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Atlantic Technology AT-1

LOUDSPEAKER

ERICK LICHTE

DESCRIPTION Two-way, floorstanding loudspeaker with H-PAS woofer loading. Drive-units: 1.1" (28mm) silk-dome tweeter, two 5.25" (135mm) graphite-loaded homopolymer-cone (GLH) woofers. Crossover frequency: 2kHz. Crossover type: parallel, second-order low-pass, third-order high-pass. Frequency response: 29Hz–20kHz, ±2dB. Nominal impedance: 6 ohms. Sensitivity: 89dB. Recommended amplification: 20–200W RMS.
DIMENSIONS 8.85" (227mm) W by 42" (1077mm) H by 13.6" (348mm) D (including grilles and feet). Weight: 54 lbs (24.5kg).
FINISH Gloss black.
SERIAL NUMBERS OF UNITS REVIEWED AT1GIN26050388.
PRICE $2499/pair. Approximate number of dealers: 103.
MANUFACTURER Atlantic Technology, 343 Vanderbilt Avenue, Norwood, MA 02062.
Tel: (781) 762-6300.
Fax: (781) 762-6868.
Web: www.atlantictechnology.com.

John Atkinson nudged my ribs with an elbow. "Did you bring your Cornelius CD with you?" he whispered.

It was the 2010 Consumer Electronics Show, and JA and I were nearing the end of a dog-and-pony act expertly presented by Atlantic Technology's president, Peter Triberman, touting a prototype of his company's new loudspeaker, the AT-1. JA and I had just heard about the finer points of the AT-1's new bass-venting technology, the Hybrid-Pressure Acceleration System (H-PAS), which was supposed to combine all the benefits and qualities of a transmission-line enclosure, horn loading, and sealed *and* ported designs. At the time, I didn't care if it combined all of the qualities of Kim Kardashian, Sacagawea, Joan of Arc, and Marie Curie—I was just thrilled that the AT-1s were sounding so good in a partitioned ballroom.

Another elbow to the ribs: "I want to hear those kick drums from 'Fit Song' on this system," JA muttered.

To avoid more bruising to my midsection, I politely raised my hand, asked if we could hear a track from my CD, and was kindly obliged. Tribeman even handed me the remote control. I turned the system up to levels you're not really supposed to reach at a hi-fi show.

The room went quiet as the unassuming black towers of the AT-1s took on "Fit Song." Each kick-drum sample hit the assembled crowd in the gut with a speed and a weight I hadn't heard in that entire CES. Jaws dropped all over the room, at the sound of the AT-1s and at how frickin' awesome this music is. At the song's abrupt end, the listeners almost applauded. When Tribeman told us that we were listening to a speaker that would cost somewhere between $2000 and $3000/pair, I knew I had to get review samples as soon as the model was put into production.

H-PAS

The technology inside the AT-1's H-PAS enclosure isn't new, but its application is. I asked Peter Tribeman about the enclosure's pedigree and development:

"H-PAS is based upon earlier work originally introduced by acoustician Philip Clements. In those days Phil was looking for ways to acoustically eliminate some distortion byproducts for his newly developed vented speaker designs. He discovered by accident that as he adjusted the relative lengths and angles of his internal chambers with small changes, the bass extension and intensity of the low-frequency output from the vent was dramatically improved. Phil realized at that point that he could achieve incredible bass response with high efficiency and low distortion in 'normal'-size speaker cabinets. By trial and error and constant experiments, Phil made up the rules of this newly discovered technology. Three decades later, we approached Phil with some proposals as to how to make some of those designs in a much smaller footprint. Both Atlantic and Phil brought computers, mathematicians, and sophisticated algorithms to the table to apply up-to-date science to solve the mysteries of his early work in speaker fluid dynamics. From this collaborative effort came what is now known as H-PAS, and our first product with this technology, the AT-1."

The AT-1 looks like a typical two-way, floorstanding speaker with a 1.1" silk-dome tweeter nestled between two 5.25" woofers with graphite-loaded homopolymer cones. Inside, however, things look a bit unusual. Glance at the cutaway diagram provided by Atlantic Technology

MEASUREMENTS

I used DRA Labs' MLSSA system and a calibrated DPA 4006 microphone to measure the Atlantic Technology AT-1's behavior in the farfield. For the nearfield measurements, I used an Earthworks QTC-40 microphone. The AT-1's voltage sensitivity is specified as 89dB. My estimate was actually a little higher than that, at 90dB(B)/2.83V/m. However, the AT-1 draws 2W from the amplifier at this voltage level rather than the expected 1W, its impedance (fig.1) averaging 4 ohms rather than the specified 6 ohms. The value of the AT-1's impedance in the treble depends on the setting of its rear-panel Tone switch. The highest impedance between 2 and 20kHz is with the switch in the "–" position, the lowest with it in the "+" position. Though the electrical phase angle is generally low, the impedance drops to 1.6 ohms above the audioband, and there is a minimum value of 3.3 ohms at 200Hz. A good amplifier rated at 4 ohms will work best with this speaker.

The traces in fig.1 are free from the wrinkles that would indicate the presence of enclosure panel resonances. However, I did find several strong modes. Fig.2, for example, is a cumulative spectral-decay plot calculated from the output of a plastic-tape accelerometer fastened to the center of one of the sidewalls, 10" from the speaker's base; a single strong mode can be seen at 246Hz. However, this mode was present over only a small area. It disappeared when the accelerometer was placed on the same sidewall level with the tweeter, replaced by a slightly stronger mode at 324Hz. The rear panel had a strong resonance at 281Hz. Fortunately, however, I could find no resonances on the front baffle, which directly faces the listener, and any resonances produced by which would have the most effect on the sound. EL did note that he couldn't hear any cabinet-derived coloration.

In his review, Erick Lichte discusses Atlantic Technology's H-PAS loading, and you can see from the exploded diagram of the AT-1 that the vent at the foot of the front baffle is not so much a reflex port as the end of a folded transmission line. Even so, the AT-1's impedance plot has the double-humped low-frequency behavior typical of a reflex design tuned to 40Hz, though the third small peak in fig.1, at

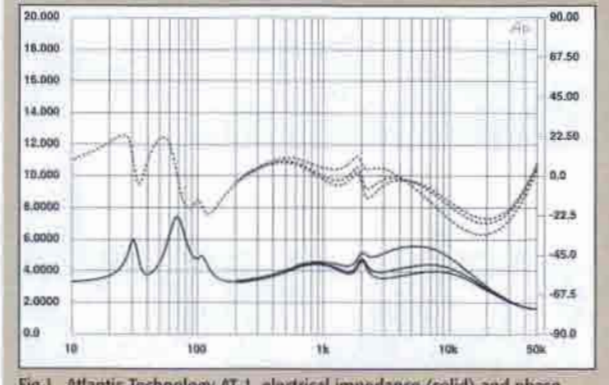

Fig.1 Atlantic Technology AT-1, electrical impedance (solid) and phase (dashed) with Tone switch set to (from top to bottom at 5kHz): "+," "0," "–" (2 ohms/vertical div.).

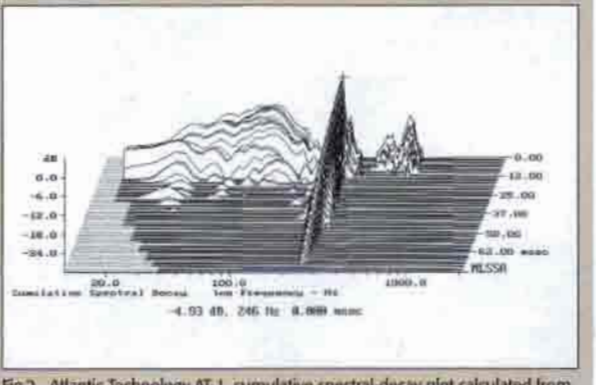

Fig.2 Atlantic Technology AT-1, cumulative spectral-decay plot calculated from output of accelerometer fastened to center of side panel, 10" from base (MLS driving voltage to speaker, 7.55V; measurement bandwidth, 2kHz).

and you get the impression that the AT-1 looks essentially like a modified transmission-line design. But according to Steve Feinstein, Atlantic's director of marketing and product development, that appearance is misleading:

"Because of the way the internal chambers work, the AT-1 really combines the essential operational characteristics of four different speaker technologies into one product: The top chamber exerts the driver control on the woofers' cones like a sealed design; the long, multi-segment internal chamber, which becomes narrower and narrower, is like an inverted horn, increasing sensitivity; the internal 'bass trap' portion, which literally 'peels off' the bass wave's harmonic-distortion products (based on that chamber and its opening's dimensional relationship to the harmonic frequencies in the bass region), is transmission line-like in its effect; and, finally, the vent opening, which acts like a horn (because of the internal wave-compressing 'plates' that are employed at that point) and also like a reflex vent. We're getting the benefits of all four types."

A benefit of the H-PAS topology is that it allows the designer to use smaller, quicker woofers without sacrificing low-bass extension. The AT-1's –3dB bass-rolloff point is specified at a low 29Hz—pretty darned good for a pair of 5.25" cones. The speaker also boasts a sensitivity of 89dB, which is nearly unheard of for small drivers capable of such low bass.

The AT-1's woofers are crossed over to its 1.1" silk-dome tweeter at 2kHz, the tweeter seeing a third-order slope and the woofer a second-order handoff. While many two-way designs cross over at higher frequencies, the AT-1's 2kHz crossover ensures a more even dispersion pattern at the top of the woofers' passband and better integration with the tweeter. However, the lower the crossover frequency, the more energy a small tweeter is asked to produce, and the

measurements, continued

105Hz, suggests that something more complicated is going on. With a conventional reflex speaker, the woofer and port step responses occur simultaneously but are in opposite polarity to one another. With the AT-1, however, you can see (in fig.3) that while the port's step (red trace) is in opposite polarity to that of the woofers (blue), it is delayed by the length of the line, and emerges approximately 4 milliseconds after the woofers' step, to blend smoothly with the latters' decay.

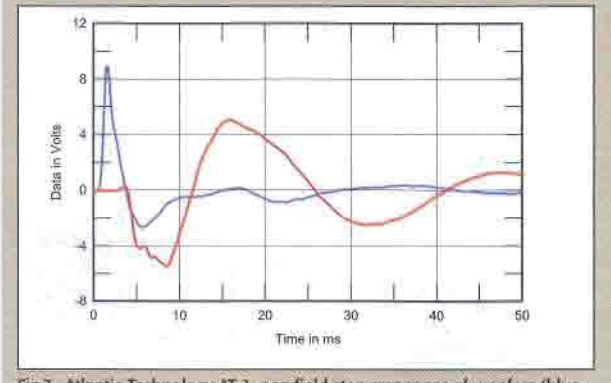

Fig.3 Atlantic Technology AT-1, nearfield step responses of woofers (blue trace) and port (red). (50ms time window, 1kHz bandwidth)

Nevertheless, the nearfield frequency response of the woofers (fig.4, blue trace) does have the minimum-motion notch at the port tuning frequency that is typical of a reflex design, and the vent's output (red) does peak in the same region. The vent's upper-frequency range is more extended than with a classic reflex design, however. There is also some low-level liveliness evident in the midrange, with a small peak on the outputs of both vent and woofers at 324Hz—the same frequency as one of the side-panel resonances noted earlier.

Higher in frequency in fig.4, the woofers' farfield response is very even and is crossed over to the tweeter a little higher than the specified 2kHz. The rolloff is steep, and though a resonant peak is visible at 18kHz, this is well suppressed by the crossover. The tweeter's farfield output with the Tone switch set to its central position (green trace) is impressively flat, and extends at full level to the 30kHz limit of this graph.

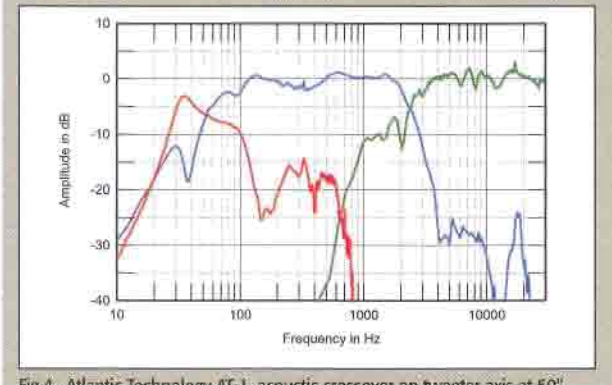

Fig.4 Atlantic Technology AT-1, acoustic crossover on tweeter axis at 50", corrected for microphone response, with nearfield woofer (blue trace) and port (red) responses plotted below 350 and 825Hz, respectively.

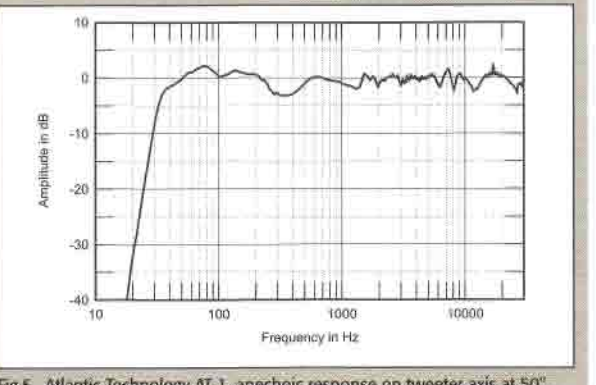

Fig.5 Atlantic Technology AT-1, anechoic response on tweeter axis at 50", averaged across 30° horizontal window and corrected for microphone response, with complex sum of nearfield woofer and port responses plotted below 300Hz.

greater chance it has of overheating or running out of excursion capability.

To address these problems, Atlantic has modified the AT-1's tweeter in some important ways. Steve Feinstein: "The tweeter's diaphragm breathes into a rear chamber. This lowers the tweeter's resonance from around 1800Hz to about 900Hz. Next, the entire rear chamber is made from drawn aluminum, which acts as one huge heatsink with lots of surface area, to cool the tweeter really well. Finally, the tweeter's surround is a full 4mm [wide], which is akin to a small woofer having one of those really big surrounds. It lets the tweeter have good, long excursion for low distortion, with no danger of mechanical mishap." The tweeter is also connected to a three-way switch on the rear of the AT-1 that controls its output level through a simple resistive network. The "+" position raises the tweeter's entire range of operation (2–20kHz) 1.8dB from the center position; the "–" switch lowers it by 1.5dB.

The recessed terminal panel proved difficult for reviewers with really fat fingers.

Though designed in the US, the AT-1 is manufactured in China. It seems to be finished in high-gloss piano-black lacquer, but a closer look reveals, under multiple applications of clear coat, a layer of metallic flake. It's quite pretty. The speaker sits on four aluminum feet that widen its stance and stability and permit the use of floor spikes. The buyer must install the pane of smoked glass that fits into an inset in the speaker's top panel. Though this looked fine, I'm no fan of letting a loose piece of glass rest atop a speaker even though there are rubber damping pads. Other than that, the fit, finish, and build quality of the AT-1 were excellent, and at a level far beyond its modest price.

An open letter to all loudspeaker manufacturers

Dear Sirs/Madams:

It has come to my attention in recent years that many of you (this includes you, Atlantic Technology) think it superswell to put cable binding posts in recessed boxes

measurements, *continued*

Fig.5 shows how these individual outputs sum in the farfield, averaged across a 30° horizontal window centered on the tweeter axis. The AT-1's upper-frequency response is superbly flat. At lower frequencies, while the summed nearfield response extends almost to 30Hz, –6dB, there is not quite as large an upper-bass boost as I was expecting from the nearfield measurement technique, which implies that the AT-1's lows are a little overdamped. But the benefit of this is that, as EL found, the AT-1's low frequencies are "not only deep and powerful, but taut and tuneful."

The responses in figs. 4 and 5 were taken without the perforated metal grille. Fig.6 shows the effect of the grille on the farfield tweeter-axis response: It introduces some peaks and dips in the mid- and high treble that render the overall response less flat in these regions. Fig.7 shows the effect of the three-position Tone switch on the rear panel. The "–" position, which shelves the tweeter down by 2.3dB, was how EL preferred the sound; the "+" position shelves it up by 1dB. Both figures are different from the +1.8dB, –1.5dB specification, though the overall range of change is the same: 3.3dB.

The AT-1's lateral dispersion without the grille (fig.8) is wide and even, though with a touch of off-axis flare at the bottom of the tweeter's passband. This may contribute to EL's finding the AT-1's treble to sound "a touch hard in

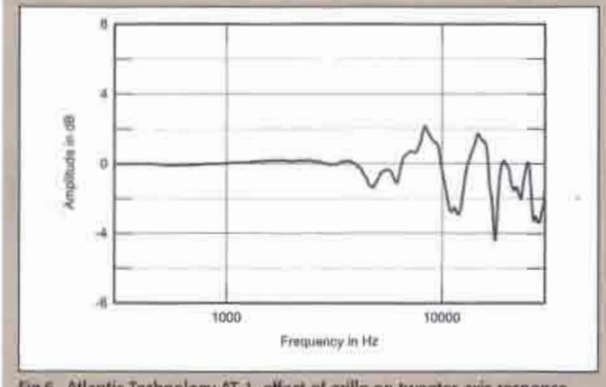

Fig.6 Atlantic Technology AT-1, effect of grille on tweeter-axis response (1dB/vertical div.).

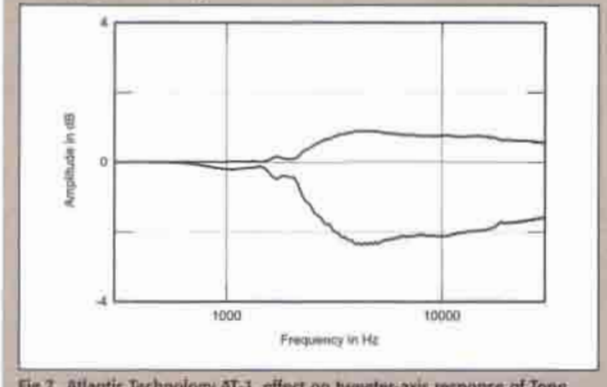

Fig.7 Atlantic Technology AT-1, effect on tweeter-axis response of Tone switch set to "+" and "–" (1dB/vertical div.).

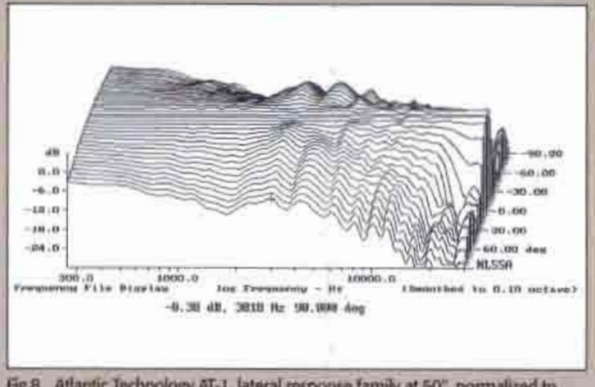

Fig.8 Atlantic Technology AT-1, lateral response family at 50", normalized to response on tweeter axis, from back to front: differences in response 90–5° off axis, reference response, differences in response 5–90° off axis.

and alcoves on your speakers, thereby making it *very* difficult to attach speaker cables terminated in high-quality spades.

I cordially implore you to cease and desist. There is no reason for you to hide your terminals in some nook or cranny. It saves you no money, and makes my life a living hell. (I'm not overstating this.) I know you want me to use good speaker cables, but I can't fit my spades into the Hobbit holes where your speaker terminals live.

I also find this practice of hiding away speaker terminals discriminatory. I was born with a common genetic condition called RFF (Really Fat Fingers): My hands look like an opened package of raw Hillshire Farm bratwurst. I've seen the top specialists in the country, but they tell me there is no known cure for RFF. Currently, I am forced to hire small neighborhood children to tighten down your binding posts for me. Is this what you want? Do you want me to run some sort of suburban audiophile sweatshop out of my listening room? For shame, speaker manufacturers—for shame!

So that *all* may enjoy the serenity of knowing that their cables are properly attached to your speakers, please go back to mounting your binding posts on a flat panel on the rear of the enclosure. It won't cost you any more money, and at last I'll feel like a fulfilled human being.

Hugs and kisses,
Erick Lichte

Setup

Setting up the AT-1s was easy. After giving the speakers a few hundred hours of break-in, I began to dial in their presence in my room. Sitting where my reference Revel Performa F30 speakers usually do, the AT-1s sounded very balanced and neutral. However, I wasn't quite getting the low-bass weight that JA and I had heard at CES. I moved the AT-1s about 4" closer to the front wall.

The AT-1s remained *very* well behaved as I moved them closer to my room's boundaries. Each inch closer brought out more low bass, without the usual thickening and sluggishness of the upper and midbass. I also ended up toeing the speakers out from my ears by 10–15°. This gave me the best soundstaging and treble balance (more on this later) without too much of a sacrifice in midrange neutrality, clarity, or openness. The AT-1s didn't require extreme fussiness in setup, but will easily reward those who take the time to set them up right.

Sound

I was immediately struck by the AT-

the low treble when pushed to realistic concert levels." The tweeter also does get very directional above 12kHz or so, which possibly correlates with EL's finding that the speaker's top octaves sounded a touch airless. The tweeter axis is 34" from the floor with the speaker sitting on its feet, a couple of inches below what we've found to be the ear height of the typical seated listener. The plot of the AT-1's vertical dispersion (fig.9) indicates that the speaker maintains its flat balance over quite a wide (+5°/−10°) window centered on the tweeter axis, but that a suckout in the crossover region develops above that window. As with almost all speakers, don't listen to this one while standing up.

In the time domain, the AT-1's step response on the tweeter axis (fig.10) indicates that all three drive-units are connected with positive acoustic polarity, with the smooth transition between the tweeter's and woofers' steps suggesting optimal crossover design. The cumulative spectral-decay plot (fig.11) is clean overall, but with a slight ridge of delayed energy just below the crossover to the tweeter.

Atlantic Technology's AT-1 offers a superbly flat frequency response with surprisingly extended low frequencies for a pair of 5.25" woofers. But I shared EL's difficulty with the recessed binding posts. —John Atkinson

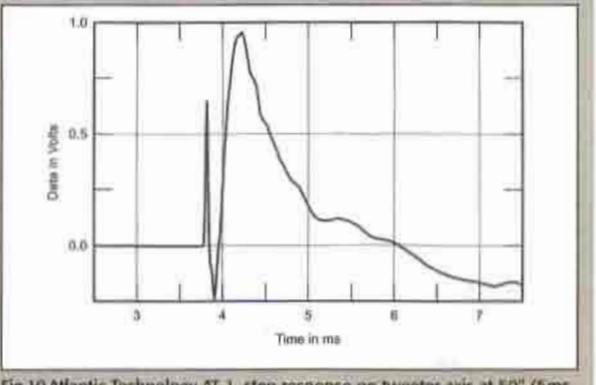

Fig.10 Atlantic Technology AT-1, step response on tweeter axis at 50" (5ms time window, 30kHz bandwidth).

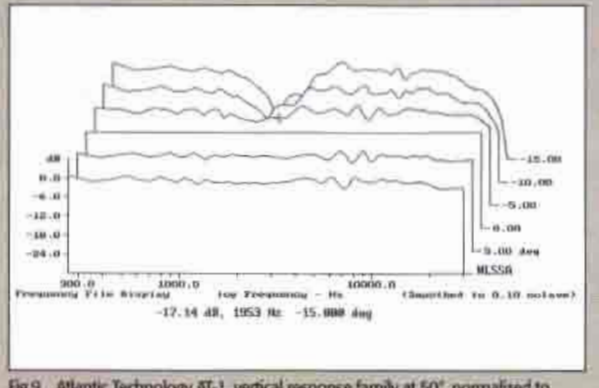

Fig.9 Atlantic Technology AT-1, vertical response family at 50", normalized to response on tweeter axis, from back to front: differences in response 15–5° above axis, reference response, differences in response 5–10° below axis.

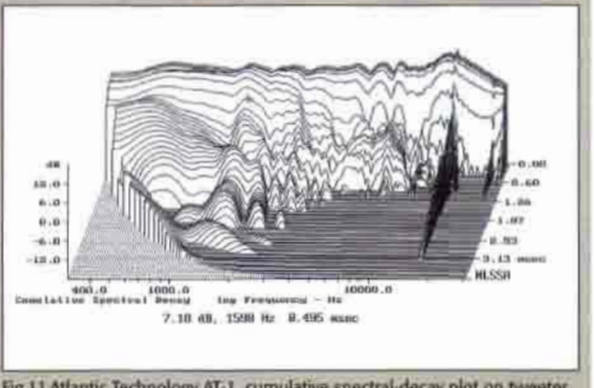

Fig.11 Atlantic Technology AT-1, cumulative spectral-decay plot on tweeter axis at 50" (0.15ms risetime).

1's nice, open midrange: Voices and instruments were presented with full-bodied sound and distinct timbral colors. Through the AT-1s, the Emerson Quartet's recording of J.S. Bach's *The Art of the Fugue* (CD, Deutsche Grammophon B0000908-02) was rendered with each instrument having a generosity of tone that was both gratifying and accurate. The Atlantic's midrange was nicely resolving and revealing, allowing me to follow each voice in these fugues. I also found the handoff from midrange to upper bass seamless, which really helped the body of each instrument's tone meld with the rest of the instrument's overtones.

Voices, too, sounded lovely through the AT-1s. Soprano Carolyn Sampson's fabulous singing in Ēriks Ešenvalds' phenomenal *Passion and Resurrection*, with Stephen Layton conducting Polyphony and the Britten Sinfonia (CD, Hyperion CDA67796), was coherent and colorful. Though the AT-1's midrange wasn't quite as open, revealing, or neutral as that of my Revel Performa F30s, I thought the Atlantic Technology speakers did a bang-up job, especially for their price. They consistently made compelling music.

Sometimes a product is so good that a single slight deficiency seems a bigger deal than it actually is—so forgive me if I unduly pick apart the AT-1's tweeter and treble. First, the tweeter wasn't as airy or as extended as I'm used to hearing from the Revels. Even though I listened to the AT-1 with the grilles off, the top octave sounded a bit dull, which made the AT-1 lose a bit of its otherwise nice resolution in the midrange and bass. This wasn't a huge problem in and of itself—plenty of tweeters sound like this. However, the tweeter also was a touch hard in the low treble when pushed to realistic concert levels. Less-than-stellar-sounding recordings—such as Destroyer's *Kaputt* (CD, Merge MRG369), an intoxicating blend of 1980s yacht rock and stream-of-consciousness musings on America—were even tougher listens than usual through the AT-1s; that low-treble hardness made my listening sessions a touch more fatiguing.

I settled on listening to the AT-1s with their tweeters at the "–" setting, which alleviated some of the hardness and blended better with the midrange, but gave up more top-octave air. When I pushed the AT-1s to higher volumes, that tendency for hardness in the lower treble also flattened out the soundstage in this region, even with such good recordings as Pantha du Prince's *This Bliss* (CD, Dial CD09), lessening the wonderful illusion of space this recording can otherwise convey. To put this all in perspective: The AT-1's treble is *not* at all bad, especially at the price, but the *rest* of the speaker's performance is so good that this was the single area in which I found the Atlantic's performance slightly lacking.

The AT-1's vent combines some aspects of horn, transmission-line, and reflex designs.

The AT-1's bass was as impressive in my room as it had been at CES 2010—not only deep and powerful, but taut and tuneful. More than this, I found the quality of the bass to be more coherent than from most sealed *or* ported designs, especially as it seamlessly presented low, mid-, and upper bass with a coherence that passed over to the midrange without a blip. Cellos and double basses sounded full and natural, without a bit of that pipe-organ quality that they have through some ported designs, in which certain bass frequencies—usually those at or near the port resonance—have a fatter, looser quality than the rest of the low end. Sealed designs lack that pipe-organ quality, but tend to also lack ultimate bass power and the ability to lock on to a room. The Atlantic AT-1 offered the best of all possible worlds and approaches to bass reproduction, especially for a speaker of this size at this price.

Pantha du Prince's *This Bliss* truly *was* bliss through the Atlantic, with bass notes full of weight and speed and great articulation. The AT-1 also did a fine job of delineating each bass sound from the rest—synths sounded like synths, basses like basses, drums like drums, etc. And the speaker's ability to make the bass information in classical music, such as the Ešenvalds disc or the Emerson's *The Art of the Fugue*, sound as coherent and compelling as electronic fare and rock, was a rare treat. By the way, "Fit Song," from Cornelius's *Sensuous* (CD, Everloving/Warner Bros. EVE016), sounded as good as I remembered from CES. (JA would have liked it.) In my room, I got good extension down to the upper 20Hz region, with no bloat or tubbiness. Bravo H-PAS!

The AT-1s' soundstaging was very good, and in some ways bettered that of my Revel F30s. The Atlantics had an uncanny ability to "disappear," and threw a soundstage that was immersive and specific. However, when I pushed the AT-1s to higher volumes, their hardness in the lower treble caused the soundstage depth in that part of the audioband to become slightly shallower. On the AT-1's front and side panels, which are finished in metallic black-gloss paint, I subjectively found cabinet vibrations to be relatively minimal; the unfinished rear and top panels seemed to vibrate a bit more. Thankfully, I noticed no major colorations that could be the fault of the cabinet.

Conclusions

Atlantic Technology's AT-1 is the bee's knees. It offers a colorful, open midrange; coherent, extended, and powerful bass; great fit'n'finish; and is relatively forgiving of room placement. Though I've been a little tough on the AT-1's treble performance, it's entirely in line with that of other speakers costing $2499/pair—and the AT-1 gives many speakers costing twice as much a real run for their money. Though some of those $5000/pair speakers will do this or that thing better, they likely won't be able to do *everything* as well—and they likely won't have the AT-1's bass quality or quantity.

ASSOCIATED EQUIPMENT

DIGITAL SOURCES Theta Miles (via S/PDIF output), Bel Canto CD2 CD players; Benchmark DAC1 & DAC1 HDR, Bel Canto DAC3.5VB with VB-1 power supply, Weiss DAC202 DACs; Sony Vaio laptop computer.
POWER AMPLIFIERS Rogue Audio M180 monoblocks, Plinius SA-103.
LOUDSPEAKERS Revel Performa F30, Thiel SCS4T.
CABLES Digital: Stereovox HDVX coaxial, Silver Sonic D-110 AES/EBU. Interconnect: Sain Line Systems Pure (balanced). Speaker: Kimber Kable BiFocal X. AC: Sain Line Systems Reference.

—Erick Lichte