



Nautilus owner's manual

The Nautilus loudspeakers you have invested in are an exact match to the first production loudspeakers. Hand-built and tested, serial marked and packaged individually, the refusal to compromise at any stage from concept to reality is a hallmark quality of Nautilus and your guarantee of absolute satisfaction.

Loudspeaker A

Loudspeaker B

Bass driver
Lower midrange driver
Upper midrange driver
High frequency driver
Crossover A

Bass driver
Lower midrange driver
Upper midrange driver
High frequency driver
Crossover B

Quality Control

Line Insp.
Tester
Packer
Random Insp.

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Introduction

Bowers & Wilkins monitors are widely considered to be the benchmark in music reproduction by professional musicians and audiophiles alike. The Matrix #801 has become the industry standard monitor in recording studios around the world, and it would be easy to rest on our development laurels.

However, the team of audio scientists at B&W's Research Laboratories at Steyning are perfectionists. For them, there are always areas which could be improved upon or refined.

Company founder, John Bowers, was an exemplar of the type. For him, the most glaring compromise in loudspeaker design lay in the cabinet. The standard rectangular enclosure only partially achieves its goal of absorbing the rear radiation from the drive unit.

Worse, it contributes resonances and reflections from the inside, and diffraction and reflection from the outside.

The Bowers & Wilkins breakthrough of Matrix cabinet construction offered a significant improvement to the panel stiffness of the rectangular box, but ultimately, the solution, John felt, was to remove the cabinet completely and create a dipole source. Sadly, time and ill-health intervened to prevent John Bowers from exploring this avenue of research further.

Custody of this work was passed to Matrix inventor and top acoustic designer, Laurence Dickie, with an enviable record of transducer and cabinet problem solving. Laurence had been experimenting with drivers mounted in the curved surface of a cylinder and encountered results not dissimilar to those of the dipole.

Namely, that external cabinet effects could be virtually eliminated and the intrinsic sound of the unit heard.

He used a ring magnet outside the coil with a thin-walled cylindrical pole piece to allow a smooth transition from dome to enclosure. Only one type of enclosure will provide absolute freedom from aberration – the infinite pipe or waveguide.

Excitingly, it became possible to imagine that an entirely waveguide-based system could actually work. Research showed that the exponentially tapered pipe was an even better absorber than the cylinder. So complete was its absorbing action that the pipe could be left open or closed.

This was the breakthrough. Thereafter, the usual disciplines of the acoustic engineer's art came into play. Juggling the variables of driver diameter, dispersion, break-up, excursion, practicality, and of course, economics.

It was decided that the system should be four-way with 300mm (12in), 100mm (4in), 50mm (2in) and 25mm (1in) units – all mounted in tapered lines within a diffraction limiting enclosure.

The enclosure evolved from the original cylinder into the sleek rolling vent design you have purchased. The massive rolling vent disposes of rear bass driver radiation, whilst the exponential transmission pipes loading the other drive units effectively deal with internal reflection and external diffraction at mid and high frequencies.

The drive for sonic purity is reinforced by using an active crossover design allowing separate amplification of each drive unit, cutting out component crosstalk and driver inter-reaction. Overall, the elimination of straight lines defeats diffraction and helps achieve virtually transparent music reproduction.

What results is arguably the most musical loudspeaker ever made.

Enclosure

Exponential line loading is used for all four drive units, primarily to achieve freedom from resonance and reflection, but also for the damping effect on the fundamental resonance in the low frequencies.

The two dome units are tightly coupled to their respective wave guides via a hollow pole magnet which causes minimal discontinuity to the advancing wave front.

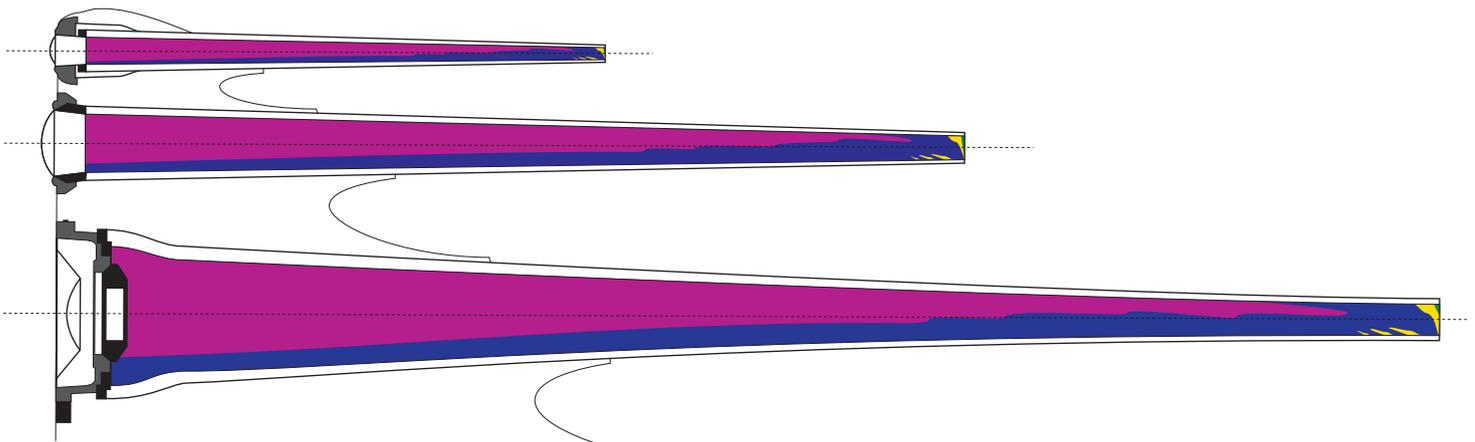
A hollow pole magnet is also to be found behind the lower mid diaphragm supported by a chassis which itself forms the first 50mm of the wave guide. The tube to which this is attached is shaped to smooth the transition from the chassis.

The distinctive natural appearance of Nautilus is derived from the best compromise of folding a tapered tube to save space whilst maintaining the highest curvature-to-width ratio. Traditionally, folded pipes have involved many 180° bends which have serious frequency dependent transmission properties.

10mm thick Glass Reinforced Plastic (GRP) has been used for the exterior surface which, when coupled with the doubly curved shape, results in an extremely stiff enclosure. The inner turns of the spiral are bounded by a foam filled GRP which braces the opposite faces of the snail in a manner similar to the Matrix type enclosure perfected by Bowers & Wilkins.

The external form of the Nautilus has been achieved using a blend of hand-built forming and advanced CAD technology borrowed from the automotive industry. This enables Bowers & Wilkins to maintain mathematical accuracy of the wave guide and to produce the final mould tool to submillimetric accuracy.

The high gloss surface finish is the result of using a two-part acrylic paint with a deep lacquer coat for lustre and durability.



Drive units



Each drive unit has been developed to operate as a piston within its intended frequency band, with two octaves between the upper roll-off and the first sign of break-up modes. Extensive use of aluminium in the diaphragms makes this possible. All voice coils are wound on polyimide formers to eliminate eddy-current losses, which are particularly serious at high frequencies.

A 9.5kg (21lbs) magnet with a 100mm (4in) voice coil acts as the massive motor of the 300mm (12in) bass unit. This, when used in the exponential line enclosure, results in a high-pass behaviour so over-damped that the traditional second-order characteristic is replaced by two distinct first-order slopes and no stored energy.

A 250 micron one-piece aluminium cone/centre dome ensures coherent motion to beyond 1.5kHz. From 220Hz to 880Hz, a 100mm flat-fronted unit is employed to prevent the gentle cavity resonance found in conventional cone units at around 2kHz interfering with the output from the upper midrange unit. A rare earth magnet assembly with hollow pole is used to minimise the obstruction to the rear radiation from the diaphragm.

Two domed units of anodised aluminium of similar construction, 50mm and 25mm in diameter, handle the 880Hz-3.5kHz and 3.5kHz-25kHz ranges respectively. All drive units are completely mounted on silicone rubber O-rings to decouple them from the cabinet.

Crossover

The division of the signal into the four required bandwidths is accomplished in the Nautilus Active Crossover via totally nonresonant circuitry. Both inputs and outputs offer single and balanced operation, the latter being particularly useful in noisy electrical environments, although a slight subjective improvement has been observed when using balanced signal interconnections at every stage.

With suitable pre- and power amplifiers, one unit is required for each loudspeaker and should be sited close to the power amplifiers. A mains power supply connection for each crossover is required. Each crossover includes an Auto Detect On/Off option switch on its rear panel. This can be used to specify the unit's power management behaviour. With the Auto Detect switch in the Off position, the crossover will always stay on. With the switch moved to the On position, the crossover will revert to standby if left inactive for a period longer than 20 minutes. To wake the unit from standby, simply supply the crossover an audio signal or press the button in the centre of the unit's fascia.

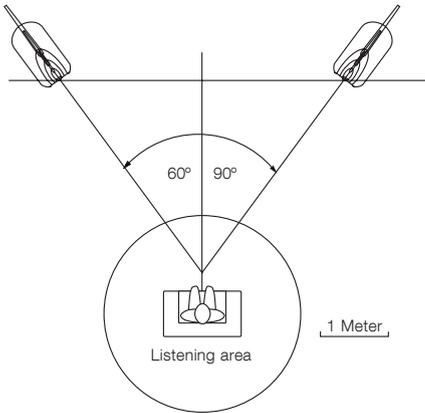
Important: your dealer must check that the serial number located at the rear of each crossover unit matches that of the loudspeaker – and that the stated voltage is correct for your mains supply.



Positioning

Placement of any loudspeaker can significantly influence the relative balance of sound in the listening seat and we recommend a degree of experimentation. In general it will be found that Nautilus gives optimum results when “toed-in” to a greater extent than in previous systems, set typically at an angle of between 60° and 90°. This is due to the smooth, wide dispersion of Nautilus which is capable of increasing the relative significance of the side-wall reflection.

Another benefit of the dispersion characteristic is the substantially increased listening area in which a pleasant and realistic stereo image may be enjoyed.



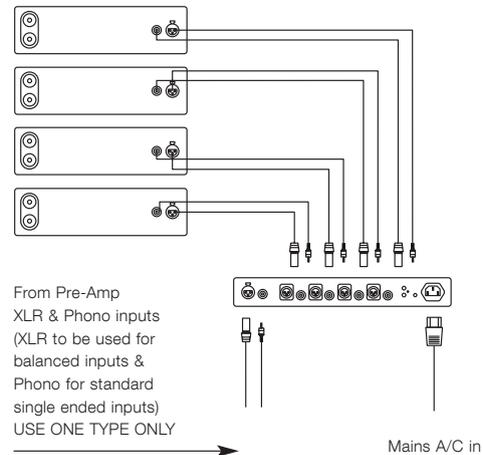
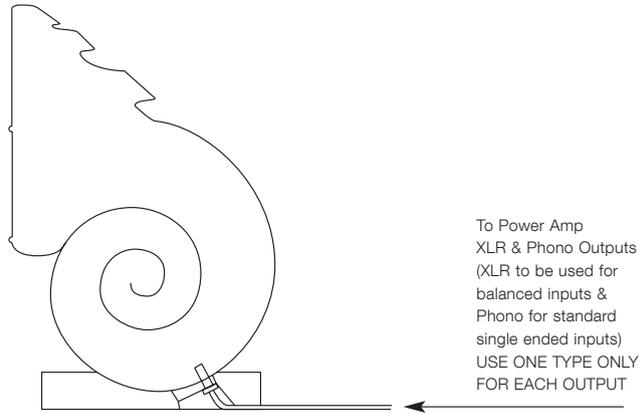
Installation

All connections should be made with the equipment turned off. Each Nautilus comes with its own dedicated active crossover network. The serial number on the amplifier end of the harness should match the serial number on the rear of the crossover network.

The crossover can be connected to the amplifiers with Phono leads for unbalanced operation or XLR types for balanced operation. Each Nautilus will require 1 separate amplifier channel for each drive unit. The gain and phase of each must be identical.

Each amplifier (channel) should be capable of delivering at least 30V RMS into 6 ohms for

realistic levels of reproduction. Most amplifiers capable of delivering 100W - 300W into 8ohms should be suitable. Connect each of the 4 crossover outputs (LF, LMF, UMF, HF) in turn to each amplifier or amplifier channel. The loudspeaker harness should then be connected to the appropriate terminals on the corresponding amplifier. The input to the crossover should then be connected to the output of the preamplifier. Connect the power and turn on the crossover, followed by the amplifiers.



Cable connection



High Frequency Unit

+ RED	+ ROT	+ ROUGE	+ ROJO	+ ROSSO
- BLACK	- SCHWARZ	- NOIR	- NEGRO	- NERO

Upper Mid Range Unit

+ BROWN	+ BRAUN	+ MARRON	+ MARRON	+ MARRONE
- BLUE	- BLAU	- BLEU	- AZUL	- AZZURRO

Lower Mid Range Unit

+ YELLOW	+ GELB	+ JAUNE	+ AMARILLO	+ GIALLO
- GREEN	- GRÜN	- VERT	- VERDE	- VERDE

Low Frequency Unit

+ ORANGE	+ ORANGE	+ ORANGE	+ NARANJA	+ ARENCIO
- VIOLET	- VIOLETT	- VIOLET	- VIOLETA	- VIOLETTO

Connection to Nautilus is via an 8-core cable of high purity silver on copper, terminated in bare ends to allow the most direct connection to the amplifier terminals.

It is generally accepted that the wires between power amp and driver should be as short as possible, so we do not recommend that the captive cable be lengthened in any way.

In the majority of cases it will be most convenient to locate the crossover units in close proximity to the power amplifiers, with correspondingly short line interconnects. Each cable should be connected directly to the respective outputs of each amplifier.

The line from pre-amplifier and crossover is likely to be comparatively long and should, therefore, be of high quality and low capacitance. It is further recommended that the balanced input of the crossover be used with two-core screened cable – even if the pre-amp is single ended.

In the latter case, the screen and one core should be joined at the source end.



Detail of twin cored screened lead connecting phono to XLR plugs (pre-amp to x-over)

Fine tuning

Before fine tuning the installation, double check the polarity and security of the connections.

If the hand-tightened nut that holds the Nautilus to the plinth is not done up sufficiently tightly, it can occasionally work loose. This may create a difficult-to-locate rattle or buzz. The accessory pack includes a rubber washer and a steel washer that should be employed between the plinth and nut to eliminate this problem. The rubber washer should rest against the plinth.

If it is not possible to position the crate near the plinth when unpacking, the pieces of foam covering Nautilus in the crate can be used to support the loudspeaker close to the plinth within reach of the loudspeaker harness.

If you need to alter the tilt of the Nautilus, French chalk is supplied in the accessory pack to ease movement between the speaker and its plinth.

If the level of bass is uneven with frequency, this is usually due to strong excitation of resonance modes in the room. Even small changes in the position of the speakers within

the listening room can have a profound effect on the perceived sound quality by altering the excitation of these modes. Try mounting the speakers along a different wall. Even moving large pieces of furniture about can have an effect.

If the general level of bass is too high, try moving the speakers further away from the walls. Conversely, if you need more bass, move the speakers closer to the walls. Space behind the speakers also improves the impression of perspective on well recorded material.

If the sound is too harsh, increase the amount of soft furnishing in the room. For example, use heavier curtains. Conversely reduce the amount of soft furnishing if the sound is dull and lifeless.

Test for flutter echoes by clapping your hands and listening for rapid repetitions. These can smear the sound, but may be reduced by irregular shaped surfaces such as bookshelves and large pieces of furniture.

After care

The GRP cabinets normally only require dusting. If you wish to use an aerosol cleaner, spray onto the cleaning cloth, not directly onto the cabinet.

If the surface of the speaker suffers any minor scratches, they can be polished out with fine T-Cut or finishing compound such as "Finesse It" by 3M.

When making or breaking connections, ensure all power is switched off otherwise damage may result.

Avoid touching the drive units, especially the domes, as damage may result.

Bowers & Wilkins

www.bowers-wilkins.com

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