

B&W

CM5

LOUDSPEAKERS



As it becomes ever-more-difficult to turn a profit building hi-fi loudspeakers, more and more manufacturers are looking to economise. Even that grandest of names in British audio, B&W, which until very recently manufactured its cabinets and drivers in Great Britain and Europe, has moved the production of some models (including the CM5) to China. However, whereas some of the biggest speaker manufacturers have decided to reduce their costs by cutting back on their R&D or, in some cases, getting rid of their research and development departments completely, B&W continues to maintain its unique, fully-equipped R&D department in Elm Grove Lane, Steyning (and yes, it is as leafy and quaint as it sounds). It's unique because the R&D facility is not only fully-staffed, but also completely separate from B&W's corporate and factory locations, so the 'boffins' are pretty much left to their own devices... which is how such designs as the CM5 come about.

THE EQUIPMENT

Our photograph of B&W's CM5 doesn't really do it justice. Neither does B&W's own expensive glossy brochure really... you have to see—and feel—a CM5 in the flesh to get a real handle on its quality. Sure it's just a small two-way loudspeaker... but what a loudspeaker!

The tweeter is a good place to start. It's not just any tweeter... it's a simplified version of B&W's famous 'Nautilus' tweeter,

so-named because it was originally developed for the curiously-shaped B&W Nautilus. If you could look inside the cabinet of the CM5 you'd see that behind the tweeter is a long tapered tube. (As it happens, you can see the end part of this tube by looking into the speaker through the bass reflex port on the rear panel, about which more later.) What happens is that sound produced from the rear of the 25mm alloy diaphragm is channelled through the hollow pole magnet and propagates down the tube as a series of simple plane waves. However, the combination of the taper and an absorbent filling within the tube means that the energy is dissipated before it reaches the end of the tube, so it can't be reflected the way it is in an ordinary tweeter. This means that not only is the physical movement of the diaphragm unaffected by the energy from the back, but also that soundwaves 'behind' the tweeter cannot interfere with the direct sound from the front of the diaphragm. Additionally, the fact that the dome is made from solid (albeit extremely thin!) metal further inhibits the transmission of sound from the rear of the tweeter through to the front. (Interference caused by unwanted 'leakage' of sound through the diaphragm is an ongoing problem with fabric-domed tweeters, and is thought by some to be a significant factor in audiophiles' perception that fabric dome tweeters sound 'softer', and 'less focused' than metal dome tweeters. The tweeter is housed behind in a very large alloy faceplate which, as you can

see from the photograph, has been 'cut away' at its base to ensure that the tweeter is as close to the bass/midrange driver as possible, to enhance the impression of the sound issuing from a 'point-source'.

The bass driver in the CM5 is also beautifully made. My tape measure put its diameter at 175mm overall, but the important Thiele/Small diameter from which the piston area (S_d) is derived is 133mm. This puts S_d at 139cm². The basket is cast from such a high-strength alloy that B&W has been able to use extremely narrow supporting struts, so that energy from the rear of the cone is able to be delivered to the bass reflex port almost completely unobstructed. The design of the basket is such that the motion of the spider cools the voice coil, the heat from which is thus dissipated almost immediately. Additional cooling is provided by virtue of the magnet itself being rear-vented, and even more because the driver is an 'exposed voice coil' design. Interestingly, the black bullet-shaped pole-piece that protrudes through the centre of the face of the Kevlar cone is removable.

Speaking of Kevlar, B&W goes to some lengths to point out that it uses *real* Kevlar, sourced from its sole manufacturer, DuPont. It seems that quite a few loudspeaker cones that their manufacturers claim to be made of Kevlar are in fact not true Kevlar at all, but some other generic para-aramid synthetic fibre, so B&W is making the point that it uses the genuine article. The bass driver is linked

to the crossover by single lengths of very heavy-duty wire terminated with gold-plated spade lugs. It's clamped to the baffle via a machined metal dress ring using no fewer than eight bolts that tap into captive nuts.

The B&W CM5's bass reflex port is on the rear, which not only enables B&W to keep the front surface of the CM5 as small as possible, but also allows the port to benefit from the wall loading. The fact that the port is rear-firing does, however, mean that you have to ensure the CM5 is a little distance away from a wall (about which more later). The port is 165mm long, potentially 50mm wide and flared at the exit. The flare is covered with small dimples, which comprise B&W's 'flow-port' design. Like the dimples on a golf-ball, the dimples in the port are intended to reduce air turbulence. But what's that I said about the port being 'potentially' 50mm wide? B&W provides a two-stage 'port plug' that can be used to close off the vent entirely, converting the CM5 from a bass reflex enclosure to a sealed enclosure (in which case you can put it hard up against a rear wall), or you can remove a small inner section of the 'plug' to effectively reduce the width of the port to just 30mm.

B&W has cut costs by making the bass reflex port and the speaker terminal block from the same plastic extrusion, which cuts manufacturing costs dramatically without affecting performance in any way. Two sets of terminals are provided, to facilitate bi-wiring, and the terminals are gold-plated, multi-way types, linked by gold-plated buss-bars. The black cloth front grilles attach magnetically, so there are no small plastic lugs to break off if you're one of the many audiophiles who removes the grilles for intense listening sessions, but leaves them on at other times. Threaded sockets in the base of the enclosure can be used for spikes, or to lock the speakers to a stand. As noted in the beginning of this review, B&W has also reduced costs by manufacturing the CM5 in China, but this has an advantage in that it means that B&W is now in a position that it can now offer a wider range of cabinet finishes at the same price. For the CM5 you have a choice between two real wood veneers (Wengé and Rosenut) or a gloss (piano black) painted finish.

LISTENING SESSIONS

Real estate agents have a mantra: position, position, position, which means where a house is located (street/suburb/orientation) is more important than the house itself. I wouldn't go quite that far when it comes to bookshelf speakers, because the make and model of the speaker is always supremely important (obviously!), but no matter what make or model it is, the fact remains that it is *where* you put a speaker in your room will have an incredibly dramatic effect on its performance. So much so that a mediocre-sounding speaker in the ideal position in a room will always sound better than a superior-sounding speaker located in the worst position in the same room. And, although positioning is important with any pair of loudspeakers, I think positioning becomes increasingly important as the physical size of the cabinet (and thus, also, that of the bass driver) diminishes.

Which is a really round-about way of saying that if you're buying a pair of CM5s (or speakers around the same physical size as the CM5s) you should be thinking as seriously about where you're going to put them as you are about your decision to purchase them.

First, let's look at the situation idealistically. In an ideal world, you'd be placing the CM5s on very, very solid heavy-weight stands, and using the threaded base to lock the speaker cabinet to the stands, maybe with a thick layer of sheet rubber interposed between. These stands would be of such a height that the CM5's tweeters were at the same height as your ears when you're sitting down in your usual chair. And, in that ideal world, you'd position those stands well out (at least two metres!) from rear and side walls, angled so the speakers aim directly at the listening position, and are also equidistant from each other and the listening position itself. That's the ideal, and will deliver the best sound. If, for reasons of domestic harmony, you think you could manage the stands, but not the position, remember that when the speakers are on stands, it's relatively easy to move the stands out into the 'ideal' position in the room for serious listening (remembering to remove the grilles as well), then put them back

nearer to the rear wall (replacing the grilles at the same time) when you're not using them, or when you're using them to play 'background' music whilst you dine or engage in some other pursuit. Of course this also means you have to factor in the additional cost of an appropriate pair of heavy-duty stands.

B&W CM5 LOUDSPEAKERS

Brand: B&W

Model: CM5

Category: Standmount Loudspeakers

RRP: \$1,999

Warranty: Five Years

Distributor: Convoy International Pty Ltd

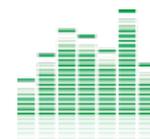
Address: Unit 7, 1801 Botany Road,
Botany NSW 2019

☎ **1800 817 787** ☎ **(02) 9700 0111**

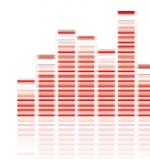
☎ **(02) 9700 0000**

✉ **info@convoy.com.au**

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- High-technology
- Outstanding build quality



- Need to add cost of stand
- Rear-firing bass reflex port

LAB REPORT

Readers interested in a full technical appraisal of the performance of the B&W CM5 Loudspeakers should continue on and read the LABORATORY REPORT published on page 114. Readers should note that the results mentioned in the report, tabulated in performance charts and/or displayed using graphs and/or photographs should be construed as applying only to the specific sample tested.



Lab Report on page 114

Matching B&W stands are available for \$599, but there are plenty of well-made Australian stands available that would be equally suitable.

If stands are not an option for you, even if you have them mostly near a rear wall, your best compromise is to wall-mount the speakers, using mounts that will give some clear space between the rear of the speaker and the wall, and the next option is to place them on a shelf or some other flat surface sufficiently far out that the port at the rear of the speaker has room to breathe, or if this is not possible, pushed back against surface, but in this case only after you've inserted both plugs in each port.

Almost all my listening was done with the speakers in the 'ideal' position in my listening room, though I did also use the 'compromise' positions for short periods, simply to judge the effect on the sound. On stands, you'll find the imaging of the CM5s is simply breathtaking, and the depth and height of the image that's created in front of you is so realistic it's almost tangible. Close your eyes and the speakers will disappear entirely... you just won't be able to locate them. All you'll hear is the band... or orchestra... or choir... or soloist... in front of you, as if you're in the best seat in the hall. It's uncanny. Of course a good deal of this is simply down to driver quality combined with quality control: two attributes for which B&W has always rightly been renowned. When you're mass-producing speakers, it's easy to find one pair of speakers from a day's production that is an outstanding example. What's more difficult is producing a day's production where every pair is indistinguishable from every other pair... and this is another area where B&W excels, and another reason why B&W speakers do cost a little extra.

One facet of the CM5s' sound that caught me completely by surprise was the fact that this high level of imaging was maintained across multiple seating positions, and not just confined to the 'sweet spot': that head-space exactly between the speakers. This meant not only that I could move my head when listening without hearing any image shifts, but also that other people listening with me could also enjoy superior imaging. This inspired me to look more closely at the dome tweeter, and I fancied it was rather less 'domed' than typical dome tweeters, which may very well have accounted for the superior spread of sound. Since I'm talking of the tweeter, I may as well discuss its sound at the same time, and I have to say that while I thought it was perhaps just a mite forward in the overall balance, it didn't have that too-forward 'zing' that manifests itself as a brightness that I often hear with metal-dome tweeters. The high frequencies were certainly extended, with a test CD showing that the tweeter easily ran out to 20kHz 'flat' to the human ear (see the

test report from *Newport Test Labs* for the full suite of laboratory tests). More importantly, when playing music, the highest octaves were always crisp and clean to the ear, with no blurring or softening, and no confusion when there was a lot of high-frequency energy, or when the volume was advanced. Playing 'Janis Ian Live: Working without a Net', which has live recordings across a wide variety of different venues, with a variety of instruments plus *a capella*, spoken voice, and of course laughter and clapping, will immediately demonstrate how accurately the B&W CM5s deliver these sounds. Particularly listen to the clapping (very hard to reproduce this properly!), and also to the unique 'sound' of each different venue. The CM5s allow you to hear that you're in a different venue even before a note has been played—you can just hear that the 'air' is different when the track starts. This attribute alone would commend the CM5s as ideal monitoring speakers.

The midrange sound is wonderfully rich, yet while maintaining a purity of tone that is remarkable. Some of this is no doubt due to the fact that the bass/midrange driver is doing almost everything that I'd classify as 'midrange', as it starts rolling off only a little below 4kHz, which is very high even for a two-way design. Most of it, though, is that lovely woven Kevlar driver, with the exposed voice coil and phase plug improving the phase and extending the upper reaches of the driver (no compression under a dust cap). The extension is important because it means the tone of reproduced sounds will remain identical from the bass right through the midrange, because it is all being produced by the same driver, with the same inherent distortions (though B&W says this is less than 0.5% from 150Hz right up to 20kHz), rather than being produced by multiple drivers—either a bass driver and a midrange driver, or two bass/midrange drivers arrayed in the increasingly popular 2½-way configuration... which brings me, of course, to the bass.

Low frequency extension is, naturally, restricted as a direct function of the laws of physics, which dictate limits on the bass you can extract from a small driver in a small cabinet... even with the assistance of a bass reflex port. Indeed B&W's own specifications put the 3dB downpoint at 52Hz and the 6dB downpoint at 45Hz, which means that the bottom string on an electric bass (an 'E' natural at 41.2Hz) will be attenuated by more than 6dB compared, say to the top string on the same bass guitar (a 'G' natural at 97.9Hz). And that's with nothing blocking the port. If you use the sealed or semi-sealed alignment, the low bass is rolled off earlier (which may very well be more desirable if you're fleshing out the low frequencies by using a subwoofer and/or if you're using the CM5s in a home theatre system rather than as a stereo pair).

All that aside, you will have to listen to



the bass yourself to appreciate what B&W's engineers have done, because when the CM5 is delivering bass within its capabilities, that bass is tight, hard-hitting and impressively detailed. What's more, the lower bass lifts somewhat in level the closer the speakers get to a rear wall... but as you do this, you start to compromise the imaging I mentioned earlier, so you can have one or the other, but not both simultaneously! Despite the fact that my listening room is very large (too large for such small speakers, actually), I found that so long as I kept a rein on my volume levels, there were actually very few times that I really thought I'd like a whole lot more bass than the CM5s were actually delivering, so I moved them up to a spare room which is about the same size as a living room in a good-sized home unit, and was rewarded by hearing more bass than in the larger room, as the CM5s were better able to 'connect' to the room. This experience would have me believe that unless you're a real bass freak, and/or you constantly play at overly-loud sound pressure levels, the CM5s will deliver ample bass in a typical living room. They'll deliver it from a modestly-powered amplifier too, because I found the CM5s to be very efficient, delivering high volume levels even when powered by a Sonos Zoneplayer 120, whose Class-D output stage (optimised for 8Ω loads) puts out only 55-watts maximum.

CONCLUSION

B&W's CM5s are quality speakers in every sense of the word. The pedigree is exceptional, the engineering is outstanding, the workmanship impeccable, and the sound quality is everything you could want from a pair of small stand-mount speakers... and more. What's more, the fit n' finish is such that the speakers simply ooze quality, such that they will draw admiring glances from visitors to your home... and that's even before you start playing any music!  **greg borrowman**

CONTINUED FROM PAGE 20

TEST RESULTS

The averaged room response of B&W's CM5 speakers was excellent, as you can see in *Graph 1*, which shows frequency response from 20Hz to 10kHz. It's very flat—always a good thing—varying by no more than ± 2 dB above 80Hz. As you can see, there are two traces on the graphs. The red trace is the averaged frequency response using pink noise test stimulus with capture unsmoothed and the blue trace shows exactly the same response, but smoothed to one-third octave to better match the perception characteristics of the human ear. Both traces are the averaged results of nine individual frequency sweeps measured at three metres, with the central grid point on-axis with the tweeter.

Graph 2 shows the high-frequency response of the B&W CM5 this time directly on-axis at a distance of three metres. It, too, is extraordinarily flat—at least it is up to 25kHz. Above 25kHz, the tweeter's response soars skywards, presumably to the resonant frequency of the alloy dome. Handily, this occurs at a frequency far higher than the human ear can detect. Over the range from 400Hz to 20kHz, however, the B&W CM5's frequency response is again within ± 2 dB. Excellent.

Given that you have the ability to 'tune' the low-frequency performance of the CM5 to suit yourself, *Graph 3*, which shows low-frequency response, was always going to be 'busy' with traces. You can see that the configuration that rolls off the bass driver the earliest is when the port is completely open (red trace). However, to compensate, it's in this mode that the port delivers the most output (black trace). The low-frequency response of the woofer is most extended (pink trace) when both foam plugs are used



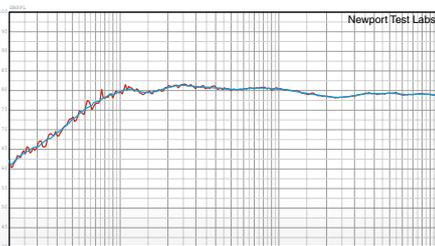
to seal the port off completely... but of course then there's no output from the port at all. Partially closing off the port extends the woofer's low-frequency response significantly, but then the port itself isn't as efficient, with almost 10dB less output than when it's not closed.

Graph 4 shows how the impedance modulus varies with the different cabinet alignments. The two bass-reflex alignments show the expected classic 'double hump' with the partially blocked alignment promising around 10Hz more bass extension. The sealed alignment has the typical single bass resonant peak at 80Hz. The graph shows that the 'nominal' impedance is lower than B&W claims, with the impedance reaching just 5 Ω at 20Hz, then dipping below 5 Ω between

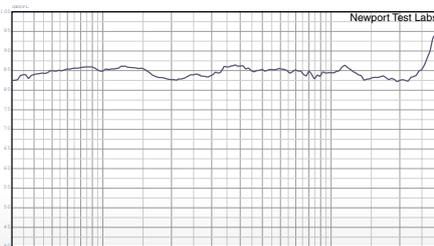
160Hz and 280Hz before dipping again below 5 Ω above 8kHz, where it reaches a minimum of 3.5 Ω at 20kHz. Under IEC guidelines, the CM5 has a nominal impedance of 5 Ω ... or maybe 6 Ω at a stretch, but certainly not the 8 Ω claimed by B&W.

Phase angle is shown in *Graph 5*. It swings from around $+60^\circ$ at 30Hz to -60° at 4kHz, but the extremes don't coincide with areas where the impedance is low, so the speaker will be an easy load for any competently-designed amplifier. This 'easy-to-drive' characteristic is given a helping hand by the relatively high sensitivity of the CM5. *Newport Test Labs* measured the sensitivity of the review sample at 87dB SPL under its standard test conditions—1dB less than B&W's specification, but an excellent result nonetheless, given the size of the bass driver and cabinet and the severity of the test methodology used by NTL.

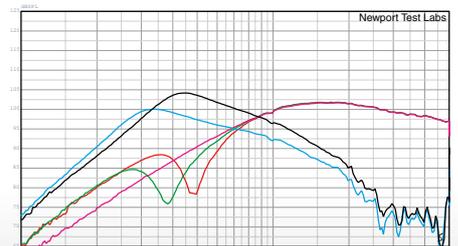
The final graph I've selected for publication is a composite one, where the low frequency pink noise response has been manually 'spliced' (via post-processing) to the gated sine high-frequency response, and the nearfield output of the bass driver has been super-imposed, together with that for the port, which this time has been scaled to show the exact contribution relative to the bass driver. You can see that overall, the response measured by *Newport Test Labs* extends from 59Hz to 25kHz ± 3 dB, which is close enough to B&W's own specification that the very small differences (amounting to 7Hz in the bass and just 3Hz in the treble!) can be put down to differences in measuring techniques. I think this response—indeed the complete set of test results returned—is an exceptionally fine result for the CM5, and for B&W's engineers.  **Steve Holding**



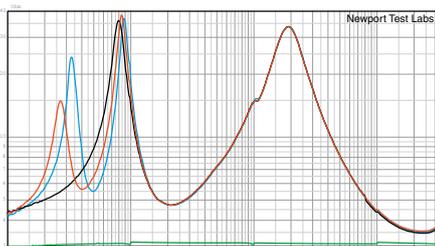
Graph 1. Averaged frequency response using pink noise test stimulus with capture unsmoothed (red trace) and smoothed to one-third octave (blue trace). Both traces are the averaged results of nine individual frequency sweeps measured at three metres, with the central grid point on-axis with the tweeter. [B&W CM5 Loudspeaker]



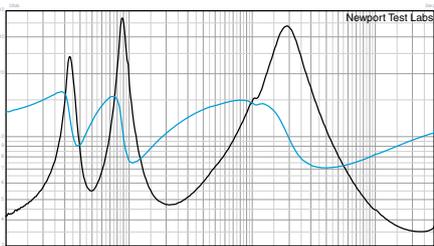
Graph 2. High-frequency response, expanded view. Test stimulus gated sine. Microphone placed at three metres on-axis with dome tweeter. Lower measurement limit 400Hz. [CM5]



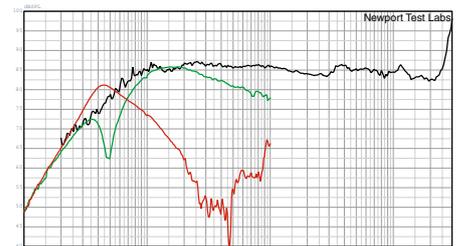
Graph 3. Low frequency response of front-firing bass reflex port open (red trace) and partly closed (green) plus woofer with no foam in port (black trace) and with port partially closed (blue trace). Pink trace shows woofer response when port is sealed off. Port/woofer levels not compensated for differences in radiating areas. [B&W CM5 Loudspeaker]



Graph 4. Impedance modulus with port partially blocked (red trace), with no foam insert at all (blue trace) and with port completely blocked (black trace). Green trace under is reference 3-ohm precision calibration resistor. [B&W CM5 Loudspeaker]



Graph 5. Impedance modulus of B&W CM5 with rear-firing bass reflex port completely open (black trace) and phase angle (blue trace). [B&W CM5 Loudspeaker]



Graph 6. Composite frequency response. Trace below 3.2kHz is the averaged result of nine individual frequency sweeps measured at three metres, with the central grid point on-axis with the tweeter using pink noise test stimulus with capture unsmoothed. This has been manually spliced (at 3.2kHz) to the gated high-frequency response, an expanded view of which is shown in Graph 2. Red trace is port output, green trace is near-field woofer response, with port scaled. [B&W CM5 Loudspeaker]