



Instruction Manual

Gebrauchsanleitung

Handleiding

Manuel d'utilisation

Manuale d'istruzioni

Manual de instrucciones



MATRIX 1 SERIES 2

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# 1 Introducing B&W Matrix 1 Series 2

Your B&W Matrix 1 Series 2 loudspeaker system incorporates the first radical improvement in enclosure design for many years. Invented by Laurence Dickie (B&W Chief Electronics Engineer) it is an ingenious new type of construction, concealed within the loudspeaker cabinet. This unique construction – the B&W Matrix – virtually eliminates cabinet vibrations, which in ordinary loudspeakers add their unwanted contribution to the final sound.

This is a monitor quality loudspeaker system capable of generating extremely high sound levels. At the same time, due to its wide and balanced frequency response, it will faithfully reproduce the quieter sounds of a solo instrument requiring considerably lower sound level for a faithful reproduction of the live performance.

Quite deliberately, the B&W Matrix series of loudspeakers are described as digital monitors. They have been designed for the age of the compact disc, with all the additional requirements that this material places on the loudspeaker system – such as increased dynamic range, increased transient information, lower noise floor, etc. B&W Matrix 1 Series 2 is, however, just as much at home with good analogue material and essentially will faithfully reproduce whatever signals are fed to it.

The aim of this instruction manual is to increase your knowledge of the product and in doing so, to give you greater enjoyment from its use. Because any high quality loudspeaker is dependent both on the signals fed to it and the environment (i.e. the listening room) in which it is used, we have devoted separate sections to these subjects.

B&W products are distributed to more than forty countries throughout the world and we maintain an international network of carefully chosen distributors whose aim is to give you, the customer, the widest possible service. If at any time you should have any problem which your dealer cannot resolve, our distributors will be more than willing to assist you.

To conclude this introduction, we would like to thank you for your confidence in purchasing our products and to assure you of our continuing interest in ensuring that they give you lasting enjoyment and satisfaction.

# 2 The B&W Matrix series of Digital Monitors – design background

Laurence Dickie's timely breakthrough slotted perfectly into the ongoing development work of our Research Department – culminating in what we believe to be a very significant advance in loudspeaker technology.

## The B&W Matrix enclosure

The newly invented B&W Matrix enclosure, on which patent applications are pending throughout the world, is the heart of this loudspeaker and represents one of the few new inventions related to loudspeaker enclosures for many years. The B&W Matrix or honeycomb structure which fills the air space inside the cabinet prevents the enclosure (as opposed to the loudspeaker drive unit) from radiating sound, almost completely. This has never before been achieved.

There are a number of ways in which this elimination of enclosure sound radiation benefits the reproduction of the complete loudspeaker system:

- It reduces the coloration so frequently associated with box type loudspeakers, and so provides a more natural open sound. The point being that conventional enclosures add something of their own character, so to speak, to the relatively neutral uncoloured sound of the drive unit.
- Because the sound radiated from the enclosure takes a long time to decay, its elimination improves transient performance, especially at low frequencies.
- The radiating area of the sound source from the B&W Matrix enclosure is a smaller source than that of a conventional enclosure (because sound is not being radiated from the enclosure). Dispersion is therefore better, seating positions less critical and stereo information more accurate. In other words, the sound is perceived as coming from the space between the loudspeakers, rather than emanating from the loudspeakers themselves.

## The loudspeaker drive units

Having made this major breakthrough in enclosure design, B&W used their ongoing research programme to design equally exacting drive units.

Your Matrix 1 Series 2 incorporates a refined version of the polypropylene coned bass unit employed in the original model and a totally new metal domed tweeter. With a complete absence of diaphragm breakup modes to well beyond audibility the high frequency unit produces superb linearity and transparency. The low moving mass and response to 35kHz also ensure impeccable transient performance.

## Crossover, filter network and protection circuits

In any product, when the designer improves one module, others have to be upgraded if the whole is to be superior. Take the example of a car for which a new, improved engine is developed; better brakes and suspension must then complement the

improved performance from the power unit if the car is to be a totally better product. Likewise with the B&W Matrix series of loudspeakers: having improved both the enclosure and the drive units, corresponding improvements were necessary both in the components and design of the crossover. The APOC protection circuit on which B&W hold world patents, has also been upgraded. Its operation is fully explained under the appropriate section.

## Design background – conclusion

Within the scope of this short section it has been possible to give no more than the briefest glimpse into the new technology embodied in the B&W Matrix monitor loudspeaker range. The complete Design Story relating to the original Matrix series has been published by B&W. It sets out the measurements and detailed proof of the Matrix principle and is available from your dealer.

# 3 Unpacking, installation and aftercare

## Unpacking

We suggest that after unpacking your loudspeakers, you should retain the packaging against the possibility of wishing to transport them at a later date.

The carton contains:

- Two B&W Matrix 1 Series 2 loudspeakers.
- One copy of this instruction manual.
- Two calibration certificates – one for each speaker.

## Installation

The B&W Matrix 1 Series 2 is designed as a free-standing loudspeaker system, for use with floor stands. Ideally, the stands should be of solid construction and fitted with floor spikes. The recommended height is 48cm to 53cm (19in to 21in).

We manufacture a purpose-designed stand for B&W Matrix 1 Series 2 loudspeakers (see description in Section 7: Loudspeaker accessories). Full fitting instructions are enclosed with each pair of stands.

Of course, B&W Matrix 1 Series 2 loudspeakers will operate without stands, but acoustical performance is inevitably impaired. So it is very strongly recommended that stands should be fitted at the initial installation stage.

Matrix 1 Series 2 has four sets of terminals at the rear of the enclosure connected in parallel, i.e. red to red, black to black, and for normal operation either pair may be used. There is a number of specially designed loudspeaker cables available and at the B&W Research Department we have found linear or mono-crystal to be eminently suitable. In any case, a heavy gauge cable is desirable and it is good practice to keep the leads between amplifier and loudspeaker as short as is reasonably possible below 10m (30ft).

Recent work carried out indicates that there can be a small improvement in reproduction by connecting the two crossover network sections with separate leads, joining them at the output terminals of the amplifier. This is known as 'bi-connection' and is illustrated in Fig. 1. Should you wish to experiment with this method proceed as follows:

- Turn the loudspeaker upside down and remove the base cover (Fig. 2).
- Remove the two shorting links (Fig. 3).
- Replace the base cover.

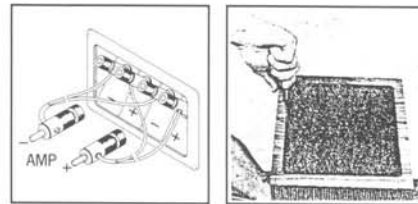


Fig. 1

Fig. 2

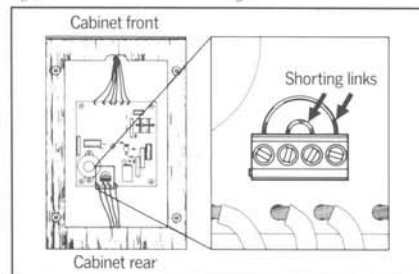


Fig. 3

The two pairs of terminals now operate independently for bass/midrange and tweeter filter.

Later sections deal with positioning your loudspeakers and the use of ancillary equipment.

## Aftercare

The real wood veneer on your B&W Matrix 1 Series 2 should be treated in the same way as you would treat a normal piece of

furniture. If you use an aerosol, please spray on to a cloth and keep it away from the front of the loudspeaker, especially the grille cloth and drive units.

If you need to brush or clean the grille cloth, please first remove the grille assembly by grasping the outer frame and pulling away from the cabinet. The grille cloth may then be brushed with a normal clothes brush or similar.

Please avoid touching the drive units, especially the tweeter, as damage could result.

# 4 The listening room and positioning your loudspeakers

The degree of accuracy with which the original musical performance can be reproduced in your own home depends on a number of factors, including the quality of the original recording, the equipment used for reproduction and the acoustic properties of your listening room.

Regardless of other links in the chain, the listening room will to a greater or lesser degree imprint its character on the reproduced sound you hear. In simple proof of this statement, notice how the sound of the human voice changes according to environment.

## Choice of listening room

Few people are fortunate enough to have a choice of listening rooms, but for those to whom this is possible (or anyone choosing a new home) the following may be helpful guidelines:

- Any room with different dimensions for ceiling height, length and width will sound more even in response than rooms where all the dimensions are similar.
- Solid walls are preferable and will show better reproduction of low frequency transients than some modern constructions where the inner walls are of plasterboard and slightly flexible.
- Other than in houses with solid or concrete floor structures, a ground floor room is preferable to an upper floor.

## Changing listening room acoustics

Quite small changes in the furnishing of a room can change its acoustic properties quite significantly. If you already have pictures on the wall, remove these experimentally and at once you will notice a considerable change in the sound from your loudspeakers! We are not suggesting that you should leave the room bare of pictures – quite the reverse, because pictures break up the otherwise plain wall surfaces and generally give fewer discrete high frequency resonances or flutter echoes.

Curtains are another element which can change the sound of your listening room in the mid/upper frequencies. Heavier curtains give more sound absorption of these frequencies and a softer, less reverberant quality to the upper octaves. Conversely if your room sounds too dead, thinner curtains will give more life or sparkle in these frequency regions. So far as sound in the low frequencies is concerned, this is largely controlled by the dimensions and construction of the room. However, large items of furniture do change room behaviour at low frequencies, and their placement may be worth experimenting with.

## Placement of your loudspeakers

It was once said that correct placement of a cheap pair of loudspeakers could produce better sound than incorrect placement of a much more expensive product. Whilst this is somewhat of an exaggeration, it is still true that changing the position of your loudspeakers will have a greater influence on the sound than any other variable under your control.

The height of the stands for your B&W Matrix 1 Series 2 system will determine the listening axis (i.e. centre of the 'listening window') when seated in normal living room furniture.

The spacing between your loudspeakers will depend on the size of your listening room and the distance of your seating from the loudspeakers. As a general rule they should not be closer than 1.5m (5ft) and the space between them should not exceed the distance of your seating for listening. Placement of the two loudspeakers and the listener on the points of an equilateral triangle is not a bad rule to follow.

The position of the loudspeakers in relation to the walls of the listening room can have a noticeable effect on reproduction – especially at low frequencies. Generally, bass will increase relative to the middle and high frequencies as the loudspeakers are moved nearer the walls.

Placement hard against a wall, or worse still in the corner, will give rise to too much bass, with a boomy quality. In general, spacing from the walls of between 0.5m (2½ft) and 1.5m (5ft) is recommended, but it is well worth experimenting until you have the most acceptable sound. It is usually worth endeavouring to make the spacing between the two nearest walls uneven. As an example, the ratio of 0.5m (2½ft) to 1.5m (5ft) for the two walls can give excellent results.

We have been discussing the proximity of loudspeakers to the wall in the context of lower frequencies; but it is also worth mentioning that stereo information in a front-back plane will also improve if the rear wall is at least 0.5m (2½ft) from the back of the loudspeaker.

One choice as to which of the four walls to place your loudspeakers near will largely depend on your arrangement of furniture. But again, the option of the longer, as opposed to the shorter wall is well worth trying.

A final word about symmetry. For best balance of stereo information the boundary conditions relative to each of the two loudspeakers should be as acoustically similar as is possible.

## 5 Amplifier, control unit and source equipment

### The power amplifier

The recommended limits of power output for the driving amplifier are:

MINIMUM ..... 50W RMS  
MAXIMUM ..... 120W RMS

In giving these limits it should also be stated that amplifier power output requirement is an almost impossible figure for the loudspeaker manufacturer to specify. It will depend entirely upon the type of music reproduced, size of listening room and sound level required by the listener(s).

Because B&W Matrix 1 Series 2 is fitted with an especially sensitive form of APOC it would be totally reasonable not to show the upper limit of amplifier power and it is always better to have an amplifier with high power output, as this allows ample headroom for the reproduction of transients; whereas if the amplifier output is too low, clipping will occur. In effect, the loudspeaker will be fed with Direct Current and the general performance degraded.

### The control unit

The control unit – although it deals with small voltages rather than large currents as in the case of the power amplifier – is an equally critical part of your listening chain. Choose with care, in the knowledge that the ultimate test for audio components is critical listening.

At B&W's research department there are many different combinations of control units, amplifiers and source components such as analogue/CD players, tuners, etc. It is our experience that each unit (to say nothing of the interconnecting cable) is a variable, and the final listening chain is a combination of variables which should be carefully listened to before making a final choice.

### CD player, analogue turntable and tuner

The comments in the previous paragraph apply equally to these items of equipment. CD players have now been on the market for some years and already considerable advances have been made. In its present state of development the CD player, when coupled with the best recordings made on this medium, can provide the most exceptional source material, totally worthy of the finest equipment with which it is associated.

## 6 The B&W Matrix 1 Series 2 protection circuit

This loudspeaker system is protected against excessive input signals. As soon as the safe upper limit is approached, the protection circuit will come into operation. Overload will result in the tweeter being temporarily muted, with a consequent loss of high frequencies. As soon as this condition occurs you should reduce the volume or switch off the power amplifier. When the overload/fault condition has cleared, your loudspeaker will automatically be restored to normal operation.

## 7 Loudspeaker accessories

In this section we propose to comment briefly on two essential accessories associated with your loudspeakers: stands and cables.

### Stands

The choice of loudspeaker stands has a considerable influence on the performance of free-standing (as opposed to floor-standing) loudspeakers. This is in two principal areas – the stability of the loudspeaker and sound radiated by the stand. Both problems arise from the mechanical forces generated by the drive unit(s) and their associated coupling to the loudspeaker enclosure.

If we consider the problem of stability, any movement of the loudspeaker enclosure will cause a blurring of the stereo image and degradation in bass transient performance. The second problem is that sound radiated by the stand is of a highly non-linear nature and will tend to defeat the benefits of the B&W Matrix enclosure. The ideal loudspeaker stand should therefore be extremely rigid both in its own structure and in the coupling to the enclosure. It should also be acoustically 'dead' to avoid extraneous sound radiation.

We have developed a purpose-designed stand for B&W Matrix 1 Series 2 which fulfils these requirements. If you have not already been shown this by your dealer, we suggest you contact him for details.

The B&W loudspeaker stand is fitted with spikes in order to further increase stability. We recommend its use wherever possible.

### Cables

The subject of cables between power amplifier and the loudspeaker has been dealt with in Section 3 under Installation.

There remains the question of interconnecting cables between the various pieces of equipment and the power amplifier. A number of excellent interconnect cables are available on the market and audible differences certainly exist between them. We suggest, therefore, that you choose one of the better cables for this purpose after consideration of the published reports.

## 8 Listening and record suggestions

Your B&W Matrix 1 Series 2 loudspeakers take you a stage nearer listening to the music rather than to the loudspeakers. You will hear much more of the desirable ambience and detail in good recordings. Unfortunately, the faults in poor recordings will also be revealed. We list a small selection of recordings which we ourselves have enjoyed listening to – both for their music and excellence of recording.

Label	No.	Title
B&W	BW001	The Academy of Ancient Music, 'B&W Present'*
L'Oiseau-Lyre	400 080-2 414 615-2 410 553-2 411 832-2 400 086-2 411 858-2	JS Bach, Violin Concertos 1 & 2 Josef Haydn, Cello Concertos Pachelbel, Canon Mozart, Exultate Jubilate Handel, Messiah Highlights Handel, Messiah (complete work)
Decca	411 929-2 400 048-2 414 273-2 410 201-2 410 004-2	Hurford, Toccata and Fugue Beethoven, Violin Concerto Copland, Detroit SO Saint-Saens, Organ Symphony Kiri Te Kanawa, Chants d'Auvergne
Philips	411 449-2 401 052-2	Haydn, Symphonies 100 & 104 (Davis) Saint-Saens, Piano Concerto No. 2
Chandos	Chan 8313	Walton, Symphony No. 1 (Gibson)
L'Oiseau-Lyre ECM 1288 CBS/Sony	DSL 09 823 844-2 32DP 230	Shostakovich, String Quartets† Eberhard Weber, Chorus Miles Davis, 'You're Under Arrest'
Geffen	35DP51	Joni Mitchell, 'Wild Things Run Fast'
GRP Records Blue Note Windham Hill Records	GRP D 9528 CDP7 46092 WD1036	Billy Cobham, 'Warning' Stanley Jordan, 'Magic Touch' Live at Montreux

The numbers listed are all for compact discs, with the exception of the item marked †. Almost all these CDs are available on 'black disc' if required.

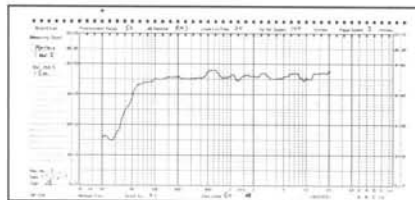
\*From your B&W dealer.

## 9 Specification

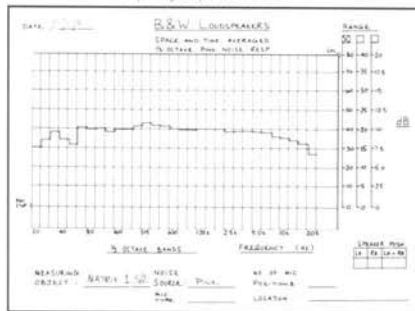
<b>Frequency range</b>	(-6dB points) 55Hz to 35kHz
<b>System resonance</b>	60Hz. System 'Q' 0.7
<b>Free field response</b>	listening axis ± 2dB, 80Hz to 25kHz ± 30° horizontal ± 2dB to 10kHz ± 5° vertical ± 2dB to 20kHz
<b>Averaged room response</b>	See plot and caption
<b>Sensitivity</b>	86dB (2.83V)
<b>Drive unit complement</b>	Two: one 150mm (5 <sup>1</sup> / <sub>2</sub> in) bass/midrange driver with polypropylene cone, 31mm (1 <sup>1</sup> / <sub>4</sub> in) voice coil on Kapton former, phenolic bonded and heat cured; one 25mm (1in) metal domed tweeter, polyamide terminated
<b>Distortion</b>	for 90dB SPL at 1m 2nd harmonic: < 3.0% (20Hz to 500Hz) < 1.0% (500Hz to 20kHz) 3rd harmonic: < 3.0% (20Hz to 500Hz) < 1.0% (500Hz to 20kHz)
<b>Impedance</b>	Not less than 5.6Ω
<b>Amplifier limits</b>	50W-120W at 4Ω (recommended)
<b>Dimensions</b>	Height 41cm (16in) Width 23cm (9in) Depth 32cm (12 <sup>3</sup> / <sub>4</sub> in)
<b>Weight</b>	10kg (22lb)
<b>Cabinet finishes</b>	Real wood veneers of walnut, black ash, natural oak, rosewood. To special order: high gloss lacquered finish within a choice of colours

B&W Loudspeakers Ltd reserve the right to amend details of their specifications in line with technical developments. B&W Matrix bass and bass/midrange drive units, which have a polypropylene cone assembly, are manufactured under licence from CBS Inc. Patent numbers available from CBS Inc. upon request.

B&W Matrix is a trademark of B&W Loudspeakers Ltd.



On axis free-field frequency response at 2m.



Third octave pink noise. Space and time averaged room response



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