Bowers & Wilkins
802 D3
LOUDSPEAKERS

One of my favourite audio quotes is nearly 50 years old and the man who said it, John Bowers, died nearly 30 years ago. That quote is: ‘The best loudspeaker isn’t the one that gives the most, it’s the one that loses the least.’ As you undoubtedly already knew, or have just guessed, Bowers was one of the two men who in 1966 founded what is arguably Britain’s most famous loudspeaker company: Bowers and Wilkins. (Confusingly, the other founding partner was not Roy Wilkins: he was Bowers’ partner in a previous retail enterprise, but Peter Hayward. Why didn’t they name the new company Bowers & Haywood? That’s a long story for another day, but one likely reason was that the abbreviation ‘B&H’ had been taken by another famous British enterprise—cigarette manufacturer Benson & Hedges.)

At the time of this review, the B&W 802 D3 was Bowers & Wilkins’ top-of-the-line loudspeaker in its 800 Series, presumably because the company was waiting until this year, when it will celebrate its 50th anniversary, to release the official 800 Series flagship, the B&W 800 D3. (The unique B&W Nautilus, which retails for more than $100,000 per pair, continues on as the company’s flagship loudspeaker design.)

**NAUTILUS DNA**

Readers familiar with the Nautilus will have already recognised one similarity between the 802 D3 and the Nautilus, which is that tapered tube behind the 802 D3’s tweeter... though whereas the 802 D3 has only one, the Nautilus has three (four if you include the one behind the bass driver). This tube works as an ‘inverse horn’, extracting unwanted energy from the rear of the diaphragm and moving it away to be dissipated inaudibly as it moves down the tube. It’s required because if the sound coming from the back of a diaphragm is not removed it will interfere with the correct motion of the diaphragm and/or—depending on the material from which the diaphragm is made—be transmitted into the room, where it would interfere with the sound waves being generated by the front of the diaphragm.
But it isn’t only the tapered tubes that are unusual: so too are the drivers used for the B&W’s tweeter, and also for its midrange driver.

The 25mm diameter surface of the dome tweeter on the 802 D3 is not made of cloth, or plastic, or metal… it’s made from pure diamond. Thanks to the use of this material the dome of B&W’s diamond tweeter is so hard that it does not enter its ‘break-up’ mode until nearly 70kHz. This is a far higher break-up frequency than any other material used to make tweeters, and means that the dome will remain rigid and exhibit the desired piston-like behaviour not only within the audio band, but also for at least an octave above it. One problem with diamond domes (apart from their cost and a slight weight penalty over other exotic materials) is that they’re so fragile that a protective grille is fitted, and this grille has a very tiny effect on the tweeter’s frequency response. Although the 802 D3 uses the same dome as previous 802 models, B&W says it’s improved the protective grille on the 802 D3 by making it more acoustically transparent, so it has less effect on the sound waves as they pass through it than the grilles on the previous 802s.

The midrange driver uses an unusual material for its 150mm diameter cone. This material is so unusual that B&W doesn’t want to tell anyone what it is, other than to tell us that it ‘isn’t Kevlar… it’s even better than Kevlar’. B&W calls this material ‘Continuum’ and says it has: ‘a unique composite construction.’ B&W’s preliminary brochure suggests that whatever material is used is woven into the desired shape but doesn’t specifically state that this is the case. Whatever it is, the new material ‘displays remarkably predictable behaviour right across the frequency range’ according to B&W, sufficient to make material ‘one of our most radical innovations in acoustic design in 30 years.’

The midrange cone uses the same FST ‘suspension’ principle as previous 802s. ‘FST’ stands for Fixed Suspension Transducer. Essentially it means that instead of having a roll surround suspension around the circumference of the cone to allow for cone movement, the outer circumference is fixed to a narrow ring of polymer foam that instead stretches whenever the cone moves inwards or outwards. Using a tiny foam ring means that far less bending-wave energy is reflected back into the cone than with a normal surround, which reduces distortion. Also, fixing the cone’s circumference in this way improves transient response, since the mass and compliance of the surround is eliminated. It also allows greater high-frequency extension, so the crossover to the tweeter can be at a higher frequency than normal.

Just as B&W is being silent about the material used for its midrange driver, it’s being equally unforthcoming about the material used to make the cones of the two 200mm bass drivers fitted to the 802 D3, other than to say it’s a composite cone with two layers of outer material enclosing a foam core, and that it calls the composite material an ‘Aerofoil’ cone. The company says this silence is a legal necessity because it has patents pending on both cones, but the construction of the bass drivers seems not too dissimilar from a material B&W has been using for years, called Rohacel, which sandwiches a hard foam core between two carbon-fibre skins, but in the case of this new driver, B&W doesn’t say what materials it is using for the outer skins.

However, unlike with the Rohacel cones, B&W is now varying the thickness of the foam over the cone’s diameter which it says extends the cone’s pistonic behaviour further than would have been possible had the cone had a uniform thickness across its diameter. And because B&W is using two bass drivers, the cone areas of those drivers combine to give greater area for bass delivery, so if B&W had wanted to use a single driver it would have had to have had a diameter of around 280mm in order to deliver the same level of bass. B&W isn’t only using the output of the front of the bass drivers to deliver bass: it’s harnessed the output from the rear of the cones as well, which it re-directs through a ‘flow-port’ that’s mounted in the base of the speaker, which fires downwards, and thus omni-directionally throughout the room.

The 802 D3 is a very large speaker (it stands 1.2 metres tall) and very, very heavy (each cabinet weighs 95kg) but despite this size and weight the speakers are supremely easy to move around, because B&W has fitted castor wheels underneath. Once you’ve used the wheels to manoeuvre each speaker to the ideal position in your listening room, you then reach underneath and spin three ‘wheels’ that force spikes down into the floor so the speaker can’t move, and to ensure vibration isn’t transmitted from the speaker to the floor or vice versa.

IN USE AND LISTENING SESSIONS
They say beauty is in the eye of the beholder, but to my mind, the 802 D3 speakers are truly beautiful… at least when viewed from any angle where you can’t see the wide expanse of fluted aluminium that runs down the spine of the speaker at the rear. Luckily, the curvature of the cabinet means the aluminium is almost completely invisible except when the cabinet is viewed from the rear. This fluted aluminium spine is apparently an essential component of the upgraded matrix bracing inside the cabinet, and also fundamental to the integrity of the cabinet’s construction, as it constrains the curved side walls. Visually, I also found the silvery, space-age finish of the Continuum cone a huge improvement over the yellowish tinge of Kevlar. I also loved the look of the bass drivers, whose surface certainly looked like carbon-fibre to me. If I owned a pair of 802 D3s I’d be leaving the speaker grilles in their boxes.
I have been a huge fan of B&W's diamond tweeter ever since it was first introduced. The glorious deliciousness of the high-frequency sound made my spine tingle all those years ago, and the delightfulfulness of that sound has never diminished... the clarity and purity of the treble issuing from the diamond tweeters is always a revelation, every time I listen to any B&W speakers that use them. You'll find there's none of the 'zinginess' in the extreme highs that is the signature sound of most hard-dome tweeters, and the result of their resonant frequency being too close to the audio band.

The quality of midrange sound from the B&W 802 D3 was indistinguishable from that issuing from the tweeter. For the first time I found myself unable to detect even a hint of the point on the audio spectrum where the midrange driver was transitioning to the tweeter. I thought it might be revealed if I moved off-axis from the speakers, due to the different directional characteristics of the two drivers, but even the most extreme off-axis positions did not expose the crossover point. They did, however, reveal that the B&W 802 D3's dispersion is unbelievably good, which I put down to a combination of the FST driver technology and the fact the driver is effectively baffle-less, mounted as it is in its new reinforced and braced cast aluminium construction, so there are none of the response aberrations, reflections and timing errors that occur when a midrange driver is mounted on a baffle. The result was a sound-field that was suspended in my listening room so three-dimensionally intact that the sonic 'sweet spot' was almost everywhere.

Listening to the 24/192 version of ‘Winds of Change’, (Soundkeeper Recordings SR1005), Art Halperin's voice was absolutely realistic and perfectly spatially positioned, irrespective of whether he was singing solo, or with his back-up harmony vocalists—just listen to the harmonies on September Nights (which sounds a bit too much like Otis Redding's Sitting on the Dock of the Bay for me to really enjoy it). The combination of the high-res recording and the B&W 802 D3 made it seem as if Jon Rosenblatt's pedal steel guitar was right there in front of me, particularly on On My Way To You, and the acoustic guitar sound on Another Day Without You was perfect. The transients of the picking on the nylon strings, the movements of fingers over frets, the different resonances of the different guitars being played... the tiniest details of the performance were all made absolutely transparently crystal-clear. The percussion is tasteful and true-to-the-original by remaining in the background when played through the 802 D3s, but did serve to perfectly reveal the acoustic of the small church in which this album was recorded live direct to stereo, without overdubs, equalisation or mixing.

As for the bass, you might guess it may be 'big' just from the sheer size of the cabinets and the diameter of the two bass drivers but to my ears it was not so much 'big' as 'just right', and completely effortless. Those two drivers deliver everything from the delicate sound of the low strings on a cello or double bass, be they plucked or bowed, to the mighty sound of an orchestra at ffff, with kettle drums being beaten to within an inch of their lives. The usual deep bass 'stretchers', instruments such as electric bass and kick drum, were just a stroll in the park for the B&W 802 D3s... and the lowest notes I could find on a pipe organ recording (the Great Organ of St. Eustache, Paris) were delivered with authority at sound pressure levels that I would not have thought possible.

But I have left the best for the last, and that's the ability of the B&W 802 D3s to sound more like a real piano than any loudspeaker I've ever heard. Listen to Simone Dinnerstein's recording of Bach's Goldberg Variations (Telarc CD-80692) and you will really think there's 1903 Hamburg Steinway D sitting in the middle of your listening room. For a more Australian flavour, listen to Gerard Willems' recordings of Beethoven's piano sonatas, all recorded on various pianos made by Australian piano manufacturer Stuart & Sons. I didn't listen to all 36, but every sonata I did listen to made it seem as though I had Stuart & Sons grand in my room, not a pair of loudspeakers. (And yes, 36 sonatas, not 32. Willems adds the three Electoral sonatas plus the Fantasy Sonata in D, a reconstruction by Dutch musicologist Cees Nieuwenhuizen of Beethoven’s 1792 'Composition in D major/minor for piano.')

CONCLUSION
The good news is that if you love the sound of the piano, a pair of B&W 802 D3s is going to cost you a whole lot less than a Steinway or a Stuart & Sons... as well as take up a whole lot less space in your room. But if you simply love the sound of music, you're going to love the sound of B&W's new 802 D3s.
LABORATORY TEST REPORT

Newport Test Labs first looked at the averaged room response of the B&W 802 D3, averaging the response over a ‘window’ in front of the loudspeaker. The result is shown in Graph 1 and you can see that it’s excellent, extending from the upper graphing limit for this particular test (10kHz) down to 35Hz ±3dB. Rather incredibly, the response from 50Hz up to 10kHz is within ±1.25dB. That is very, very flat. It’s even more impressive when you consider that the region where the response ‘steps down’ by 1dB (50Hz to 300Hz) is an area that’s sensitive to room acoustics, so with careful speaker placement, even this might be ‘stepped up’ by 1dB.

The B&W 802 D3’s frequency response above 10kHz is shown in Graph 2 … or more precisely, its high-frequency response from 700Hz up to 40kHz. In this case, 40kHz is not only the limit of the test equipment’s measuring capability, it’s also the limit of the test microphone’s calibration. You can see that on this graph, Newport Test Labs has measured the frequency response of the B&W 802 D3 as extending from 700Hz to 35kHz ±3dB. The higher resolution of this graph shows minor dips at 2.5kHz and 5kHz, plus a 5dB downstep at 15kHz that then extends at the same level out to 35kHz. The minor dip at 2.5kHz is visible on the pink noise response as a very shallow depression in the response, but the dip at 5kHz doesn’t show on the response at all, indicating that it would be inaudible to the human ear. The overall frequency response of the B&W 803 D3 is shown in Graph 6, which was created by Newport Test Labs manually splicing the data from Graph 1 to the data from Graph 2. It shows that the overall measured response of the B&W 802 D3 was 35Hz to 35kHz ±3dB.

Low-frequency response is shown in Graph 3, acquired using a near-field technique that simulates what would be measured in an anechoic chamber. You can see the responses of both bass drivers are almost identical, which is excellent, but actually very rare in a twin-driver design, so full marks to B&W for managing it.
The drivers roll off very smoothly below 100Hz, with the output from the port not taking over primary duties until 30Hz. The acoustic crossover to the midrange driver appears to be at around 420Hz. The port is tuned very low, with its maximum output at 20Hz, with the result that it’s still producing significant output as low as 15Hz. There is some unwanted high-frequency output from the port at 250Hz, but because the port is down-firing I’d expect this to be absorbed by the floor. There’s certainly no evidence of it having any effect on the room response shown in Graph 1.

The impedance of the B&W 802 D3 shows that it will be quite a difficult design to drive, requiring an amplifier that’s happy driving loads lower than 4Ω almost continuously, because the impedance is lower than this across a great proportion of the audio spectrum—from 70Hz up to 1kHz—and it’s also below 4Ω from 14kHz out to 40kHz, after which it starts rising to the tweeter’s resonance. You can also see that the impedance dips to nearly 3Ω between 90Hz and 150Hz, and again to nearly 3Ω at 700Hz. The phase angle isn’t extreme but swinging as it does between –80° and +70°, it also isn’t exactly benign.

On the plus side, although the amplifier should be able to easily drive very low impedances, it won’t have to be overly powerful, because the B&W 802 D3 proved to be very efficient in Newport Test Labs’ standard—but very stringent—test for sensitivity, returning a measured result of 89dB SPL at one metre for a 2.83Veq input. This means it’s nearly twice as efficient as most loudspeakers.

This design is a tour de force for B&W, with almost unprecedented bass and treble extension, a superbly linear response across the audio spectrum plus high efficiency.

Steve Holding