highly resolved to genuinely rate as an audiophile design. If the Quad ESL-63 is taken to represent an ideal tonal balance, then the Beolab 5 sounds a bit leaner and a mite clinical, yet such was the available extension and sheer might of its low frequency output that it never sounded small or thin.

Some aspects were striking. From the upper-mid to the treble, the sound was very open, crisp and explicit. Percussion transients were properly portrayed in the three-dimensional soundfield. The sound in the room was most natural, thanks to the wider energy dispersion in the upper range which gave a lively, airy effect.

In addition, the overall gain in performance delivered by the use of direct-coupled 'active' speaker technology lifts the Beolab 5 well beyond the norm. On digital drive this speaker delivered lively dynamics and with above-average rhythm and timing, while the overall effect of the scale and bandwidth was undoubtedly very impressive.

Comparing analogue and digital signal inputs, the use of the analogue inputs connection involved a further conversion to digital within the Beolab 5, and you can hear it. The sound quality was now heard to be not as clearly etched, the soundstage not as deep, not so highly resolved nor so dynamically involving. Of course, the price and quality of those necessarily long analogue cables matters as well. Careful tests showed that on digital input mode the standard B&O coaxial cable was just fine, and no significant gain was obtainable with audiophile digital cable. The Beolab 5 worked very well on its analogue input for general-purpose use, but the full performance was only attained through the digital connect.

CONCLUSION

The Beolab 5 is a *tour de force*, for both the design team at B&O and the industry as a whole. It has combined challenging innovations in the fields of optimally controlled acoustic directionality, with an intriguing and effective, wholly automated room EQ facility; either feature would have been adequate to distinguish a new design, but in addition to this, B&O has also included ICE power high-efficiency amplification with a generous total of 2.5kW per channel for four-way active loudspeaker drive, organised by a powerful DSP engine, generating fully-corrected crossover algorithms.

The Beolab 5 had a very wide dynamic range, a very wide and even frequency response, low distortion and precise and stable stereo imaging. Its adaptability means that surprisingly good sound will be possible even with difficult room arrangements.

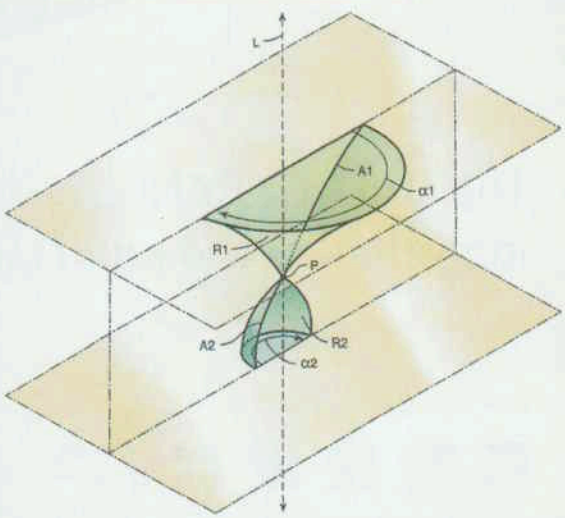
> Its adaptability will mean surprisingly good sound will be possible even with difficult room arrangements

Nothing has been left to chance, from the generous 380mm woofers to the control interfaces, usable with any system including those from B&O. The result is a highly capable, relatively compact and thoroughly modern loudspeaker. In fact, I found this a musical, neutral and informative product, quite well-timed and thoroughly credible, if a touch restrained in its overall dynamic expression. This BeoLab 5 really is whole lot of loudspeaker for the money, and should be put on your wish list, taking note for the value for money stakes that in this design the amplifiers and remote volume facility come free of charge! ■

B&O's acoustic lenses provide almost 180° of horizontal radiation

B&O'S ACOUSTIC LENS

Conventionally, drivers are placed on the front plane of a loudspeaker enclosure. The enclosure generally shadows sound from radiating to the back, while the spread of sound to the front is reduced with increasing frequency as the wavelength of sound in air becomes comparable with the size of the source. Designers seek to address the non-uniformity of sound distribution over the frequency range by using drivers of reducing size with frequency and the results can be very good, especially when allied to low-diffraction tapered cabinet geometry, as exemplified by the Wilson WATT, the Avalon pistonic dome speakers and the low diffraction pod technology extensively worked on by B&W. However, the Beolab 5 uses an 'acoustic lens' principle developed and patented by Manny LaCarrubba of SAW (Sausalito Acoustic Works, California) and licensed to B&O. In essence, the technology places a driver at one focus of a three dimensional elliptical reflector, whereby the energy is reflected to the second focus, where it is redirected to the smooth curved directive expansion surfaces. These provide almost 180° of horizontal radiation, with a focused 35° control in the vertical direction. After further refinement based on psychoacoustic and computer-generated models which benefited from advanced B&O research in image perception, the production lenses were designed.



LAB REPORT

Looking at those strange slot-like radiating reflectors, I was frankly sceptical about their potential to give good frequency responses. But I needn't have worried, this speaker measured really well.

The Beolab 5's impulse response is well worth reproducing. Its fidelity to a filtered digital impulse form is so well time- and transient-aligned that it compares with the industry reference in this respect, the Quad ESL-63 electrostatic [Figure 1].

Figure 2 shows the primary, forward frequency response for which the last few kilohertz is somewhat dependent on the precise vertical azimuth. The response extended from a very low 20Hz right up to 20kHz for ±2.5dB limits, despite the use of those acoustic lenses. They must be very good, and in fact just how good can be gauged from Figure 3. Here the uniformity of horizontal directivity was seen to be extraordinary, like the reference performances of the Quad '63 and the big Tannoy Dual Concentric. The off-axis response closely mirrors the axial result right to 45°. Beyond this, the Beolab 5's performance pulls away from the other two speakers, maintaining a flat response even for a full 180° arc, just as claimed. In the vertical plane (not shown on the graph) a similar uniformity was seen for a 45° solid angle, falling away outside these limits, and so delivering the designed directivity performance.

FREQUENCY RESPONSE

Nearfield measurement showed that the effective crossover points were at about 120Hz, 550Hz, and 2kHz, with the bass and lower-mid drivers operating in their pure piston range, and time-aligned using fully-corrected digital crossovers.

The upper-mid dome continues to about 2kHz whereupon the final driver, the 25mm dome tweeter takes over. On its ideal axis, it held within 2dB to 20kHz, and with a finite ±2dB limit pass band from 4kHz upwards. The directivity and uniformity of response shown overall was simply excellent. Fine energy-versus-time behaviour was revealed by a MLSSA waterfall display. Comparison tests showed that the automatic low frequency equalisation was effective up to about 200Hz and that the local compensation generated was quite effective. For reference purposes, the measurement of room spatial average was done for the laboratory 'flat' speaker setting and here, while mild bass gain was evident, the overall trend was very smooth and carried a very extended bass response, in fact flat to 17Hz [Fig 4]. After auto equalisation, a still better balanced curve resulted, shown in green.

DYNAMIC RANGE

This is a powerful yet compact speaker and I wanted to confirm its credentials with respect to dynamic range and distortion. A very powerful 108dB was available for a stereo pair in a medium sized room, while the distortion results were interesting. At 86dBA, a fairly loud 'cruising' level, and for this calibre of active speaker, distortion should be low – and it was. At 5kHz in the treble we had second harmonic dominant at a creditable –60dB (0.1%). For 50Hz bass tone at this level, I got much the same figure. At a moderately higher level of 90dBA, now testing the upper-mid dome, a typical –50dB (0.33%) was still good, while 90dBA at 250Hz for the lower-mid cone driver gave much the same result. Gradual increases in distortion were seen at increasing power and sound level. 96dBA is a rather loud continuous level, yet here the tweeter still gave better than –50dB of distortion and the upper-mid was still tolerably good at 0.5% of distortion, this dominant second harmonic and thus acceptable.

CRANKING IT UP

Even at 25Hz the speaker would deliver 96dB before the onset of audible limiting. It could pull 100dBA before the automatic cutback set in. 35Hz at 100dBA was available pre-clip, if at a 10% distortion level (acceptable for such a low frequency). A massive 100dBA was possible at 50Hz and, unlike a separate subwoofer, these speakers worked as a stereo pair delivering still more room power. 90dBA for 50Hz gave a low distortion of 0.2% so the magnet and mechanical system of the 380mm woofer are of low distortion design. Taken overall, these were a very good set of lab results for a subjectively very good speaker.

Figure 1: Impulse response

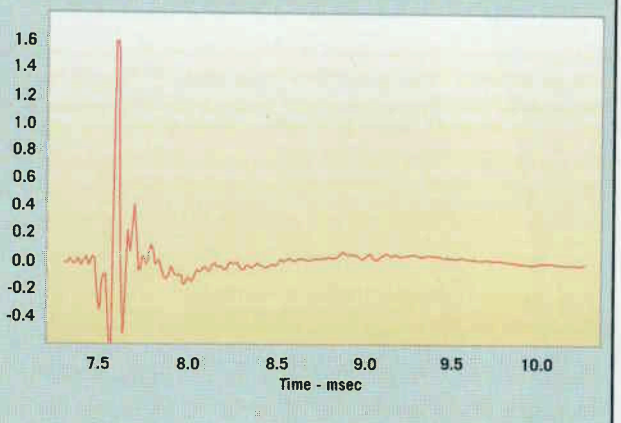


Figure 2: Primary, forward frequency response

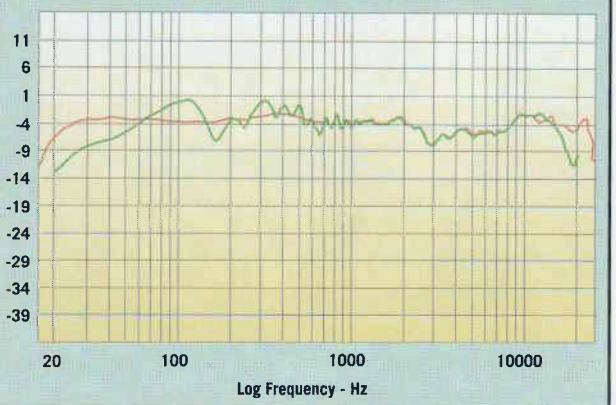


Figure 3: Frequency response

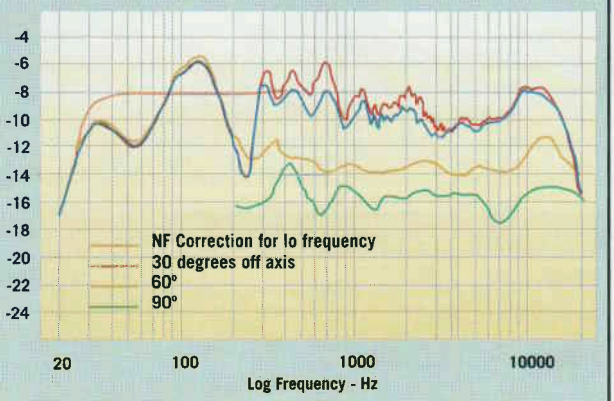


Figure 4: Frequency response