

PRODUCT REVIEW

Sound Pax Speaker System

By Dennis Colin

What kind of sound would you expect from a pair of 1 lb. 19½" tall cardboard speakers driven by a 14 oz. battery-powered amp, the combination costing \$69? And what would you think of this amp (6.5 oz. without the batteries) claiming 11W per channel 4Ω, 6W per channel 8Ω, at 0.1% THD, true continuous average power? Finally, how about a piece of cardboard driven by a single acoustic "exciter" motor, whose specifications include "sensitivity: high," and "power handling: excellent. Loud enough to dance to."?

I remember what kind of sound I expected. Then I connected the system to a CD player and pressed "play." No, I didn't observe 30Hz bass knocking flowerpots off tables! But surprisingly, I also didn't observe any unpleasantness to the sound—no serious resonances, no cardboard rattling, and so on.

What I do hear from this \$69 won-

der is genuinely astonishing—reasonably balanced response I'd estimate to cover 80Hz to at least 15kHz, natural voice reproduction, smooth highs, good image focus coherence, and "loud enough to dance to," perhaps 90dB SPL. When I then listened to my "audiophile" system (Swans M1 with Scan-Speak subs, "Mad Katy" 125W per channel tube amp), I not surprisingly thought of the Sound Pax system as "not audiophile grade." But when just listening to the Sound Pax, I could forget the "audiophile" stuff and enjoy the music,

be it a first-rate classical SACD such as *Stereophile's* K622 (Mozart clarinet concerto with Antony Michaelson, Mu-

PHOTO 1: Portable speaker system from Sonic Impact Technologies.

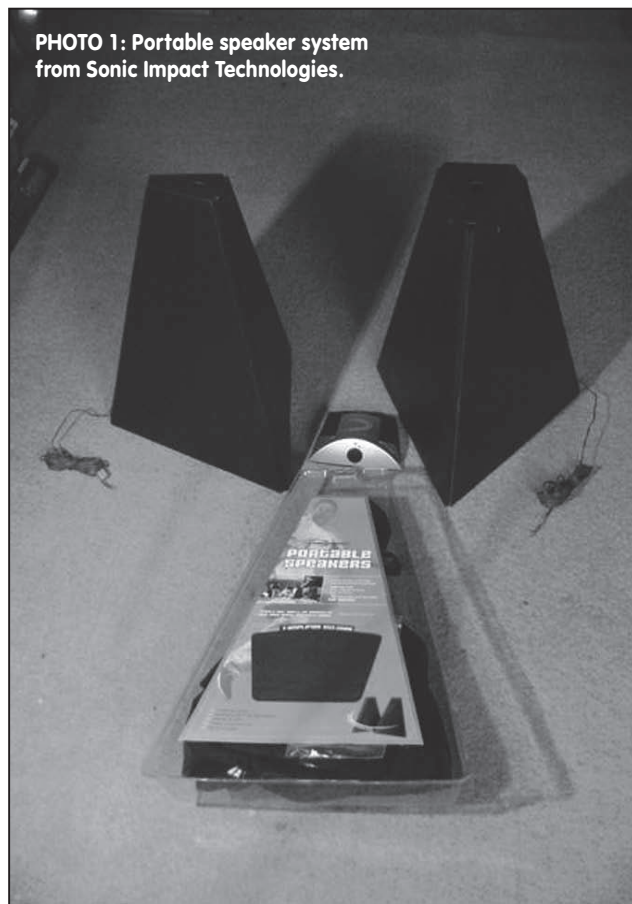


PHOTO 2: Speaker, inside view from bottom.

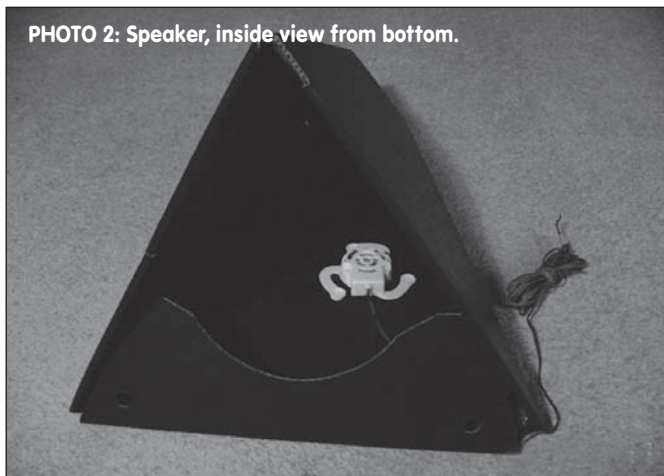
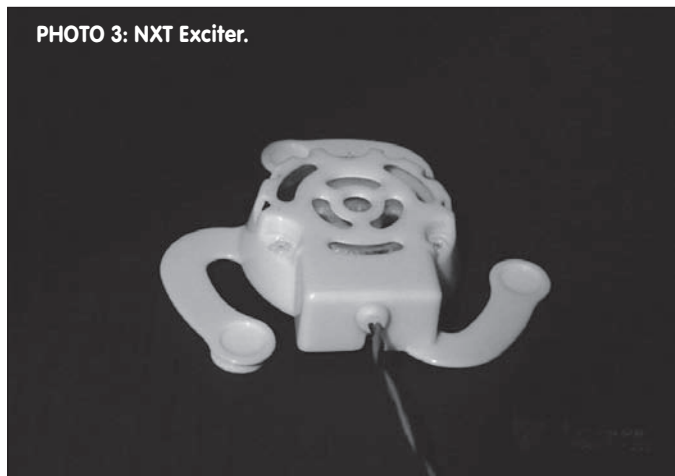


PHOTO 3: NXT Exciter.



sical Fidelity MF-SACD017) or driving electric rock such as "That's It" (David Raitt, Jimmy Thackery, Blu Rock' It BRCD132).

Comparing the two systems (grossly unfair: \$3500 in *materials cost* vs. \$69 *retail*!), the Sound Pax had less resolution, a mildly resonant lower midrange, and, of course, no deep bass and perhaps 90dB maximum SPL. But the sound was smooth, natural, undistorted, focused and spacious, and free of objectional coloration. "Computer speakers" I've heard at twice the price cannot even begin to compare.

COMMENTS ON CARDBOARD

After some thought, I believe there's nothing inherently wrong with the idea of a cardboard speaker:

1. Cardboard is made of paper, which forms the conical diaphragm of many a fine conventional driver. Paper has a high stiffness-to-mass ratio, and can be well-damped.
2. I've made many cardboard prototype speaker enclosures for midrange and tweeter drivers. Often they were less resonant than the dimensionally-copied wooden enclosures, above the (200Hz or so) cardboard resonance limit.
3. The high-tech-sounding term "constrained-layer damping," applied to multiple wooden (or other material) layer cabinet construction, has been touted as almost revolutionary. But this term also applies to good old-fashioned cardboard.

In the Sound Pax speaker, the cardboard sheet is both the driven diaphragm and the enclosure—no dis-

PHOTO 4: "T" amplifier.

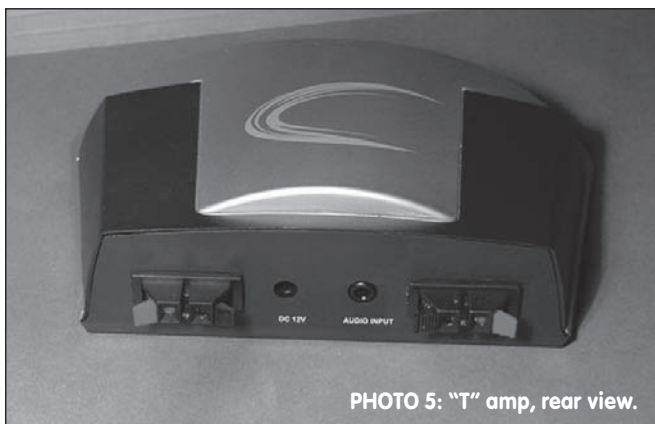
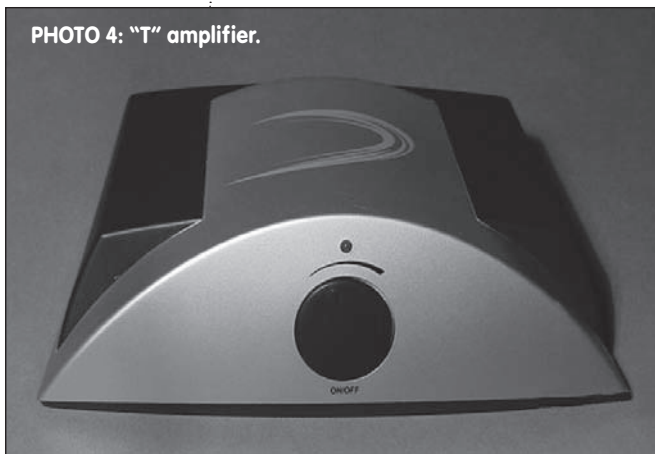


PHOTO 5: "T" amp, rear view.

continuity there. Also, the triangular pyramid shape is naturally rigid, and the tapered width smoothes the distribution of resonances both in the vibrating material and from acoustic wave diffraction. And the off-center placement of the "exciter" motor further ensures a smooth distribution of whatever resonances escape the cardboard's intrinsic damping. Most important, all of this theorizing is supported by the pleasant, natural sound reproduction.

For \$69, including an apparently good-quality 20W stereo amp, the performance-to-price ratio borders on the ridiculous (ridiculously good, that is)!

For \$207 you can have five-channel surround plus one extra channel, whose amp can power a small subwoofer. This price, plus some old enclosed woofer you probably have collecting dust, buys you a complete 5.1 channel setup good for a small room or the beach!

An absurdly good and novel product—why didn't I think of it first?

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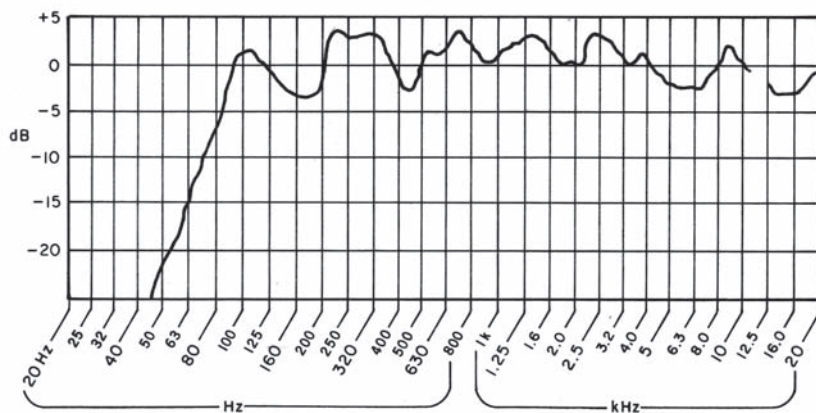
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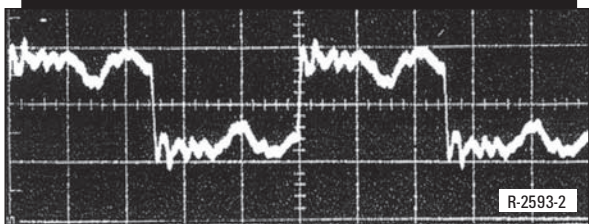
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FIGURE 1: Sound Pax speaker, frequency response. Speaker on floor of 2000ft³ room, mike 12" on-axis. 1/6 octave smoothing. Response is ± 3.5 dB, 85Hz-25kHz.



R-2593-1

FIGURE 2: Sound Pax speaker, 400Hz square-wave response. Speaker on floor of 2000ft³ room, mike 5" on-axis.



R-2593-2

MEASUREMENTS Sound Pax Speaker:

While certainly not as comprehensive and accurate as Joe D'Appolito's measurements usually included in *aX* reviews, my two close-miked in-room measurements used the Panasonic WM-60AY capsule (used in Mitey

Mike II, typ. ± 1 dB 20Hz-20kHz). **Figure 1** shows the frequency response at 12" on-axis with speaker on the floor (as it's likely to be located—the pyramid taper aims the direct sound upward). The response, ± 3.5 dB 85Hz-25kHz, would be good for a conventional speaker in a room—but for an "excited" sheet of cardboard, it's nothing short of astonishing. I'm more "excited" than the cardboard!

Figure 2 shows the 400Hz square-wave response at 5" on-axis. The response is not only time-coherent, but is a cleaner square wave than that from most high-quality multi-way dynamic speaker systems. NXT (inventor of the flat-panel speaker and exciter products) certainly knows what it's doing!

"T-AMPLIFIER":

As **Table 1** shows, this little jewel works very well; I heard no "digital switching glare" (why would I at 1MHz switching frequency?) or other amplifier anomalies. 20W from a 6.5 oz. amp is 49W per pound.

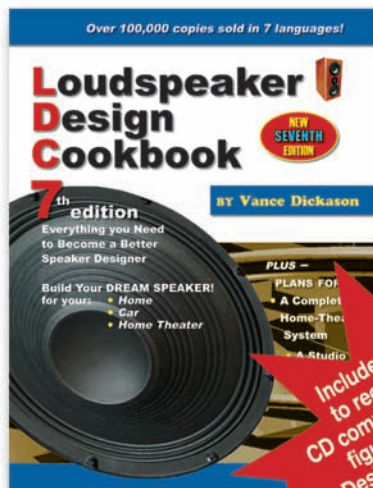
The output has about 56mV RMS of

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the 1MHz switching frequency, feeding a 12' antenna (the supplied speaker wires). Although the differentially-driven twisted-pair configuration should suppress much of the 1MHz radiation, interference to a nearby AM radio should be likely. (If so, ferrite suppression cores around the amp end of the

TABLE 1: MEASUREMENTS

Sound Pax Speaker

Response, 12" on-axis, in-room, 1/6 octave smoothing: $\pm 3.5\text{dB}$, 85Hz-25kHz
Sensitivity: approximately 84dB SPL, 2.83V, 1m
DC resistance: Stereo pair, 9.1 Ω , 8.4 Ω
Dimensions: 19.5" $\times$ 12.75" $\times$ 12.25"
Weight: 15.5 oz.
Wires: 12' twisted pair.

Sonic Impact "T-Amplifier"

With 10 Ω load; eight fresh Duracell batteries (1.612V each, no load):
Power output: 8.1W per channel just before clipping
Sensitivity: 304mV RMS input with volume control maximum, for maximum output
Frequency response: -3dB at 28Hz, 63kHz
Switching frequency output: $\approx 1\text{MHz}$, 56mV RMS
Output configuration: Differential (balanced) "H"
Bridge, both terminals at $\approx 50\%$ of DC supply (Do Not Ground!)
Dimensions: 6 1/4" $\times$ 4" $\times$ 2"
Weight: 6.5 oz., 14 oz. with batteries

speaker wires should help.) A portable AM radio I tried received interference around 1MHz, but only if within about 10' of the speakers, amp, or wires. *aX*

TABLE 2

Sonic characteristics ratings	
Presence	8
Freedom from distortion*	8
Frequency response smoothness	7
L-M-H balance	8
Treble quality	8
Midrange quality	7
Bass quality	6
Bass extension	4
Immediacy and transient response	8
Image focus	9
Stereo soundstage realism	9
Ambience	8

* within limits of $\approx 10\text{W}$ overall, $\approx 1\text{W}$ bass

A note on perspective regarding this scale:

1 = worst rock band PA system you've heard

3 = boom box

5 = mass-produced stereo speakers

7 = just acceptable for "high fidelity"

9.5 = Joe D'Appolito's "THOR" (aX May 2002)

10 = virtually perfect: limited only by recording/playback technology limits

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