight, AMG Viella 12
Tape deck: United Home Audio UHA-Q Phase 11S OPS
Phono cartridges: Clearaudio Goldfinger Statement, Ortofon MC A90, Ortofon MC Anna, Benz LP S-MR
Digital source: Berkeley Alpha DAC 2
Cable and interconnect: Synergistic Research Galileo LE, Crystal Cable Absolute Dream, Anzus Diamond
Power Cords: Synergistic Research Galileo LE, Crystal Cable Absolute Dream, Anzus Diamond
Power Conditioner: Synergistics Research Galileo LE, Technical Brain
Accessories: Synergistic ART and HFT/FEQ system, Shakti Hallographs (6), Zanden room treatment, 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, Synergistic Research RED Quantum fuses, HiFi-Tuning silver/gold fuses

So…what does the Zero 1 sound like?

I could say, "Like an electrostat with sensational dynamic range, limitless loudness capabilities, and deep, superbly defined bass." But that would be a bit misleading, as 'stats have more soundstage depth than the Zero 1s, somewhat higher resolution, and less midrange presence; plus, most of them are warmer in timbre, particularly in the midbass, where they usually have a hump, and the presence range, where they're usually recessed. What the Zero 1s really sound like is precisely what they are: horn loudspeakers without the horn-loudspeaker colorations.

All of the good things that you expect from a horn loudspeaker are there: the far-truer-to-life (and faithful-to-the-source) dynamic range; the fine low-level detail about instruments and performance; the superior speed of attack; the lifelike presence on voice and instruments. What aren't there to any appreciable degree are the bad things that you also expect from a horn loudspeaker: the lack of driver-to-driver coherence, the poor-to-nonexistent integration of the woofer or sub, the "horn-colored" midrange and/or piercingly directional tweeter, the six-foot-wide imaging, and (to a degree) the truncated soundstaging. Here, for the one and only time in my experience, is a horn system that, minus an occasional dollop of extra sibilance (not brightness, mind you), does disappear as a sound source.

Let's start with timbre and dynamic range—perhaps the foremost of horn-loudspeaker virtues but often the very things that get them into the most trouble. Most horns are not particular "neutral" transducers. Because of their own colorations and the often highly-colored amplifiers that are used to drive them, they don't produce timbre with the transparent-to-source accuracy of a linear system like, oh, a typical Magico Q Series floorstander. What horns (and SETs) do do, or can do, despite their colorations is make timbre sound spectacularly lush and beautiful—the way we would like tone colors to sound at their best rather than the way they more often sound in life or were actually recorded on record. In short, when it comes to timbre horns are the quintessential "as you like it" kind of speaker.

The Zero 1s are far and away the most neutral—which is to say the least "horn-colored"—horn loudspeaker I've ever heard.

Where horns are highly transparent-to-sources, however, is dynamic range. Here no other kind of speaker will reproduce swings from *pianissimo* to *fortissimo* (or the absence of them on highly compressed pop records) with the accuracy of a horn. A recording with considerable dynamic range—even a smaller-scale one such as *Mario Lanza Live in London* [RCA], for example—can give conventional loudspeakers fits. At shows I've almost invariably heard such speakers grow bright and edgy or outright break up on Lanza's most powerful fortes, provoking at least one famous audio engineer/loudspeaker designer to proclaim that there had to be something "wrong" with this record (as his speakers were, presumably, perfect). There was and is, in fact, nothing wrong with the recording. It's just that when playback ranges, at an average level of a mere 62.7dBC, from a peak of 90.5dBC to a minim of 37.3dBC (actual measurements taken using the Avantgarde Zero 1s with a calibrated SPL meter) most drivers simply don't have the "bandwidth" to cope at more lifelike average volumes. Their inertia, their peak-to-peak excursion limits, their distortion when they are pushed hard quickly—all of the things that don't come into play with a horn-loaded driver—make a simple aria like "Lamento di Federico" a torture test *par excellence*.

Horns sail through such demanding dynamic passages with literal ease, waxing and waning continuously, as dynamics do in real life, rather than flattening out and breaking up on peaks or dropping below the noise floor on valleys as they do with many conventional loudspeakers. But what horns will also do (as already noted) is amplify their own resonances along with the music, giving something like Lanza's tenor a markedly nasal, cupped-hands timbre and (if the tweeter is also misbehaving—and it usually is) added sibilance and overly aggressive, in-your-face presence. When you factor in a typical horn's inability to image precisely, you can end up with just as much of a sonic nightmare as you get from a conventional cone or planar loudspeaker in the face of virtually instantaneous, near-60dB dynamic swings.

The Avantgardes do none of these bad things and all of the good ones. Thanks to Thomas Holm's brilliantly successful DSP'ing of amplitude response, the Zero 1s are far and away the most neutral—which is to say, the least "horn-colored"—horn loudspeaker I've ever heard. By neutral, I do not mean the Zero 1s are lacking in color—overly cool, clinical, or whitish. They have extremely lifelike timbre on well-recorded discs; they simply aren't anywhere near as Technicolored as most horn speakers. As a result, when Lanza hits his triple-fortes there is not only no strain; there is also no added distortion, horn coloration, or excessive in-your-face/lap presence (although the Zero 1s do have more presence than non-horn-loaded speakers).

In addition to vanquishing the coloration/distortion problem, Holm's DSP'ing makes the drivers work in phase and time to a degree I've never heard before from a horn loudspeaker. The most obvious audible benefits come in imaging and soundstaging. On a CD like the Lanza disc or a 96/24 file like Joni Mitchell's *Court and Spark* [Warner/Asylum] or an LP like *Leonard Cohen: Live in London* [Sony], Lanza's and Joni's and Lenny's voices (and the voices of the backup singers on the two pop albums) have as much focus as you'd hear on a good 'stat. They're not etched or laser-cut, as with certain mini-monitors, but they are definitely naturally sized and defined.

The DSP seems to pay a similar benefit with the soundstage, which extends slightly outside and behind the speaker enclosures, though it typically starts closer to the plane of the drivers or a bit in front of it. (I have to wonder whether this somewhat wider, deeper, "outside the box" staging—so unusual in a horn speaker—isn't also a side benefit of the way the horns are built into the Zero 1's enclosure. Unlike horns that extend outward from the front baffle, the Zero 1's concave horns are surrounded by a bit of a flange—the "left-over" surface-area of the rectangular baffle into which they are set. Perhaps this flange

I/O Board with optional A-to-D converter.

gives them a touch of point-source-like dispersion. I'm sure its presence was factored into the DSP.)

With such a clean, focused, and spacious presentation—and such superior dynamic range—the Zero 1s have excellent resolution, reproducing little details, such as the swirl of drummer Paul Motian's brushes on the skin of his snare or the way the great bassist Scott LaFaro double-stops certain plucked notes on *Waltz for Debby*, or the chucking sound of Javier Mas' archilaud (a Spanish version of the twelve-string guitar) in "Ain't No Cure For Love" and other numbers from *Leonard Cohen: Live in London*, with lifelike clarity and color. When speaker are this neutral and drivers are this low in inertia, you're not going to miss many musical or performance details. On the other hand you're not going to be buried in them, either—this is not an analytical speaker.

I mentioned Scott LaFaro's standup bass just a sentence ago, so let me turn to the Zero 1's bottom octaves. The seamless integration of a cone woofer into a system of horn-loaded drivers is really one of the great triumphs of this loudspeaker (and of Holm's DSP). In timbre, focus, speed of attack, and resolution, you will have no sense—zero—that the music in the bass octaves is coming from a different kind of driver. In dynamic range and impact, the woofer also keeps up with the horns convincingly, although I wouldn't say the Zero 1's single 12" woofer packs all the weight and wallop of the four ported woofers in a multi-driver floorstander like the Raidho D-5; on the other hand the Zero 1 doesn't have the excess midbass energy or the beguiling and, I think, lifelike added power-range warmth of the D-5. (Unlike the Raidho, the Avantgarde was a snap to situate in my treated listening room and didn't excite any room resonances.) The Zero 1's bass is extremely detailed, exceptionally well defined, surprisingly deep-reaching, unusually natural in timbre, but perhaps somewhat laid-back when it comes to slam.

No one should take this last point as a potential disqualifier. There really isn't anything "disqualifying" about this landmark horn-loaded speaker—the first of its breed and, as I've already said, the highest-fidelity compact horn system I've ever heard. The Zero 1 does have a touch more presence (a more forward-projected midrange—although see my sidebar on setup for a change in this regard) than some cone speakers or most 'stats, and it can on rare occasions (I mean rare—it doesn't do this on anything like a regular basis) very slightly accentuate sibilance on vocals (once again see the sidebar on setup), but on the whole its horn-loaded tweeter is as much a model of good behavior as its midrange and its woofer, sounding sweet, clear, and natural on massed strings, woodwinds, upper-octave piano (and other percussion), and higher-pitched brass. (Though its horn virtues are manifest, it is only fair to point out that—perhaps because of the equalization and the absence of true compression drivers—the Zero 1 isn't as lightning-fast or as hard-hitting as a "true" horn speaker, though the way Holm's eq eliminates horn issues more than makes up for these very small differences in speed and impact.)

Let me conclude with an overall observation. I am an analog guy used to listening to analog sources via conventional electronics, and the Avantgarde Acoustic Zero 1 is a digital loudspeaker. Consequently, you might think that I would've found its sound not to my taste. However, while I can't truthfully say that listening to digital and digitized sources through a digitally optimized loudspeaker is the same experience as listening to analog sources through conventional loudspeakers and electronics, I can say this: I was not at all put off by the quality of the Zero 1s' presentation. On the contrary, I greatly enjoyed (and continue to enjoy) the Zeros, to such an extent that I'm seriously considering buying them—not that I think (or think that *you* should think) that a reviewer buying any item at parts-cost should be considered a virtuous act. What I do think is that when a guy who is as devoted to analog as I am (and continue to be) finds a digitally optimized speaker so engaging and pleasurable—and, on many occasions, so startlingly realistic it curls his toes (give a listen to Nina Simone and tell me she isn't "right there")—that he's considering buying them, it *does* mean something. To put this plainly, if you're looking for the benefits of horns without their downside and you use digital sources almost exclusively, I can't recommend the Avantgarde Acoustic Zero 1 active, horn-loaded, digitally-optimized, virtual plug 'n' play loudspeaker highly enough.

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Avantgarde Zero 1 Setup

The instruction manual that comes with the Zero 1 does a good job of explaining how to set these speakers up for your listening position. As noted in the review, they will make far-better-than-decent sound virtually anywhere, but for highest fidelity they need to sit in a space with a mixture of live and damped surfaces (such as an average audiophile listening room). Though the speakers can be parked close to rearwalls (with a consequent increase in

bass output), I found the Zero 1 had the best balance in the places that I usually park speakers-under-test—about four feet from back and sidewalls and about ten feet from the listening seat, with the speakers toed in so that you are listening virtually on axis (though the Zero 1s also sound swell with some toe-out, slightly off-axis). The most important adjustment you will make is to the tilt of the speaker. Adding (supplied) washers to the front of the speaker (where it screws into the supplied stands) increases the angle of tilt. What you want to do is ensure that the tweeter is more or less directed at ear height.

The two speakers that make up a Zero 1 pair are configured as a master and a slave unit. The Master speaker has all of the digital inputs and the remote-control sensor (see below). The Slave speaker has the same built-in amplifiers as the Master but no inputs. You can connect and sync up the Master and the Slave by two means: wirelessly via a built-in, dedicated 2.4GHz ISM/GRD link or hard-wired via an Ethernet cable. (I chose the Ethernet cable.)

Outside of on/off switches beside the IEC power-cord inlets and the various inputs for digital sources on the Master unit, the Avantgarde Zero 1s have no controls. Everything is handled by its hefty cylindrical remote, which you use to turn the speakers on and off, change inputs, and raise and lower volume by aiming the remote at the IR-receiver built into the base of the Master loudspeaker. Though the power-on light in the bases of the Master and Slave speakers wink when the speaker is "off" and brighten to full illumination when the system is turned on, these are the only "indicator lights" on either loudspeaker. Unfortunately, neither the speakers nor the remote have any provision for telling you which input you are switching to and from (or what volume level you are at). For me, the usual routine is to keep pressing the Channel button until I hear the music I want to hear—then adjust volume from there. Another little oversight is the absence of a mute control on the remote. To turn these speakers down—for whatever reason—you have to hit the volume-down control button or switch inputs or turn the entire speaker system off. (If you change inputs be aware that the remote is uni-directional, which is to say that you can't "go back" to the input you just left with a touch of a button; you have to cycle through all the inputs to get back to the channel playing music.) The other little drawback of the remote is ergonomic. There is a reason why most companies do not make cylindrical remote controls—they can roll off things like tabletops or chairs if they aren't set down carefully.

All of the Zero 1's inputs are compatible with 24-bit/192kHz files, except for the USB input, which is limited to 48/16. Why Avantgarde made this choice I don't know, but in practice it isn't much of a limitation. All you have to do is use a USB-to-AES (or SPDIF) converter box, plug your USB cable into the converter, and then plug an AES or SPDIF cable from the converter into one of the Zero 1's high-resolution inputs—instant access to high-res files. The AD converter for analog sources that came with my Zero 1s is 24/96.

At the moment Avantgarde makes no provision for DSD or double-DSD playback. However, the spare port into which my AD board plugs (no assembly or disassembly required) could easily house a DSD module. If DSD catches on, I'm sure that Avantgarde will make such a module available.

According to its Web site, Avantgarde does offer an optional software package (though it wasn't offered to me) that lets you further tune your room/speaker interface via DSP, with 100 built-in EQ curves (each with 16,000 frequency points) and, one supposes, the potential of developing any number of freakish curves of your own. Although the company strongly advises against taking this route, endless DSP'ing is available to you tweakers out there. (Given that Avantgarde is markedly opposed to this kind of fiddling, you have to wonder why the software's even being offered as an option.)

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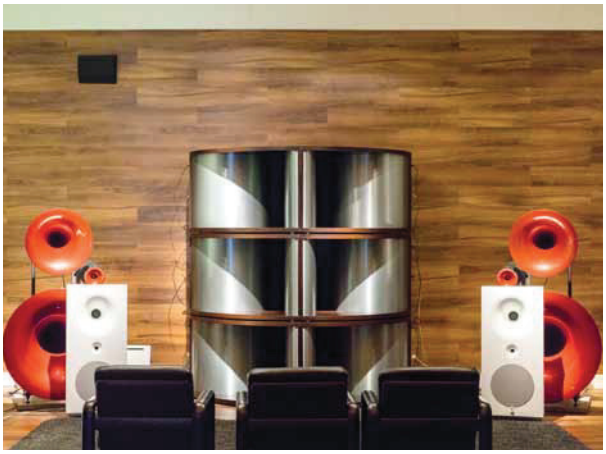
N.B. Since I wrote this review, Avantgarde has developed an app—Windows only, I'm afraid—that addresses many of the command-and-control issues that I just mentioned. In order to use it, you have to connect a PC, on which the app has been downloaded, to the Zero 1 Master speaker via a USB cable. Once the Zero 1 and your computer are hooked up, you can use the app to do all of the things that I just said you couldn't do with the remote, as well as to adjust some things that I didn't even mention—e.g., set volume precisely with a numerical readout, mute the speaker, directly select the source by input name, adjust the balance, switch between stereo and mono, optimize the gain of the analog input for mm or mc cartridges, etc. The only downside is that the app requires a hardwired connection, eliminating the USB input as a potential audio source and making a functioning PC or PC laptop a necessity. Though it certainly works, I think the app is a bit of a kludge solution to a problem that would be better addressed with a new, wireless touchscreen remote.

Along with the app, Avantgarde has also made a simultaneous change to its DSP engine, which, though subtle, does audibly affect the upper midrange and lower treble, reducing or outright eliminating the occasional touches of extra sibilance that I mentioned in the review, slightly dialing back presence, tightening focus just a wee bit, and, as a result of the changes in tonal balance, making the bass octaves seem a bit fuller and more prominent, though they still don't have the slam of the Big Boys.

A Visit to Avantgarde Acoustic Lautsprechersysteme GmbH

▲ View through the door of Avantgarde's showroom.
In the late winter of this year, I visited Avantgarde Acoustics in Lautertal, Germany—a picturesque village just outside of Frankfurt. My relationship with Avantgarde dates back to the mid-1990s when, I believe, I became the first writer (I was then with *Fi Magazine*) to review the company's flagship Trio Compacts. My review helped put the company on the map and, even though I'd moved on from horns and SETs before the turn of the millennium, I maintained a lively interest in the company and a friendship with its founder Holger Fromme and its chief engineer Matthias Ruff.

▲ Avantgarde's beautiful Uno, Duo, and Trio horn loudspeakers in the Lautertal showroom.
My trip in late February was designed to bring me up to date on the entire Avantgarde line (a lot has changed in the near-twenty-years since I first heard the Trio Compacts), allow me to listen to the Zero 1s and the latest Trio/Basshorn system (with reviews of each in the offing), and visit the Avantgarde factory to see how its speakers, particularly the Zero 1s, are made.



▲ Avantgarde's listening room in Lautertal.
Avantgarde's listening room, within the Lautertal showroom, is large, beautifully appointed, and very good sounding. Here you see the ultimate Avantgarde setup: a pair of Trios mated to six centrally located, powered (by six 600W ADRIC amplifiers), expo-spherically horn-loaded Basshorns. With a collective mouth area of 54 square-feet, the Basshorn stack can reproduce true horn-loaded bass as low as 27Hz. (A pair of the new Zero 1s is sitting in front of the Trios.) The Trio/Basshorn system I heard in Lautertal was vastly improved in every regard over the Trio Compacts I reviewed decades ago, in particular, in the bottom octaves (thanks to the Basshorns) and in top-to-bottom coherence, which now seems to me almost seamless. I may review the entire Trio/Basshorn system in a future issue of TAS, but on the basis of my Lautertal audition I don't think I've ever heard a better speaker on large-scale power music, such as symphonic showpieces, big band, or hard rock. I know I haven't heard one with more realistic power or lifelike scale.

◀ Avantgarde's Offices.
Avantgarde's office building is extraordinary. Formerly occupied by Avantgarde founder Holger Fromme's father—a hugely successful German entrepreneur who once owned a 40% stake in Leica AG (among many other ventures)—the offices are unique in my experience of audio firms. Filled with sculptures and artwork from famous contemporary German artists (Fromme's father was an art collector of exceptional taste) and Avantgarde's own strikingly sculpturesque loudspeakers, it is quite the most beautiful audio office I've ever seen.

▲ Holger at his Desk.
Holger's office is on the second floor. The desk he is sitting behind once belonged to his father. tas