

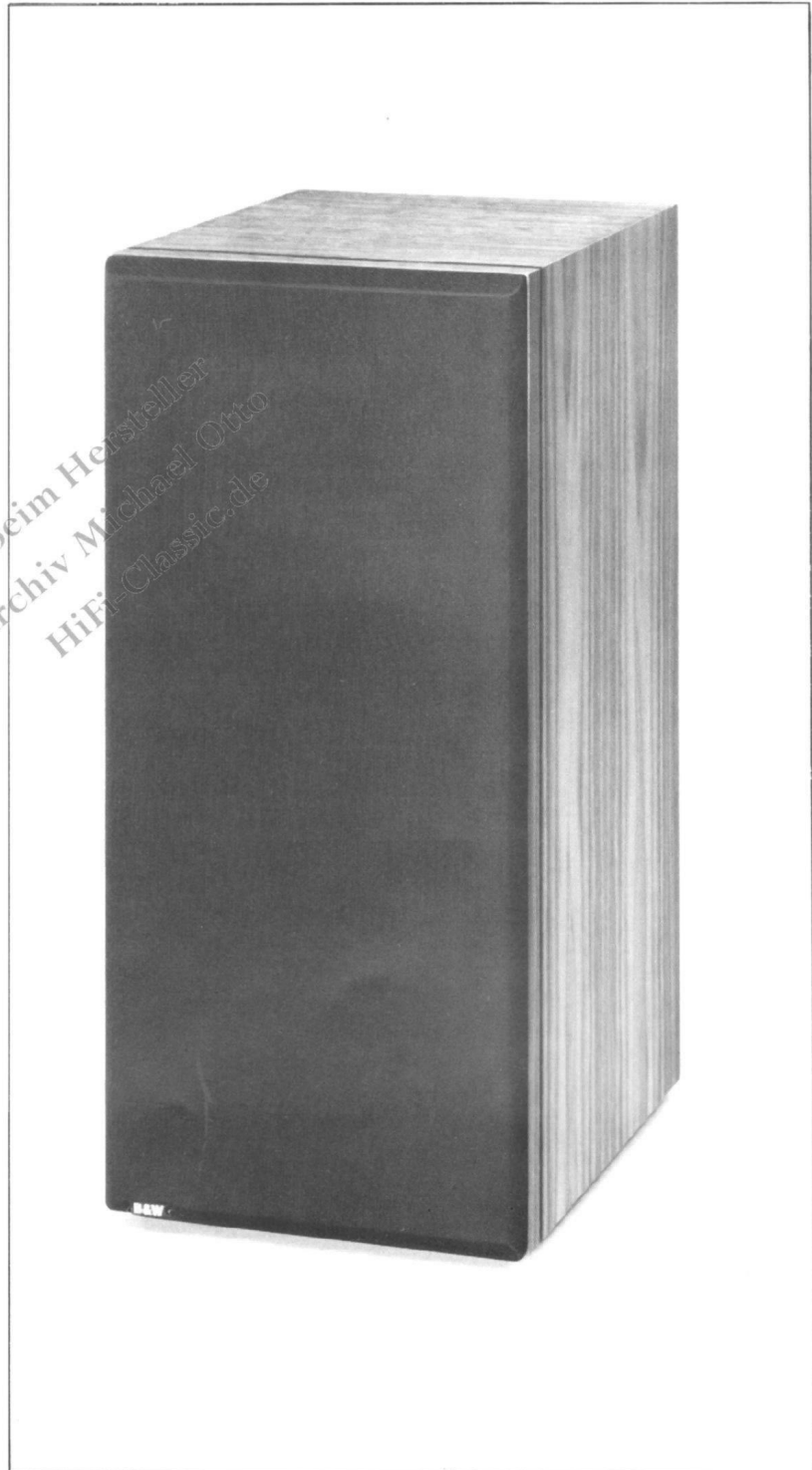
# B&W DM14

## The Design Brief

The DM14 is one of a series of new loudspeakers which together form the ongoing B&W DM range for the 'eighties. The design brief for the entire range was to benefit from the most sophisticated high-technology tools—such as the digital computer, the laser interferometer and computer optimisation programmes. With B&W's expanded factory space it was possible to purpose-design and produce every component except the enclosures 'in-house'. Originality of design and guaranteed quality control in production were thus ensured.

Two questions were asked in the DM14 Brief. In what way would this model best extend the range? What were its salient features to be? Four areas of development were selected:

- (1) DM14 should follow DM12 in that frequency linearity, freedom from all forms of distortion and colouration must be to 'monitor' standard, and that the model should be fitted with audio powered overload protection.
- (2) DM14 should have a useful extension in low frequency response over DM12 and be of higher sensitivity.
- (3) Enclosure size should be kept as small as possible—say approximately twice that of DM12.
- (4) Styling and general visual design should follow the DM12 concept, allowing the unobtrusive accommodation of DM14 in domestic rooms of modest dimensions, or in small studios.



### The Drivers

As both higher sensitivity and an extension in the low frequency output were prime design aims, the obvious engineering solution was to double the driver complement, thus doubling the radiating area and thermal power handling of the system. This solution has the advantage that if two drivers, having a nominal piston diameter of, say 150 mm are mounted close to each other, they will behave similarly to an elliptical driver with cone dimensions of 150 mm × 300 mm and will have the same broader horizontal dispersion compared with a single driver of circular shape and having the same radiating area.

The obvious disadvantage to this solution is that the vertical dimension of the driver has now increased to 300 mm and it will become more directional in a vertical plane as frequency increases. There are two possible solutions. One is to cross over to the high frequency transducer at a sufficiently low frequency so that the vertical directionality in the bass/mid-range configuration is unimportant. The alternative is to compensate electrically for the problem by a first order difference filter between the two bass/mid-range drivers. The latter solution was found most satisfactory and this is dealt with under the crossover and filter network section of the Specification.

The final driver configuration chosen for DM14 therefore consists of two high impedance 150 mm bass/mid-range drivers operating in a totally sealed enclosure, designed so as to ensure a low 'Q', well-damped third order highpass characteristic.

The high frequency section of the system was dealt with by our proven TW26 high frequency transducer. In this connection it is of interest to note that a similar motor system is used in our professional monitor Model 801. (Model 801 has been selected by EMI as the classical music monitor at their Abbey Road Studios and on location for recordings throughout the world. No higher accolade could be bestowed on a loudspeaker system.)

All DM14 drivers are 'over engineered', working totally within their limits as to power output, frequency response and dispersion. This is one of the many factors contributing to a large loudspeaker sound from this miniature enclosure.

### The Crossover Network

High technology crossover and filter networks have been synonymous with B&W designs for many years. Indeed, it was B&W who originated computer optimisation for the ultimately accurate design of these complicated networks.

In DM14 the networks feeding the upper bass and high frequency transducers are third order complementary Butterworth, having an acoustic response conforming to the closest limits of the theoretical ideal down to some -30 dB in the stop bands. This ensures accurate phase and amplitude conformity, and the minimum of distortion arising from resonances outside the passband.

In the section dealing with drivers, mention was made of the vertical directivity problem and the need gradually to attenuate the high frequency output from the lower bass/mid-range radiator. This problem has been completely solved by feeding the two drivers in

such a way that there is a first order difference filter between them, giving a fourth order characteristic for the lower drive unit. This first order difference filter ensures minimal phase shift with a 6 dB per octave fall in response as frequency increases.

All capacitors are close tolerance reversible electrolytic types with a generous 'over design' in terms of voltage rating. All series inductors are ferrite cored to ensure minimum insertion loss.

### The Enclosure Design

DM14 employs acoustic suspension rear loading for the bass/mid-range drivers. The sealed enclosure is massively constructed of 12 mm high-density particle board, laminated with 6 mm bituminous pads, and a 19 mm Medite front baffle assembly. The enclosure follows exactly the same design philosophy as our professional monitor Model 801 and some conception of the 'over engineering' aspect may be gleaned from the fact that the net weight of DM14 is some 16 kg.

### The Overload Protection

B&W was the first manufacturer in the world to introduce a complete electronic protection device into a production loudspeaker. This audio-powered overload protection makes it virtually impossible to destroy the drive units. Immediately the maximum thermal safety limit for any driver is reached, the system input is severely attenuated and the LED indicator shows a fault condition. The loudspeaker automatically returns to normal working conditions when the fault has been removed.

### The Accessories

As with all small loudspeakers, it will often prove convenient to locate DM14's on a table or within a shelf or wall unit. However, there are considerable advantages—in terms of freedom from colouration—to be gained by locating the loudspeakers away from reflecting surfaces. For this purpose, a specially designed stand is available which allows DM14 to be placed at the correct height to centralise the listening window for the seated listener. The stand (type STA/14) is an optional extra.

### Conclusion

As mentioned in The Design Brief, some of the most sophisticated high technology tools—such as our in-house computer and laser interferometry equipment—played an essential part in making the DM14 possible. Subjective listening tests also made a vital contribution to the assessment of final performance.

Different listening panels were asked to comment on comparative tests between two models, relating the listening experience to live music and speech. In the case of DM14, many of these tests were carried out in direct comparison with our Model 801, and it was pleasing to find many similarities. In view of the tremendous reputation Model 801 has gained from outstanding world press reviews, and the EMI accolade mentioned above, the design team felt that no higher indirect compliment could be paid to their latest miniature creation, the B&W DM14.

### SPECIFICATION

#### Frequency response

80 Hz to 20 kHz  $\pm 2$  dB free-field on listening axis at 2 m.

#### Low-frequency system

Acoustic suspension with third order high-pass characteristic, -3 dB at approx 65 Hz (half-space loading).

#### Dispersion

Vertical:  $\pm 2$  dB over 10° arc free-field response.

Horizontal: +0 -2 dB over 40° arc, 20 Hz to 10 kHz axial free-field.

#### Drive units

Three, vertical in line.

#### Bass/mid-range drivers BM150/14

150 mm dia. Bextrene cone heavily damped with p.v.a. compounds. 26 mm dia. high-temperature voice coil, phenolic resin impregnated on a foil-lined former. Vibration-isolation mountings reduce excitation of minor structural resonances.

#### High-frequency driver TW26

26 mm dia. polyester weave dome. 26 mm dia. high-temperature voice coil. Total moving mass not more than 0.3 g ensuring excellent transient response and extended frequency range above 20 kHz.

#### Distortion

For a nominal s.p.l. of 95 dB at 1 m.

Second harmonic: Less than 3% 30 Hz to 200 Hz.  
Less than 1% 200 Hz to 20 kHz.

Third harmonic: Less than 3% 30 Hz to 200 Hz.  
Less than 0.5% 200 Hz to 20 kHz.

#### Impedance

8 ohms nominal. Not falling below 6.4 ohms throughout the frequency range 20 Hz to 200 kHz.

#### Sensitivity

1 watt into 8 ohms for a s.p.l. of 86 dB at 1 m, sinewave input at 1 kHz.

#### Power handling

Suitable for amplifiers having a power output of 15 watts or greater. No upper limit in normal use because of electronic overload protection device. Maximum s.p.l. at 500 Hz 106 dB at 1 m.

#### Dimensions

Height: 567 mm (22 1/2 in).

Width: 256 mm (10 in).

Depth: 295 mm (11 1/2 in).

#### Weight

16 kg (35 lb).

#### Cabinet finish

Standard: selected veneers of teak or walnut.

Special: selected veneers of rosewood or black ash.

B&W Loudspeakers Ltd reserve the right to amend details of their specifications in line with technical developments.



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