

# AAD

## Reference Silver-1

### LOUDSPEAKER

John Atkinson

**DESCRIPTION** Two-way, stand-mounted, reflex-loaded loudspeaker. Drive-units: 1" (25mm) horn-loaded, flat-diaphragm, "Helical Conductive Transducer" (HCT) tweeter; 5" (127mm) honeycomb-cone woofer. Crossover frequency: 2.8kHz. Crossover slopes: second-order low-pass, third-order high-pass. Frequency response: 40Hz–40kHz,  $\pm 2$ dB. Nominal impedance: 6 ohms, "compatible with 8 ohm load."

Sensitivity: 87dB/2.83V/m. Recommended amplification: 50–200W.

**DIMENSIONS** 14.6" (371mm) H by 7.6" (193mm) W by 14.2" (360mm) D. Weight: 22 lbs (10kg) each.

**FINISHES** High-gloss maple side-walls with metallic silver top, base, rear panel, baffle; high-gloss cherry sidewalls with piano-black top, base, rear panel, baffle.

**SERIAL NUMBERS OF UNITS**

**REVIEWED** None visible.

**PRICE** \$1550/pair; matching stands, \$300/pair. Approximate number of dealers: 7.

**MANUFACTURER** AAD by Phil Jones, American Acoustic Development LLC, 8559 Page Avenue, St. Louis, MO 63114. Tel: (314) 814-4660. Fax: (636) 536-1338. Web: [www.aadsound.com](http://www.aadsound.com).

**B**ookshelf loudspeaker. The phrase may be common usage, but I really dislike describing small speakers as "bookshelf" models. Place a pair of high-performance minis on a bookshelf against the wall and you destroy much of the sound quality for which you've paid. Yet place the same speakers on good stands well away from room boundaries, and while it could be argued that their footprint is no smaller than a conventional tower speaker, with the best designs you'll get true high-end sound, particularly regarding the accuracy of midrange reproduction and the stability of stereo imaging.

In recent months I've been exploring what is attainable from high-performance miniature speakers—not "bookshelf" speakers—starting with the surprisingly good Era Acoustics Design 4 (\$600/pair) in January, continuing with the Stirling LS3/5a V2 (\$1695/pair) and Harbeth HL-P3ES2 (\$1850/pair) in April, thoroughbreds both, and ending with the extraordinary PSB Alpha B1 (\$279/pair) in May. For my final foray into the field, I chose for review a new speaker, the Reference Silver-1 (\$1550/pair), from a fairly new company, American Acoustic Development of St. Louis.

AAD's founder and technical director is not new, however. English expatriate Phil Jones was the man behind the superb Acoustic Energy AE1, which I very favorably reviewed for *Stereophile* at the start of the 1990s (see [www.stereophile.com/standloudspeakers/526](http://www.stereophile.com/standloudspeakers/526)), and who went on to design impressively high-tech speakers for Boston Acoustics and Platinum Audio ('standloudspeakers/1195platinum). Following what must have been a rather traumatic end to Platinum, Phil worked for some years in the pro-audio business, working on amplifiers and speakers for his other love, the bass guitar. The result was the Phil Jones Bass company ([www.philjonesbass](http://www.philjonesbass)), which combined American design know-how with Chinese manufacturing to produce impressive gear used by such nimble-fingered A-list players as Nathan East and Chuck Rainey, and by such earthbound, concrete-fingered players as John Atkinson.

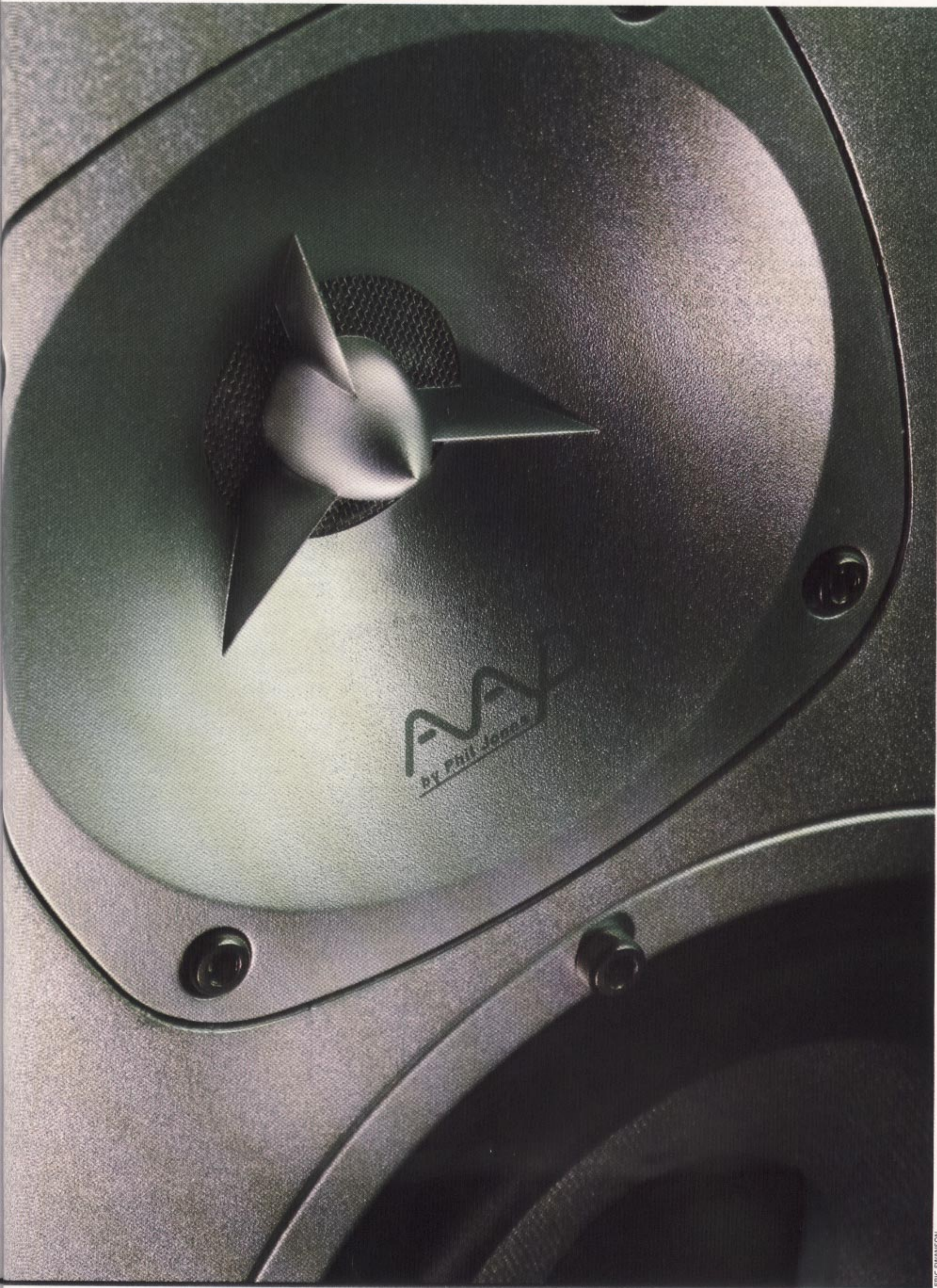
The AAD by Phil Jones division of PJB's parent company, American Acoustic Development, applies the same ethos to domestic loudspeakers. Design them here in the US, but take advantage of the economies of offshore manufacturing to keep the price affordable—and also, these days, the quality high.

#### Reference Silver-1

The Silver-1, the smallest in AAD's new Reference line of speakers, is made to a very high standard indeed. When I unpacked the review samples, the gloss of their maple side-panels and the high-tech look of their metallic silver front baffles led me to believe that I was reviewing a pair of speakers costing more than \$4000/pair. This impression wasn't dispelled when I set them up for a first listen, so it was with some disbelief that I greeted the information from AAD's Eric Sharp that the speaker sells for \$1550/pair (stands cost \$300/pair extra).

The most noticeable feature of the Silver-1 is its tweeter, which sits behind a bullet-shaped phase plug at the apex of a short horn set into the front baffle. Called by AAD







a "Helical Conductive Transducer" tweeter, it uses, instead of a dome, a flat Kapton diaphragm less than 0.002" thick, to which is bonded a featherweight aluminum spiral. When loaded by the horn, this tweeter—with a total moving mass said to be one tenth that of a conventional dome, and driven across its entire area by the intense magnetic field from a rare-earth magnet—is said to offer excellent dispersion and transient performance, and extension to above 40kHz.

The reflex-loaded woofer appears to be no less high-tech. Constructed on a low-acoustic-profile diecast chassis with

a massive magnet structure, its cone is fabricated from some sort of honeycomb material finished in metallic silver, with a black dustcap and a substantial rubber roll surround. Both drive-units are rabbeted into the baffle, and secured with Allen-head wood screws. (These have little "bite"—when I removed the drive-units at the end of the review process to take a look inside, two of the six screws fastening the woofer of one of the samples rotated without getting a grip when I replaced the unit.) The cloth-covered, plastic space-frame grille is held in place by four pins protruding

from the baffle. I did all my serious auditioning without the grilles, but they seemed to have very little effect on the Silver-1's sound.

The cabinet is constructed from MDF, and the veneered sidewalls gently follow an elegant elliptical profile around to the narrow rear panel. The enclosure is loosely filled with acrylic fiber, and a horizontal figure-8 brace joins the front, rear, and side panels between the drive-units. Electrical connection is via two pairs of binding posts mounted on a panel beneath the rear-facing port. Internal wiring is with

## MEASUREMENTS

**T**he AAD Reference Silver-1 was of below-average sensitivity, at an estimated 84dB(B)/2.83V/m, which, all things being equal, will demand more watts than usual from the partnering amplifier. However, the Silver-1's impedance modulus (fig.1, solid trace) remains high over almost the entire audioband, with a minimum value of 5.4 ohms at 284Hz. And although the electrical phase angle (fig.1, dotted trace) reaches  $\pm 45^\circ$ , this occurs only when the impedance is high, meaning that the Silver-1 will not demand much current from the amplifier. It should work well with tube designs.

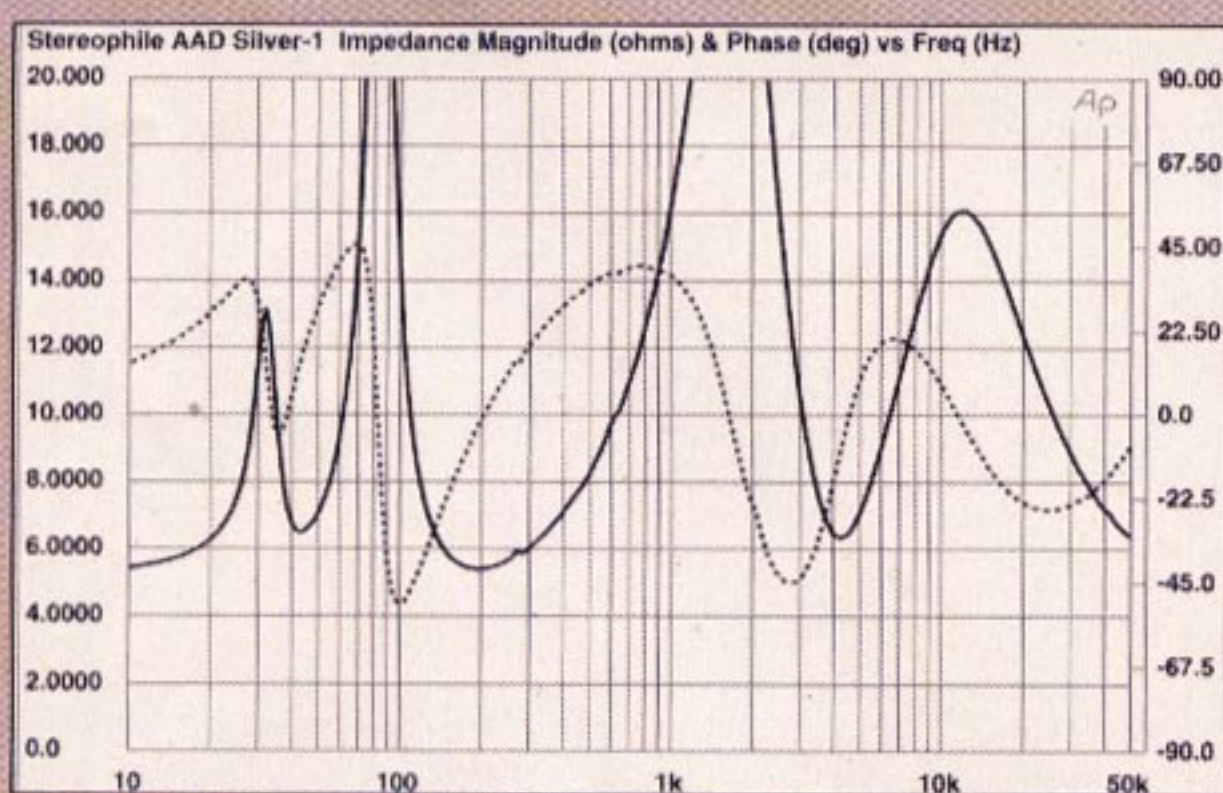


Fig.1 AAD Reference Silver-1, electrical impedance (solid) and phase (dashed). (2 ohms/vertical div.)

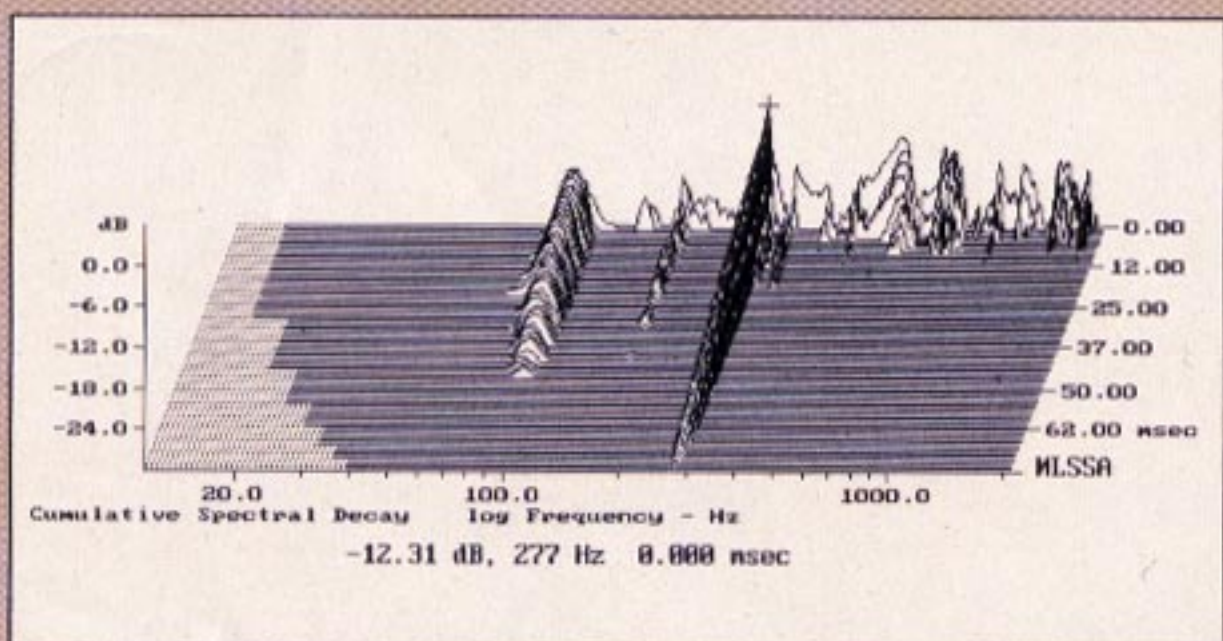


Fig.2 AAD Reference Silver-1, cumulative spectral-decay plot calculated from the output of an accelerometer fastened to the center of the cabinet's side panel (MLS driving voltage to speaker, 7.55V; measurement bandwidth, 2kHz).

There is a glitch in the impedance traces at 280Hz, and investigating the cabinet panels' vibrational behavior with a simple accelerometer did reveal, on all surfaces, a resonant mode at this frequency (fig.2). This mode was strongest on the top panel, but the limited radiating area of this surface will work against audibility. Though impossible to see at the scale fig.1 is printed, there is a hint of a discontinuity in the impedance traces around 700Hz—but there are no panel resonances present at that frequency.

However, there is a strong, high-Q resonance present at that frequency in the port's output, as well as a milder mode just above 400Hz (fig.3, left-hand trace). The fact that the port faces away from the listener will reduce any audible effects of these resonances. While I wondered if the existence of the higher-frequency mode correlated with the occasional confusion I noticed in the midrange, I could hear this resonance only if I hit it with a signal more or less at its exact frequency, and then only if I crouched down behind the speaker. The audible congestion probably has more to do with the behavior of the cabinet around Middle C.

Lower in frequency, the peak in the port's response is slightly offset from the minimum-motion notch in the woofer's nearfield response, which coincides with the saddle centered on 42Hz in the fig.1 impedance-magnitude trace. Fig.3 reveals that the crossover between the woofer

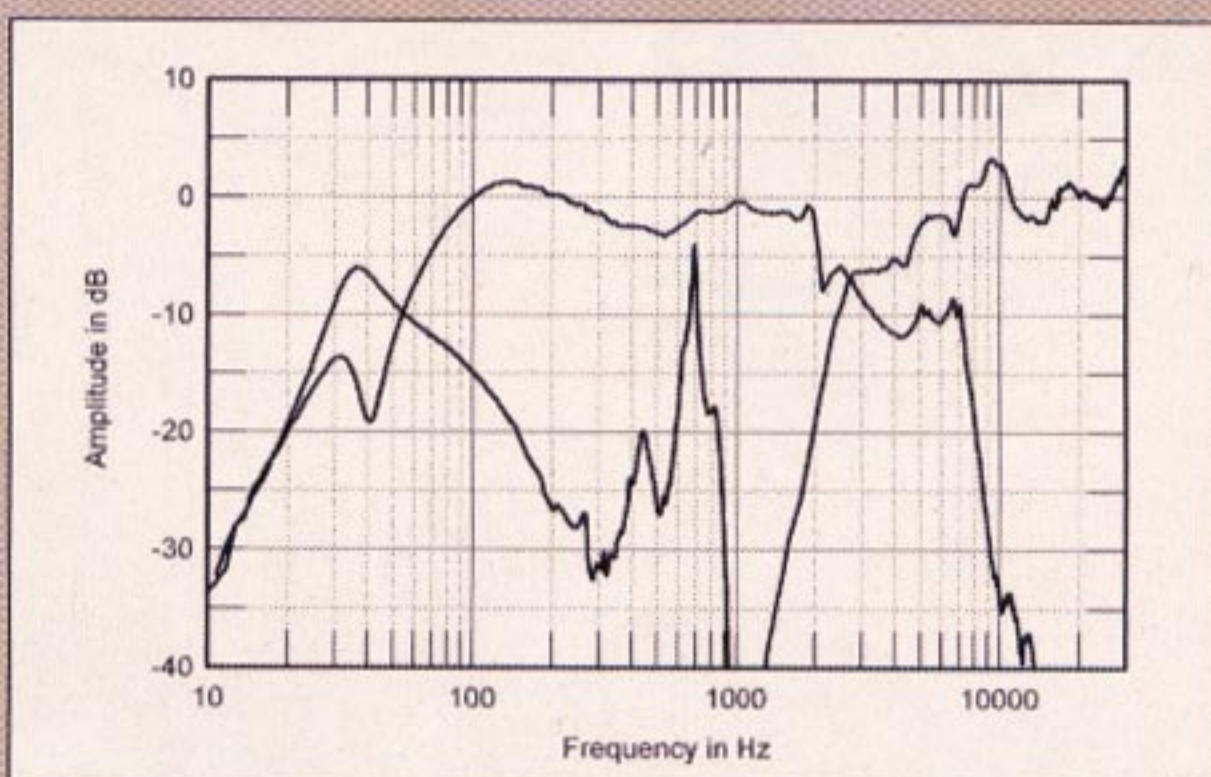


Fig.3 AAD Reference Silver-1, acoustic crossover on tweeter axis at 50", corrected for microphone response, with the nearfield responses of the port and woofer plotted below 900Hz and 300Hz, respectively.



Transparent Cable, soldered to the drive-unit terminals, and the crossover is mounted on a printed circuit board on the inside of the terminal panel. The electrical slopes, according to measurements sent me by Phil Jones, appear to be second-order low-pass to the woofer, third-order high-pass to the tweeter.

### Sound

I set up the Silver-1s on my usual 24" Celestion stands, their central pillars filled with a mix of dry sand and lead shot; small pads of Blu-Tack separated the bases of the speakers from the steel

top plates. This put the AAD's tweeters at my ear level; listening to pink noise, I found the midrange and treble balance was smooth if I listened on this axis or just above. Slouching in my chair, as I am wont to do at the end of a hard day's magazine editing, introduced a slight hollowness. After some experimentation, the speakers, on stands, ended up in exactly the same positions the PSBs had been—about 6' in front of the wall behind them—but a touch closer to the sidewalls than the LS3/5a's and Harbeths.

What disc to play first? I reached for a new purchase, the late Lorraine Hunt

Lieberson singing Mahler's *Rückert Lieder*, accompanied by Roger Vignoles on piano, and recorded by the BBC live in 1998 at London's Wigmore Hall (CD, Wigmore Hall Live WHLive0013). The Silver-1's presentation of her voice was magic with delicacy and air. The piano might have sounded a tad boxy, though this may well be true of the sound in the hall, which I used to attend regularly before I moved to the US. At the extreme levels Ms. Lieberson was capable of there was no sense of strain, though a touch of extra sibilance did creep in.

Time to put on a more familiar record-

and tweeter occurs just below 3kHz, but also that there is a discontinuity in the woofer's output at the top of its passband. The crossover's ultimate acoustic rollout slopes are steep, with the tweeter's output down by more than 40dB at 1kHz. The tweeter's on-axis output rises gently throughout its passband, and is still strong at the 30kHz upper limit of this graph.

A similar circular flat-diaphragm tweeter, but without the horn loading, is used by Seattle-based Genesis. When I reviewed Genesis's 5.2 floorstander in February 2006, I found that the tweeter suffered from subharmonic distortion at the bottom of its passband; *ie*, it produced lower-frequency tones half the frequency of the fundamental. Listening to pure tones, I didn't find that the AAD tweeter behaved in this manner. The combination of the fast crossover slope, the crossover frequency, and the increase in sensitivity gained from the horn-loading must keep the tweeter diaphragm out of trouble.

Fig.4 shows how these individual responses add up in the farfield, averaged across a 30° horizontal window on the tweeter axis. The slightly overdamped bass alignment results in an output that shelves down slightly between 40 and 100Hz, while the bump in the upper bass is entirely due to the nearfield measurement technique. The upper frequencies are superbly flat, broken only by

a narrow notch at the top of the woofer's passband, and small peaks at 5 and 10kHz. Even with the tweeter's limited dispersion above 20kHz, there is still full-level energy evident at 30kHz.

The Silver-1's horizontal radiation pattern (fig.5) is wide and even below 10kHz, with the on-axis notch just below 2kHz filling in to the speaker's sides. In the vertical plane (fig.6), suckouts in the crossover region develop not much above or below the tweeter axis, indicating that any stands with which the speaker is used be high enough to place the listener's ears level with the tweeter. In-room, the AAD's ½-octave, spatially averaged response at the lis-

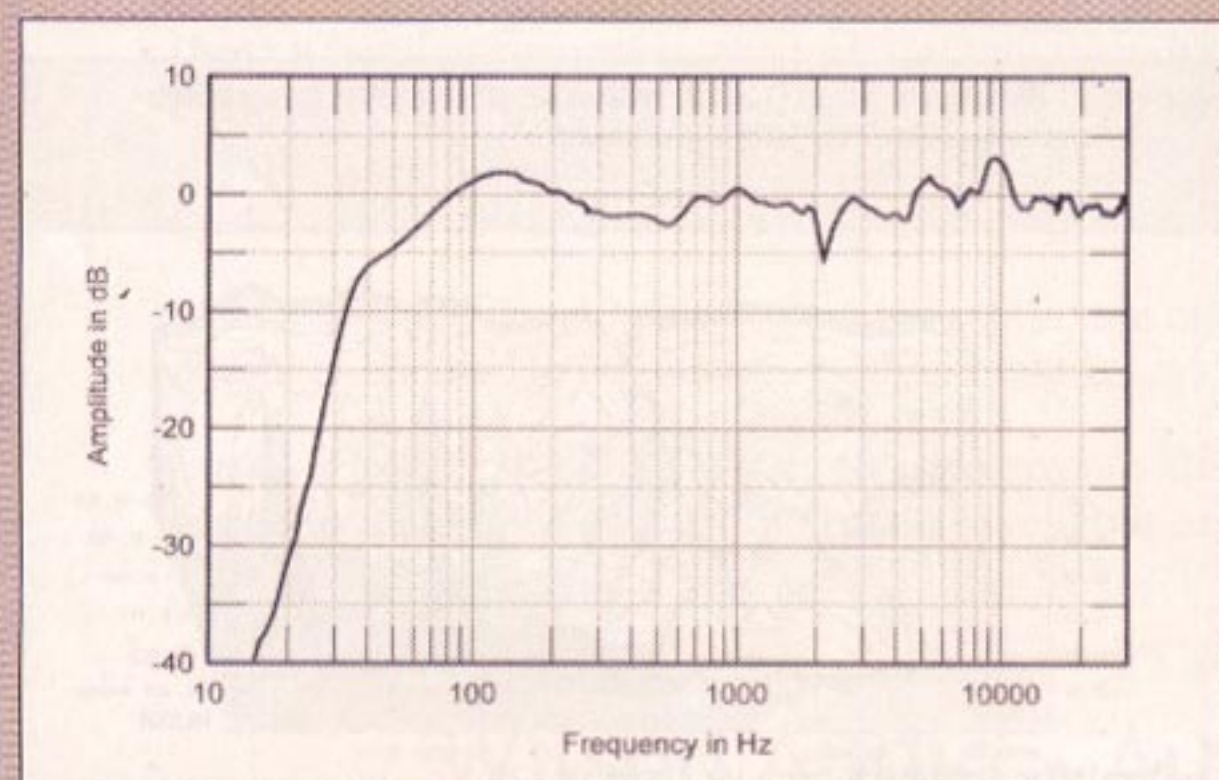


Fig.4 AAD Reference Silver-1, anechoic response on tweeter axis at 50", averaged across 30° horizontal window and corrected for microphone response, with the complex sum of the nearfield responses plotted below 300Hz.

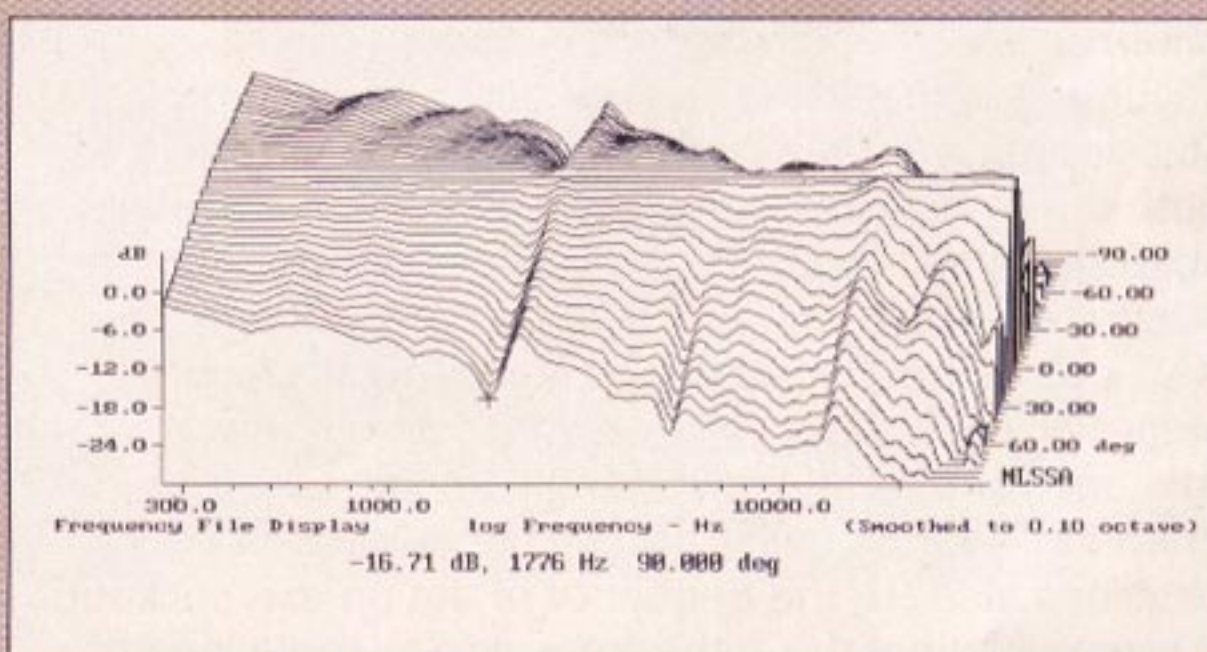


Fig.5 AAD Reference Silver-1, lateral response family at 50", normalized to response on tweeter axis, from back to front: differences in response 90-5° off axis, reference response, differences in response 5-90° off axis.

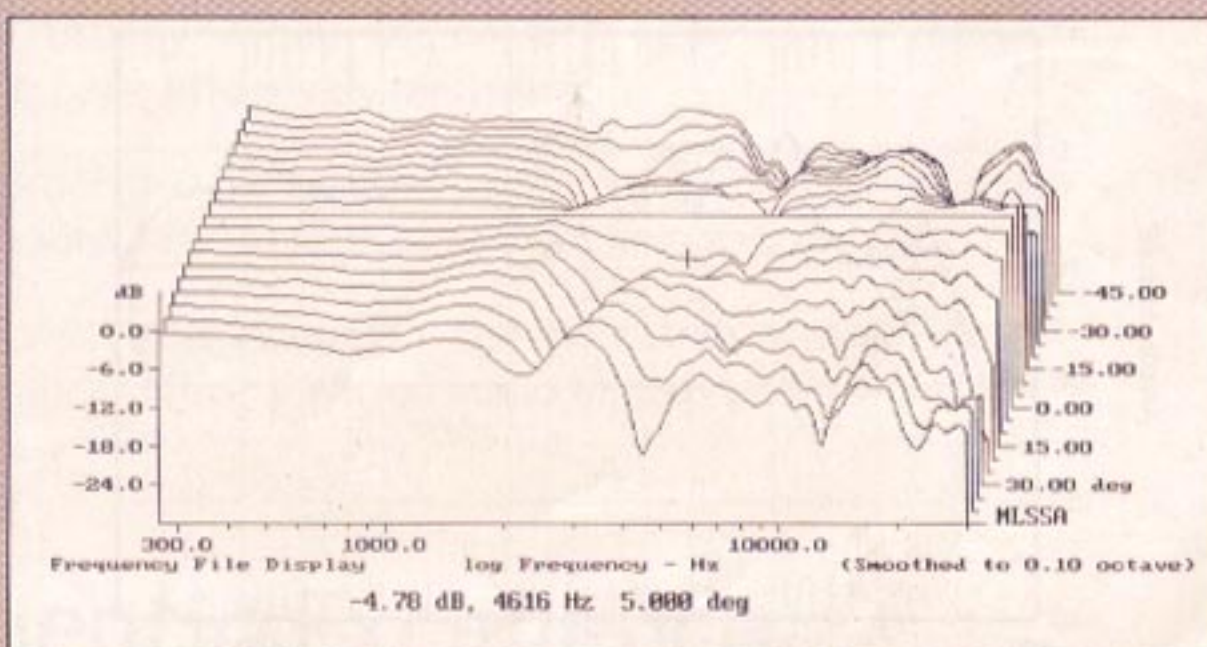


Fig.6 AAD Reference Silver-1, vertical response family at 50", normalized to response on tweeter axis, from back to front: differences in response 45-5° above axis, reference response, differences in response 5-45° below axis.



ing. On *There Lies the Home*, from Minnesotan male-voice choir Cantus, which I recorded in 2005 (CD, Cantus CTS-1206), the Silver-1 sounded superbly clean and uncolored in the upper mid-range. On that masterpiece of orchestral scoring, Benjamin Britten's *The Young Person's Guide to the Orchestra* (SACD, Telarc SACD-60660), the distinctions between the tonal colors of the diverse instruments were superbly delineated.

The AAD speaker also did well with naturally recorded piano. Mark Neikrug's Steinway, in Mozart's concerto-like Piano Quartet in g, K.478, on *Bravo!* (CD, Stereophile STPH014-2), was reproduced with a delicacy to the attack of the notes that was true to my memory of the sound of the live instrument when I made the recording. This is one fine tweeter! The speakers placed me unambiguously in the performing space with Robert Silverman's Steinway on his, for me, landmark reading of Beethoven's

*Diabelli Variations* (CD, Stereophile STPH017-2), with the left-hand register reproduced with sufficient weight.

But after a while, I couldn't help noticing a touch of color in the lower mid-range, some occasional congestion. This was very music-dependent. Bass guitar, such as the channel-identification tracks on Stereophile's *Test CD 2* (STPH004-2), acquired a bit of a hoot that tended to obscure the body of the instrument's tone, while bass voices on my recordings of Cantus were somewhat thickened. When I listened to the cabinet surfaces with a stethoscope while the speakers played the half-step-spaced tonebursts on my *Editor's Choice* CD (Stereophile STPH016-2), the cabinet was very lively in the region of Middle C (262Hz). This resonant hoot was also excited by notes an octave lower, adding a touch of mud to the Silver-1's ability to speak cleanly in this region.

It is unrealistic to expect thunderous

low frequencies from such a small speaker with only a 5" woofer. Even so, I was surprised to find that, at my normal listening level, the bass extended at close to full level down to the 40Hz,  $\frac{1}{3}$ -octave band on *Editor's Choice*, and that the 32Hz band was still well audible, thanks to the help from my room's fundamental diagonal resonant mode. From 40Hz down, however, some wind noise could be heard coming from the port, despite the radius of its exterior opening. (The inner opening isn't radiused, and there is a fine mesh screen about 2" inside from the opening.)

As well as having acceptably good low-frequency extension for a mini, the Silver-1's bass control was excellent. I had the Silver-1s in-house while I was mixing and mastering Attention Screen's *Live at Merkin Hall* (CD, Stereophile STPH018-2). As well as using a distant pair of spaced Earthworks omnis for the band as whole, I had recorded Mark

## measurements, continued

tening position (fig.7) is broken by some residual room effects in the lower midrange and bass. There is also a slight lack of presence-region energy and an excess around 10kHz—the same frequency as the larger of the on-axis peaks—but the balance is smooth overall.

Turning to the Silver-1's time-domain performance, its step response on the tweeter axis (fig.8) indicates that both drive-units are connected with the same positive acoustic polarity, with the individual outputs smoothly integrated, suggesting excellent crossover design. The AAD's cumulative spectral-decay plot (fig.9) demonstrates a very clean initial decay throughout the midrange and treble, correlating with the speaker's grain-free sound quality, but a ridge of delayed energy develops at 2kHz, the frequency of the on-axis suckout. It is possible that this behavior is due to some kind of interaction between the cone and its surround. There is also some low-level hash evident in the mid-treble,

perhaps the result of some woofer cone modes that are not totally suppressed by the crossover's low-pass filter.

—John Atkinson

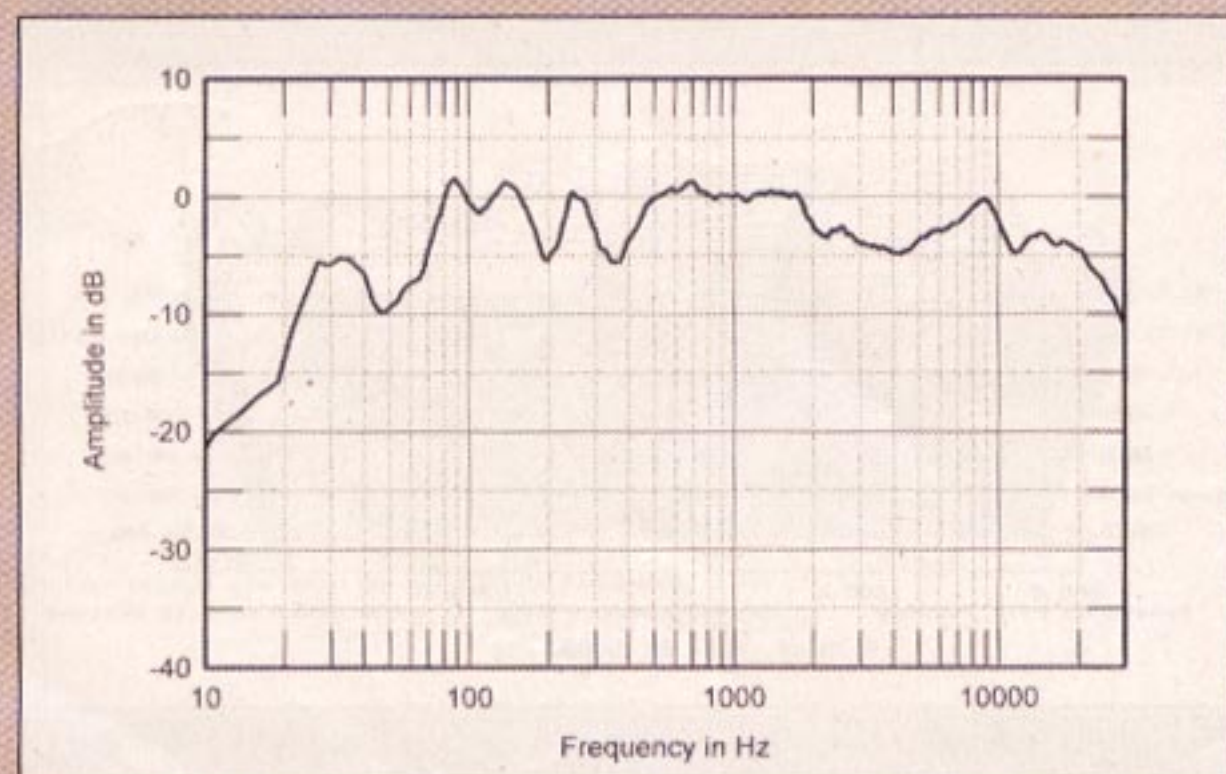


Fig.7 AAD Reference Silver-1, spatially averaged,  $\frac{1}{3}$ -octave response in JA's listening room.

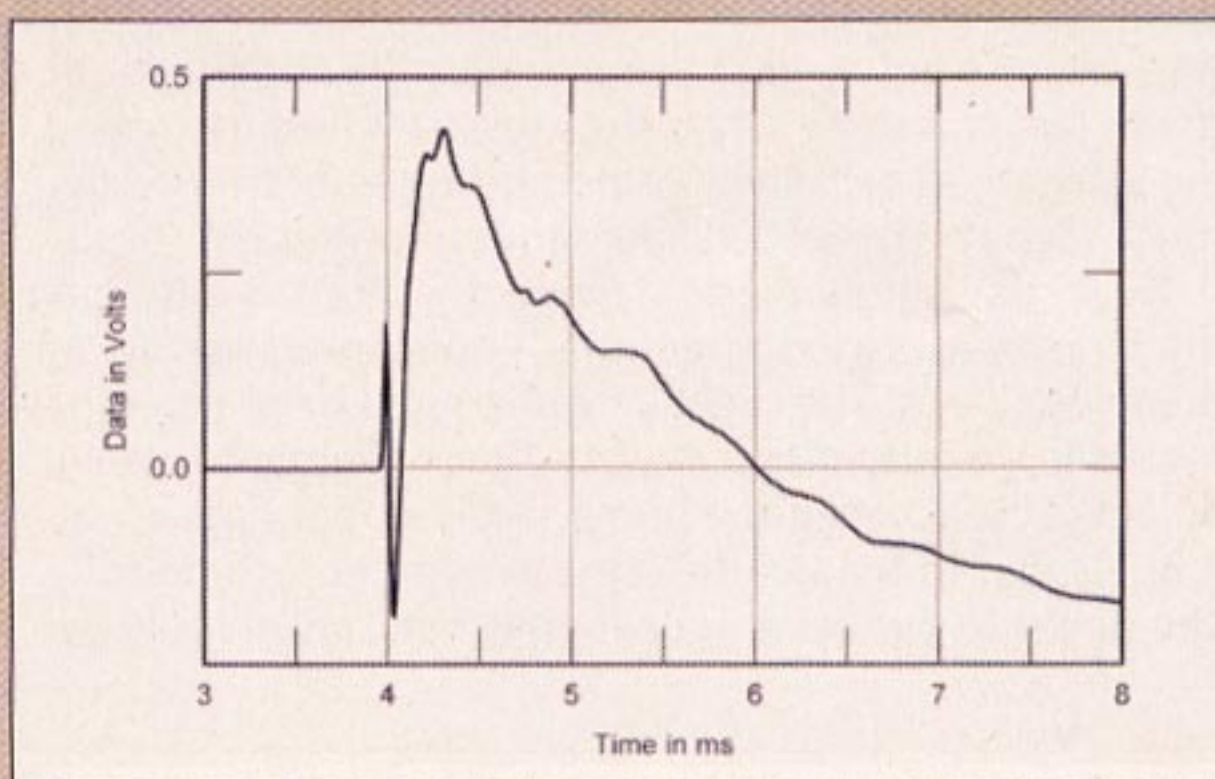


Fig.8 AAD Reference Silver-1, step response on tweeter axis at 50" (5ms time window, 30kHz bandwidth).

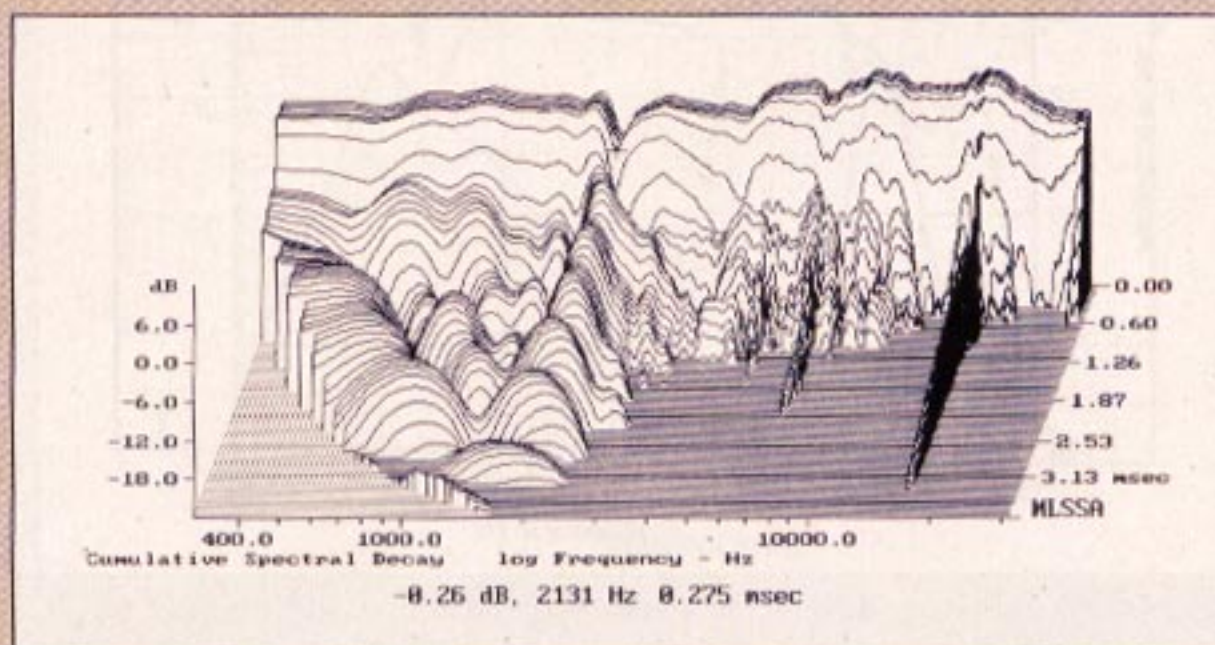


Fig.9 AAD Reference Silver-1, cumulative spectral-decay plot at 50" (0.15ms risetime).



Flynn's Gretsch drums with four microphones: an overhead pair of cardioids, and close mikes on the snare and kick drums. In the mix, I was trying to marry the body and weight of the close-miked output with the in-room sound from the distant mikes. With their leading-edge clarity, the Silver-1s proved an excellent tool for letting me hear the differences that slight changes in the mix made to the character of the kick drum. And that clean, delicate treble was delightfully true to the sound of Mark's cymbals.

Turning to orchestral music, I played Otto Klemperer's 1961 recording of Beethoven's Symphony 3, "Eroica," with the Philharmonia Orchestra (CD, EMI CDC 7 47186 2). The double basses lacked a little grunt in the monumental fugue in the *Marcia funebre: Adagio assai*—this is one of the few recorded performances not to play this fugue too fast, so that it has the necessary funereal tempo—but the refreshing clarity of the midrange and the delicacy of the Silver-1's overall presentation were addictive. The balance was rather forward, however, and, as with the Mozart piano quartet, there was some emphasis of tape hiss and violin rosin noise.

Was the forwardness a symptom of the port resonance I discuss in the "Measurements" sidebar? Jumping forward 44 years, I put Smetana's *Má Vlast* in the Ayre player, with the London Symphony Orchestra conducted by Sir Colin Davis (SACD, LSO Live LSO0516). Despite being recorded in London's Barbican, possibly my least favorite performing space, the modern recorded sound was more distant, less forced than the Klemperer Beethoven, suggesting that the port resonance was not at fault. But the relatively lightweight lows of this recording left the violins sounding more shrill through the Silver-1s than I would have liked. Even so, the bass-drum rolls at the end of *Vltava* had good weight, and the clarity given by the speakers to the leading edges of the timpani notes and the harp solo that begin the work's first movement, *Vysehrad*, provided much to thrill at. On Telarc's more naturally recorded disc of English orchestral works, with Paavo Järvi conducting the Cincinnati Symphony (SACD, Telarc SACD-60660), the AAD's low frequencies were high enough in level and sufficiently extended to balance its silky highs.

But what this 2006 recording emphasized was the stability and dimensionality of the stereo image thrown by the Silver-1s. In Britten's

*The Young Person's Guide to the Orchestra*, each instrumental choir was anchored solidly in space, each solo instrument no bigger than it should have been, and set back the appropriate distance from the listener. The AAD Silver-1s proved excellent tools for allowing me to hear into the recorded balance.

by my taking a direct feed from the instrument's amplifier, there was also a phantom central image formed by the left-hand piano mike and the right-hand drum overhead mike, and a second phantom image slightly to the right of center produced by the distant spaced omnis. The AADs let me hear unambiguously

## AT \$1550/PAIR, THE REFERENCE SILVER-1 **COSTS LESS** THAN YOU'D EXPECT FOR A SPEAKER OF THIS **SONIC QUALITY AND APPEARANCE.**

I mentioned earlier that I used the Silver-1s to mix Attention Screen's *Live at Merkin Hall*. Although I mainly used close mikes to record the band, there was a considerable amount of leakage, meaning that, while mixing, I had to ensure that the multiple images of each instrument reinforced rather than worked against each other. For example, as well as the mono image of the bass guitar produced

the quality of the three different images, so I could arrange the levels and stereo panning of each to produce a satisfyingly three-dimensional bass-guitar image. The same was true for the piano, the guitar, and, as mentioned earlier, the drums.

Again, there was a satisfyingly solid quality to the Silver-1s' stereo imaging. Was it accurate? I do wonder if the effect of the lower-midrange cabinet behavior was not to add congestion, but to add a degree of overhang that reinforced the effect of recorded ambience. But in the end, it is whether the listener likes what the speaker does that matters. When I played the final 24-bit/88.2kHz mixes of *Live at Merkin Hall* through the Reference Silver-1s to Attention Screen's Bob Reina and Don Fiorino before sending the master files to JVC for the CD to be pressed, they seemed very satisfied, not just with the mixes (*Phew!*), but also with the speakers' presentation.

### Summing up

I very much enjoyed my time with AAD's Reference Silver-1. I certainly didn't miss the low-bass range much, given how clean and uncolored were the mid- and upper bass, and the overall delicacy of the speaker's treble was a continuing delight. Its stereo imaging, too, is simply superb, and it reproduces the human voice in a lovingly natural, sympathetic manner. Its faults—that touch of midrange congestion and the slight excess of energy at the bottom of the top octave—are relatively minor. And from my own experience using the review samples while I worked on my own recordings, I imagine that this speaker would make an excellent nearfield monitor for mixing and mastering.

At \$1550/pair, the Reference Silver-1 costs less than you'd expect for a speaker of this sonic quality and appearance. Nice one, Phil!

—John Atkinson

### ASSOCIATED EQUIPMENT

**DIGITAL SOURCES** Ayre C-5xe universal player; Mark Levinson No.30.6, Benchmark DAC 1 D/A processors; Slim Devices Squeezebox WiFi music player with Apple Mac mini running OSX for media storage.

**PREAMPLIFIERS** Mark Levinson No.326S, Ayre K-5xe.

**POWER AMPLIFIERS** Mark Levinson No.33H monoblocks.

**LOUDSPEAKERS** PSB Alpha B1, Stirling LS3/5a V2, Harbeth HL-P3ES2.

**CABLES** Digital: Kimber Illuminations Orchid AES/EBU, AudioQuest OptiLink-5 S/PDIF. Interconnect (balanced): AudioQuest Cheetah, Ayre Signature Series, Crystalconnect. Speaker: AudioQuest Kilimanjaro. AC: PS Audio Lab, Shunyata Research Anaconda Helix Alpha, manufacturers' own.

**ACCESSORIES** Target TT-5 equipment racks; Ayre Myrtle Blocks; ASC Tube Traps, RPG Abffusor panels; PS Audio Power Plant 300 at 90Hz (sources only), Audio Power Industries 116 Mk.II & PE-1, APC S-15 AC line conditioners (not power amps). AC power comes from two dedicated 20A circuits, each just 6' from the breaker box, a Mark Levinson No.33H plugged into each.