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B&W's 804 Diamond tower

**DIAMONDS
ARE
FOREVER**



KALMAN RUBINSON

Bowers & Wilkins 804 Diamond

LOUDSPEAKER

I don't think that the Bowers and Wilkins 804, in any of its incarnations, gets its due respect. As the smallest floorstander in B&W's elite 800 series, it has historically been overshadowed by its larger brethren and outmaneuvered by the smaller, stand-mounted 805. However, the 804 Diamond is unique, and deserves special attention for reasons I discovered when I chose the earlier 804S for the surround channels of my 5.1-channel surround system.

The first of these reasons: The three-way 804 Diamond takes up no more floor space than the two-way 805 while also having two 6.5" woofers, which greatly expand its power handling and bass extension. In fact, it was my wife who, when I consulted her about choice and placement, asked why one would even consider the smaller speaker when the bigger one took up no more floor space and looked better. Second, in the 804, the same 6" Kevlar-cone mid/woofer used in the 805 is relieved of all bass responsibilities and works purely in the midrange, as it does in the 800 Diamond.

The third reason—perhaps a corollary of the second—is that dedicating the Kevlar driver to the midrange means that it can be used with B&W's proprietary Fixed Suspension Transducer (FST) technology, which was designed to better control and define the breakup patterns of relatively nonrigid diaphragms. The use of Kevlar in the 805's mid/woofer demands a more traditional surround that imposes the uncontrolled radial breakup patterns that the use of a Kevlar diaphragm was intended to avoid. Note, also, that B&W uses

diaphragms of Rohacell, which is stiffer than Kevlar, in the woofers (*ie*, not mid/woofers) of all its 800-series models, including the 804.

Finally, although the 804 Diamond is not endowed with B&W's iconic Marlan head, as in the 800 Diamond (see www.stereophile.com/content/bampw-800-diamond-loudspeaker), the 804's midrange driver is still enclosed in an internally tapered enclosure, and scores over the larger but similarly configured 803 Diamond in having a narrower cabinet, which, potentially, would not have as great an impact on midrange dispersion. It might also be effective in minimizing the kink in the horizontal off-axis radiation pattern that John Atkinson has discovered in the transition from the woofers to the midrange drivers of the Marlan-topped 802 and 800 Diamonds.

Arrival

The 804 Diamonds arrived in substantial packaging that lacked the forklift-accessible plinths needed for the 800 Diamonds. I was grateful for the unpacking instructions printed on the outside of the box; I was able to unpack and set them up with little effort and no assistance. Both spikes (for carpet) and plastic feet (for hardwood floors) are provided. I chose the latter. The slim, graceful cabinet is oval in cross section, except for the flat front panel; my review samples were finished in Rosenut veneer. (Cherry and Piano Gloss Black are also available.) A black front grille attaches magnetically—

SPECIFICATIONS

Description Three-way, reflex-loaded, floorstanding loudspeaker. Drive-units: 1" (25mm) diamond-dome tweeter, 6" (150mm) FST woven-Kevlar midrange cone, two 6.5" (165mm) Rohacell-cone woofers. Crossover frequencies: 350Hz, 4kHz. Frequency range: -6dB at 30Hz and 33kHz. Frequency response: 38Hz-28kHz, ±3dB, on reference axis. Dispersion: within 2dB of

on-axis response over 60° arc (horizontal) and 10° arc (vertical). Sensitivity: 90dB/2.83V/m. Harmonic distortion (second and third harmonics, 90dB, 1m): <1.0%, 90Hz-100kHz; <0.5%, 120Hz-100kHz. Impedance: 8 ohms nominal, 3 ohms minimum. Recommended amplification: 50-200W into 8 ohms, unclipped program. Maximum recommended

cable impedance: 0.1 ohm.

Dimensions 39.8" (1020mm) H by 9.3" (238mm) W by 13.7" (351mm) D. Weight: 59.4 lbs (27kg).

Finishes Rosenut, Cherry, Piano Gloss Black.

Serial numbers of units reviewed: 009625, 009626 (listening); 009176 (measuring).

Price \$7500/pair. Approximate number of dealers: 275.

Manufacturer

Bowers & Wilkins, Dale Road, Worthing, West Sussex BN11 2BH, England, UK. Tel: (44) (0)800-232-1513. www.bowers-wilkins.co.uk. US distributor: B&W Group North America, 54 Concord Street, North Reading, MA 01864. Tel: (978) 664-2870. Fax: (978) 664-4109. www.bowers-wilkins.com.



when the grille is removed, no securing devices mar the speaker's appearance.

On top of the cabinet, lying in a shallow niche, is B&W's iconic enclosure for its diamond tweeter and its tapered tube. Below that is the yellow, woven-Kevlar diaphragm of the FST midrange driver, which is installed through the front panel and secured by a shaft to a compliant support in the rear, just as the FST midranges in the 802 and 800 Diamond models. (A plastic disc must be removed from the rear of the midrange enclosure, which opens to the speaker's rear, before listening.) Below that are the two Rohacell-cone woofers and a low-turbulence port, dimpled and flared, and similar to the one hidden on the underside of the bigger models. Protruding from near the top of the rear of the cabinet is the adjustable mount for the midrange; near the bottom are two pairs of speaker binding posts of a new design that accommodates easy tightening by hand. Biwiring and biamping are thus made possible; jumpers are also provided. To meet EU requirements, the center bore of each binding post is occupied by a plastic plug; I removed these in order to use cables terminated with banana plugs.

Set-up

I was able to lift and lower each 60-lb 804 Diamond into position by using its bass port as a grip. At first, I set them up in the precise spots just vacated by my 800 Diamonds. In these positions, the 804Ds seemed to sound somewhat thin and bright, but some expectation bias is inevitable: I was consciously aware, from both sight and aching muscles—I'd just moved the



The 804 Diamond's tweeter is loaded with a transmission line.

big 800Ds out of the way—that I had just replaced two very familiar, very large speakers with a pair of small towers fresh from the farm. Apparently, I adapted as I adjusted the setup. The 804Ds ended up about a foot closer to each other than where they started out, toed in by no more than 10°.

MEASUREMENTS

I used DRA Labs' MLSSA system and a calibrated DPA 4006 microphone to measure the Bowers & Wilkins 804 Diamond's frequency response in the farfield, and an Earthworks QTC-40 for the nearfield responses, the latter's 1/4" capsule offering no significant acoustic obstacle to the outputs of the small diaphragms. Before performing any measurements, I removed the plastic disc from the rear of the tube that loads the midrange unit, as instructed in the manual.

My estimate of the 804 Diamond's voltage sensitivity was 89.3dB(B)/2.83V/m. While this is slightly lower than the specified 90dB, it is still usefully higher than average. The plot of the 804 Diamond's impedance magnitude and phase against frequency is shown in fig.1. The speaker is a moderately difficult load for the partnering amplifier to drive. Not only does its impedance reach a minimum value of 3 ohms at 108Hz, there is a combination of 4.5 ohms and a 53° capacitive phase angle at 72Hz, and the impedance remains below 4 ohms for much of the midrange and the top octave.

The traces in fig.1 are free from the small discontinuities that would sug-

gest the presence of resonances in the speaker cabinet's walls. Nevertheless, investigating the enclosure's behavior with a simple plastic-tape accelerometer, I found a strong resonance at 309Hz on the side walls level with the upper woofer (fig.2), with a lower-level mode at a slightly lower frequency. However, as Kal Rubinson didn't comment on any congestion in the midrange that might be laid at the feet of this resonance, it's likely that the affected area, hence the audibility, is relatively small. The sidewall in the vicinity of the midrange unit was dead as a doornail.

The saddle centered on 31Hz in the impedance-magnitude trace in fig.1 suggests that this is the tuning frequency of the flared port on the front baffle. Indeed, the port's output, measured in the nearfield, peaks between 22 and 44Hz, with a smooth rolloff above that region unbroken by any midrange resonances (fig.3, red trace). To my surprise, however, the two woofers behaved differently in the bass: while the upper woofer (green trace) had a minimum-motion notch at 30Hz, the lower woofer's (blue) lay at 26Hz. (For clarity, the levels of the two woofers are each raised by 6dB in this graph.) The

crossover to the midrange driver (black trace) appears to lie just below 400Hz,

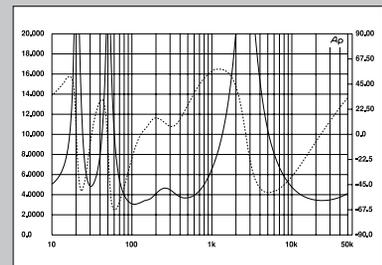


Fig.1 Bowers & Wilkins 804 Diamond, electrical impedance (solid) and phase (dashed) (2 ohms/vertical div.).

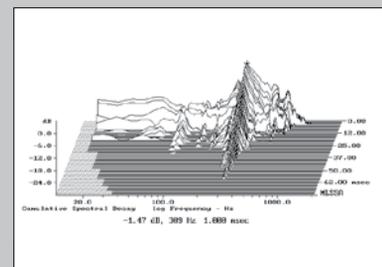


Fig.2 Bowers & Wilkins 804 Diamond, cumulative spectral-decay plot calculated from output of accelerometer fastened to center of side panel level with upper woofer (MLS driving voltage to speaker, 7.55V; measurement bandwidth, 2kHz).

ASSOCIATED EQUIPMENT

Digital Sources Sony XA-5400ES SACD/CD player, Oppo BDP-105 universal Blu-ray player, Mytek Stereo192-DSD DAC, PC-based server using JRiver Media Center 18.

Preamplification Audio Research MP1 multichannel analog preamplifier, Meridian HD621 HDMI audio processor & 861 Reference V6 digital surround controllers.

Power Amplifiers McIntosh MC303, Parasound A-31 (both three-channel).

Loudspeakers Bowers and Wilkins 800 Diamond & 804S, Aerial Acoustics 7T.

Cables Interconnect: van den Hul Flat 180, AudioQuest Vodka (HDMI); Black Cat Veloce (digital); AudioQuest Cheetah (DBS balanced). Speaker: AudioQuest Mont Blanc (DBS biwire). AC: JPS Alumina.

Accessories Environmental Potentials EP-2450 power conditioner.—Kalman Rubinson

Comparisons can be odious

That doesn't mean that comparisons smell bad, but making direct comparisons can lead to various problems. In the case of speakers, it's all too easy to describe how one speaker sounds different from another, but 1) that doesn't tell us a lot about which speaker might be better or more accurate, and 2) a specific character of one speaker might constrain an accurate description of another. So, although I can't ignore

comparing the 804 Diamond to its 804S forebear or to its big brother, the 800 Diamond, both of which I had on hand, I'll first describe the 804D's sound as I found it, independent of comparisons.

I listened casually to the 804 Diamonds for a couple of weeks before sitting down to do more careful listening. During that time they evinced good tonal balance and great stereo center fill. FM broadcasts sounded good, with no emphasis of hiss with weak signals, and Internet radio sounded fine without obvious dulling due to the limited bandwidth. As I sat down with my favorite discs and downloads, my expectations were rising.

The 804 Diamond was quite beyond criticism in the treble, with clarity and fine detail. Cymbals and triangles sizzled and tingled appropriately, but, more important, E-string fiddling was sweet and pure. Voices, too, were lifelike, whether solo or in chorus. One of my new favorite vocal recordings is a 24-bit/192kHz PCM download of Marianne Beate Kielland's recital disc *Come Away, Death* (SACD/CD, 2L 2L-064-SACD). Following a tonally convincing introduction by pianist Sergei Osadchuk, Kielland's silken mezzo-soprano appeared eerily between the 804 Diamonds with such presence that I got up to check that my (presumably) idle center speaker was, in fact, silent. The effect expanded with multiple voices—as on *Dixit Dominus*, a disc pairing Handel's and Vivaldi's settings of Psalm 109, with David Bates leading La Nuova Musica (SACD/CD, Harmonia Mundi HMU 807587): the choristers' voices were arrayed in space between and above the 804 Diamonds.

measurements, continued

and the crossover seems to feature asymmetrical slopes: 24dB/octave high-pass but 18dB/octave low-pass. The woofers' upper-frequency behavior is identical.

Higher in frequency in fig.3, the 804 Diamond's treble response is uneven, with a suckout evident between 1.5 and 3kHz and a peak indicated between 7 and 16kHz. Puzzled by this, I checked the response using a different microphone (a QTC-40) and a different measurement system (Fuzzmeasure 3.0). The result was identical. I then looked at the review my colleague Thomas J. Norton had written for *Home*

Theater magazine: While the measured response of the 804 Diamond in Tom's review (the red trace in the graph at <http://tinyurl.com/mjk2wvwy>) differed in the fine details, the overall measured response was broadly similar to mine.

Fig.4 shows how these individual responses sum in the farfield. The bump in the upper bass is primarily an artifact of the nearfield measurement technique; as KR found in his listening, the 804 Diamond offers excellent low-frequency extension, the output lying 6dB down at 28Hz. At the other end of the audioband, the combination of presence-region suckout

and top-octave peak persists, though the overall trend is basically flat. The effect of the suckout would be to make the speaker sound somewhat laid-back, though the upside is that the 804 Diamond would be forgiving of too-bright recordings, which are common. The peak is a little too high in frequency to render the sound "steely" or "wiry"; instead, it might just emphasize the airiness of the recording.

The B&W's lateral dispersion, normalized to the response on the tweeter axis, is shown in fig.5. Although the suckout at the top of the midrange unit's passband deepens to the speaker's sides, the radia-

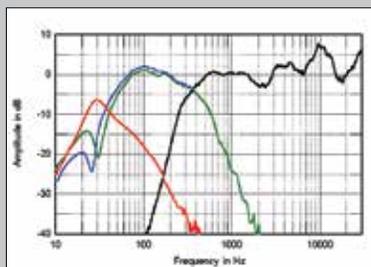


Fig.3 Bowers & Wilkins 804 Diamond, acoustic crossover on HF axis at 50", corrected for microphone response, with nearfield responses of midrange unit (black), upper woofer (green), lower woofer (blue), and port (red), respectively plotted below 450Hz, 2kHz, 2kHz, 550Hz.

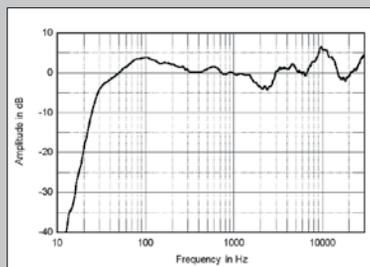


Fig.4 Bowers & Wilkins 804 Diamond, anechoic response on HF axis at 50", averaged across 30° horizontal window and corrected for microphone response, with complex sum of nearfield responses plotted below 300Hz.

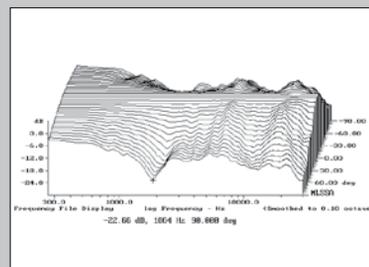


Fig.5 Bowers & Wilkins 804 Diamond, lateral response family at 50", normalized to response on HF axis, from back to front: differences in response 90-5° off axis, reference response, differences in response 5-90° off axis.



The twin 6.5" woofers feature Rohacell cones.

Moving down the spectrum to winds and guitar, the presences, placements, and harmonic balances of those instruments were exquisite. Stefano Grondona's guitar in Francisco Tarrega's *Capricho árabe*, from Grondona's *La Guitarra de Torres* (CD, Divox CDX-29701), is intimately recorded—the

touch of his fingers on the strings is easily discerned from the rich supporting resonances of the instrument's body. Each repetition of the familiar theme offers another serving of mesmerizing harmonies.

Lower-pitched male voices and cello, however, demanded greater scrutiny—speakers the size of the 804 Diamond often lack the true low bass of bigger speakers. How and where the low end rolls off can pull the rug out from under low voices, robbing them of weight and warmth. I pulled out my Hans Theesink and Leonard Cohen discs, just to confirm that their voices sang out with focus, depth, and grit. More critically, Gavriel Lipkind's 1702 Garani cello spoke in a single voice across its range, from the soprano sweetness of the A string to the baritone warmth of the C string, in Lipkind's recording of J.S. Bach's *Suites for Solo Cello* (SACD/CD, Lipkind Productions S04), indicating bass extension entirely sufficient for realistic tonal balance. It was, therefore, no surprise that the plucked lower strings in Boccherini's *La Musica Notturna della strada di Madrid*, from the Stuttgart Chamber Orchestra's *Die Rohre—The Tube* (SACD, Tacet S 074), were rendered with appropriately plusive effect.

The 804 Diamonds' significantly greater bass extension endowed the sound with a natural balance often sacrificed by the smaller speakers.

measurements, continued

tion pattern is even and uniform overall—something that always correlates with

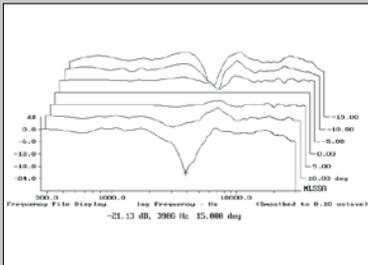


Fig.6 Bowers & Wilkins 804 Diamond, vertical response family at 50°, normalized to response on HF axis, from back to front: differences in response 15–5° above axis, reference response, differences in response 5–10° below axis.

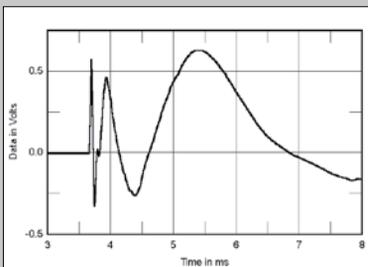


Fig.7 Bowers & Wilkins 804 Diamond, step response on HF axis at 50° (5ms time window, 30kHz bandwidth).

stable and accurate stereo imaging. In the vertical plane (fig.6), a suckout at the upper crossover frequency of 3.9kHz develops 10° above and 15° below the tweeter axis. It also looks as if the flattest treble response occurs 5° below the tweeter axis.

This is confirmed by the 804 Diamond's step response on the tweeter axis (fig.7), which is 40" above the floor: the sharp up/down spike that represents the tweeter's output doesn't quite smoothly blend with the start of the midrange unit's slower-rising output. Moving the microphone down by 5° would bring the midrange unit's output slightly forward in

time and eliminate the slight discontinuity in this graph. Fig.7 also indicates that all four drive-units are connected in the same, positive acoustic polarity, this confirmed by examining the step responses of the individual units (not shown). Finally, the 804 Diamond's cumulative spectral-decay plot on the tweeter axis (fig.8) is generally clean in the treble.

In 2004, I visited Bowers & Wilkins' Research Center, in the village of Steyning, West Sussex, nestling in the shadow of England's South Downs, north of Worthing. I was impressed by both the depth and the breadth of the engineering talent and resources I found there. There is no doubt in my mind that B&W's engineers can design a loudspeaker to have any response they desire. That the 804 Diamond does not have a flat on-axis response is thus a mystery. That suckout in the presence region in fig.4, for example, appears from fig.5 to be due to the large-diameter midrange driver narrowing its radiation pattern in the top octave of its passband, despite the FST technology that is intended to prevent that from happening. But overall, the B&W 804 Diamond's measured performance is quite respectable.—John Atkinson

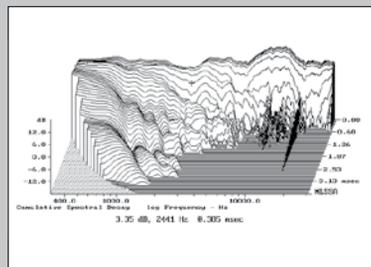


Fig.8 Bowers & Wilkins 804 Diamond, cumulative spectral-decay plot on HF axis at 50° (0.15ms risetime).

At the very bottom, the 804 Diamonds were capable of playing everything creditably, if not imposingly. I noticed this first when playing a 24/96 download of “Malena,” my favorite track from *Será Una Noche* (M•A Recordings M052A). It was delightfully atmospheric, as always, but the

I had become so accepting of the generous size and sound of the bigger, pricier speakers I've been using that I was surprised by how satisfying the 804 Diamonds were.

rhythmic percussion didn't seem to anchor the tempo as solidly as I had expected. The footfalls of the Cosmic Hippo, as depicted by Victor Wooten's bass in the title track of Béla Fleck's *Flight of the Cosmic Hippo* (CD, Warner Bros. 26562-2), were weighty but less than thudding, and the heartbeats in Pink Floyd's *Dark Side of the Moon* (SACD/CD, Capitol CDP 5 82136 2) were audible but not palpable. Still, the bass was certainly good. Had I not savored these tracks before through bigger speakers—such as the 800 Diamonds—I probably would not have noticed anything missing. Those who delight in the open soundstage and pinpoint imaging of minimonitors will find that in spades with the 804 Diamonds, whose significantly greater bass extension endowed the sound with a natural balance often sacrificed by the smaller speakers in the pursuit of those other qualities. As a result, the lack of really deep, powerful bass from the 804 Diamonds is, to me, a minor issue overall. I found that, unlike stand-mounted minimonitors, the 804Ds could deliver a full orchestra of appropriate balance and size, as was demonstrated when I played Dmitri Kitayenko and the Cologne Gürzenich Orchestra's recording of Tchaikovsky's monumental *Manfred Symphony* (SACD/CD, Oehms Classics OC665). And if you demand that the impressive bass-drum whacks *also* hit you in the chest, or that the organ in the final movement also shake your room . . . get a subwoofer.

Audible differences

I began this review by saying that B&W's 804 models have not gotten as much attention as they deserve. I, too, was guilty of this. When, a decade ago, I transformed my main system from two to 5.1 channels, I chose the B&W 804S for surround duties without ever having heard them as a stereo pair—and there they sat in the background ever since, until I pulled them out to compare them with their successors. With the 804Ses (\$4000/pair when last available) plonked down next to the 804 Diamonds (\$7500/pair), I often found it difficult to distinguish between them by eye or ear, but there were differences. Other than the 804D being three pounds lighter than the 804S, B&W's specifications for the two are identical. Careful study reveals that the 804D sports a silver ring around its now gloss-black tweeter housing, has mushroom-shaped terminal knobs, and replaces the grille's tabs with magnetic attachments.

Standing almost 40" tall, the 804D has a domestically friendly footprint.

The two models sound similar, too, though I easily heard the differences in an A/B comparison. There is some improvement of bass definition at the extreme bottom of the audioband, the 804 Diamond offering a somewhat sharper edge to LF transients, particularly noticeable with bass guitar. There was also significantly more detail in the critical upper midrange, around the upper crossover frequency of 4kHz, which is also in the range of the human ear's greatest sensitivity. B&W's use of gold-silver-oil Mundorf capacitors in the HF crossover filter and the Diamond tweeter—which were used only in the 800 Diamond in the previous generation of models—is probably paying great dividends here.

Compared with other speakers that have occupied this room, the 804 Diamond sounded like a nimbler version of the 800 Diamond (\$24,000/pair), or a compact version of the Aerial Acoustics 7T (\$9850/pair, see www.stereophile.com/content/aerial-acoustics-model-7t-loudspeaker). In the first case, a comparison of the specs (and ignoring their differences in size and weight) revealed that the 800 and 804 Diamonds differ in only two performance parameters: low-frequency extension/THD and maximum power handling. So, granting the very real sonic differences at the low end of the audioband, I found that the 804 Diamonds produced a closer, more intimate sound in my 26' by 15' room, perhaps due to the effects of their narrower cabinets on midrange radiation and room interaction. The Aerial 7T's bass capabilities, too, are greater than the 804 Diamond's, with the latter's smaller drivers and enclosure, while the Aerial's midrange is equally detailed and a bit smoother. The treble was a toss-up. Overall, the slightly bigger and more costly 7T differs only slightly from the 804 Diamond, and its advantages would not be substantial in smaller rooms.

Conclusions

In general, I had become so accepting of the generous size and sound of the bigger, pricier speakers I've been using that I was surprised by how satisfying the 804 Diamonds were. I should not have been—for \$7500/pair, one should expect superb performance across the board. B&W has trickled down their unique technologies to the entire 800 Diamond range, and the 804 Diamonds incorporate all the most important ones. In fact, with the 804 Diamonds replacing the 800 Diamonds for the front left and right channels—a third 800 Diamond remaining for the center channel, and 804Ses as surrounds—they gave up little in multichannel performance. And the 804 Diamonds sounded excellent as a stereo pair, leaving me in no rush to relegate them to surround duties. For the money, I don't feel you can do much better—different, maybe, but for making music, not better. ■

