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IN REVIEW

BRITISH SPEAKERS FROM BOWERS & WILKINS, WILSON BENESCH

ESOTERIC ANALOG FROM DSA AND ACOUSTIC SIGNATURE

VINNIE ROSSI'S TOTALLY MODULAR AMPLIFIER

› SEPTEMBER 2015

FOLLOW-UP BY JOHN ATKINSON

THIS ISSUE: Wilson Benesch's Square One Series 2 stand-mounted speaker is run through its paces in JA's test lab.

Wilson Benesch Square One Series 2 loudspeaker

John Marks enthused about this elegantly finished stand-mounted speaker from England[1] in his column in the August 2015 issue of *Stereophile*, and included a quote from his September 2004 column: "The Square Ones have much of the same technology and the same build quality as Wilson Benesch's more expensive models . . . and provide a smaller-scaled version of WB's house sound: 'extremely low distortion, seamless coherence, unfussy easefulness, rounded liquidity of tone, articulate dynamics, and seductively natural imaging and soundstaging.'" John concluded that "the Square One is a standout performer that I think absolutely deserves a very high Class B (Restricted LF) rating in our 'Recommended Components.'"

High praise indeed. I asked John to send me the review samples (serial nos. 01240A and B) so I could perform my standard set of measurements. As always, I used DRA Labs' MLSSA system and a calibrated DPA 4006 microphone to measure the speaker's frequency response in the farfield, and an Earthworks QTC-40, with its small, ¼"-diameter capsule, for the nearfield responses.

The Wilson Benesch Square One Series 2 is specified as having a voltage sensitivity of 87dB/2.83V/m. My estimate was a little lower, at 85.7dB(B)/2.83V/m, perhaps due to a lack of low-treble energy in the frequency response (see below). The specified nominal impedance is 6 ohms, with a minimum value of 4 ohms, but, as the solid trace in fig.1 shows, the Square One's impedance drops below 8 ohms only briefly, in the lower midrange, and the minimum impedance magnitude is 6.77 ohms at 235Hz. The phase angle of the impedance is generally low, which means that, taken with the highish impedance, the Square One will be very easy to drive.

Small discontinuities in the impedance traces between 500 and 600Hz and just above 1kHz hint at the presence of resonances of some kind. I did find a resonant mode at 508Hz on the top panel (fig.2), though this is a little lower in frequency than the impedance wrinkle. There was also a stronger mode, at 359Hz on the side panel (not shown). I don't believe either mode will affect the speaker's sound quality.

With a rear-facing acoustic bass radiator (ABR) and two downward-facing ports, the Square One's low-frequency alignment is complex, though Wilson Benesch says that the ABR absorbs and controls the energy radiated by the rear of the woofer cone, and that the combination of the ABR and ports "[enhances] bass performance and extension." The red trace in fig.3 shows the summed outputs of the ports—they behave identically—measured in the nearfield. The double peak is most unusual, though the ports roll off below 50Hz with the usual second-order slope. The green trace in this graph is the nearfield response of the ABR, plotted in the ratio of its radiating diameter to that of the woofer. It peaks sharply at 100Hz, coincident with the

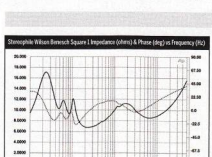

Fig.1 Wilson Benesch Square One, electrical impedance (solid) and phase (dashed) (2 ohms/vertical div.).

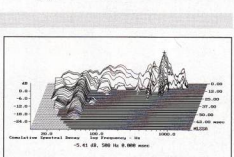

Fig.2 Wilson Benesch Square One, cumulative spectral-decay plot calculated from output of accelerometer fastened to center of top panel (MLS driving voltage to speaker, 7.55V; measurement bandwidth, 2kHz).

1 The Square One Series 2 costs $3800/pair, plus $1395/pair for matching stands. Wilson Benesch Ltd., Falcon House, Limestone Cottage Lane, Sheffield S6 1NJ, Yorkshire, England, UK. Tel: (44) (0)1142-852656. Web: www.wilson-benesch.com. US distributor: The Sound Organisation, 159 Leslie Street, Dallas, TX 75207. Tel: (972) 234-0182. Fax: (972) 234-0249. Web: www.soundorg.com.

upper peak in the ports' output, and rolls off above 110Hz and below 70Hz with a fourth-order slope. Its output is actually in antiphase to that of the woofer in the midbass, and even compensating for the fact that it's mounted on the rear of the enclosure, adding its nearfield output to that of the woofer gives a sharply defined notch at 61Hz.

The black trace in fig.3 shows the woofer's nearfield output below 355Hz and its farfield response on the tweeter axis above 355Hz. The peak just above 1kHz coincides with the high-frequency wrinkle in the impedance traces. Above that peak, the woofer is crossed over to the tweeter (blue trace) at the specified 5kHz with second-order filter slopes—the original Square One used a first-order crossover—but there is significant overlap between these drivers. Both units are impressively flat on axis above 1.5kHz, but the overlap in the crossover region gives rise to a peak between 3 and 7kHz in the overall response averaged across a 30° horizontal window on the tweeter axis (fig.4). Concerned that this behavior, measured with sample 01240A, may not be typical, I looked at sample 01240B. It measured identically—in fact, the matching of the pair was superb, any difference between the two samples being less than 0.5dB over almost the entire audio band. Figs. 3 and 4 were taken without the grille; repeating the measurement with the grille slightly increased the height of the mid-treble peak and introduced a small suckout centered on 8kHz.

The trace below 300Hz in fig.4 shows the complex sum of the nearfield responses of the woofer, ABR, and port. Some of the apparent peak between 90 and 200Hz in this graph will be an artifact of the nearfield measurement technique, but the alignment does appear to be underdamped overall. The ultimate rolloff seems closer to third-order, 18dB/octave, rather than the usual 24dB/octave of a ported design. But with a –6dB point of 80Hz or so, the Square One doesn't offer significant low-frequency extension, I feel.

Fig.5 shows the Wilson Benesch's horizontal dispersion, referenced to the output on the tweeter axis. The contour lines are even across most of the audioband, indicating a well-controlled radiation pattern, though the Square One is a little more directional above the cursor position at 3200Hz than is usually the case with a small speaker. This might well work against

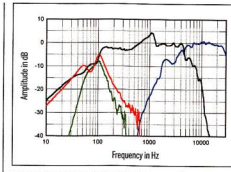

Fig.3 Wilson Benesch Square One, acoustic crossover on tweeter axis at 50", with nearfield responses of: woofer (black), ABR (green), ports (red), plotted below 350Hz, 350Hz, 600Hz.

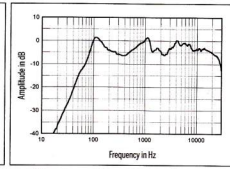

Fig.4 Wilson Benesch Square One, anechoic response on tweeter axis at 50", averaged across 30° horizontal window and corrected for microphone response, with complex sum of nearfield responses plotted below 300Hz.

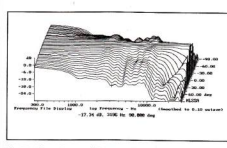

Fig.5 Wilson Benesch Square One, lateral response family at 50", normalized to response on tweeter axis, from back to front: differences in response 90–5° off axis, reference response, differences in response 5–90° off axis.

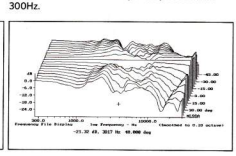

Fig.6 Wilson Benesch Square One, vertical response family at 50", normalized to response on tweeter axis, from back to front: differences in response 45–5° above axis, reference response, differences in response 5–45° below axis.

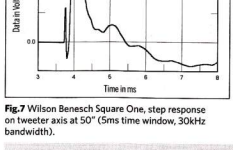

Fig.7 Wilson Benesch Square One, step response on tweeter axis at 50" (5ms time window, 30kHz bandwidth).

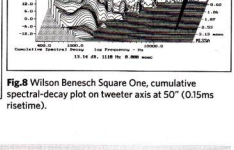

Fig.8 Wilson Benesch Square One, cumulative spectral-decay plot on tweeter axis at 50" (0.15ms risetime).

the audibility of the crossover-region peak in larger rooms, though the top octave will sound rather too mellow in those rooms. In the vertical plane (fig.6), the use of first-order crossover filters makes the speaker's response very dependent on the listening axis. This graph suggests that placing the speakers on high stands so that the listener sits between 5° and 10° below the tweeter axis might give the optimal treble balance.

Turning to the time domain, the Square One's step response on the tweeter axis (fig.7) reveals that both drive-units are connected in positive acoustic polarity, with the decay of the tweeter's step smoothly blending into the start of the woofer's step. But the latter is disturbed by an undulation with a period of just less than 1 millisecond, visible in the cumulative spectral-decay plot (fig.8) as a ridge of delayed energy centered on the frequency of the on-axis peak. Other than that, however, the spectral decay is impressively clean from 2kHz up.

I'm puzzled both by the Wilson Benesch Square One Series 2's measured performance and by John Marks's praise for its sound quality. This is a not-inexpensive loudspeaker, and while its fit'n'finish are to a quality commensurate with its price, it's difficult for me to see how its rather peaky treble response is outweighed by its shallower-than-usual low-frequency rollout, well-controlled horizontal dispersion, and clean decay in the treble.–**John Atkinson**