


B&W Nautilus 801 loudspeaker

	<p>Description: Three-way, reflex-loaded dynamic loudspeaker. Drive-units: 1" (25mm) metal-dome tweeter, 6" (150mm) woven-Kevlar-cone midrange unit, 15" (380mm) paper/Kevlar-cone woofer. Crossover frequencies: 350Hz, 4kHz. Crossover type: third-order. Frequency response: 32Hz-22kHz, ± 3dB. Sensitivity: 91dB/2.83V/1m. Nominal impedance: 8 ohms (3 ohms minimum). Recommended amplifier power: 50-1000W. Maximum recommended cable impedance: 0.2 ohms. Dimensions: 43.7" (1110mm) H by 20.6" (522mm) W by 27.2" (690mm) D. Net weight: 229 lbs (104kg). Serial numbers of units reviewed: 0541, 0542. Finishes: black ash, cherry, red-stained cherry. Price: \$11,000. Approximate number of dealers: 150. Manufacturer: B&W Loudspeakers Ltd.,</p>
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The big B&W's sensitivity was basically to specification, at an estimated 90dB(B)/2.83V/m. However, the plot of its impedance magnitude and phase (fig.1) reveals that it is a demanding load, dropping to **3 ohms** through the midrange and to 4 ohms in the high treble. In addition, a punishingly high capacitive phase angle in the midbass, coupled with a low magnitude, will demand a good, current-worthy amplifier. It's no surprise that WP found biamping the 801s with two Levinson No.332s to be a worthwhile exercise. The saddle in the impedance magnitude curve indicates that the big flared port is tuned to 21Hz, which in turn implies superb low-frequency extension.

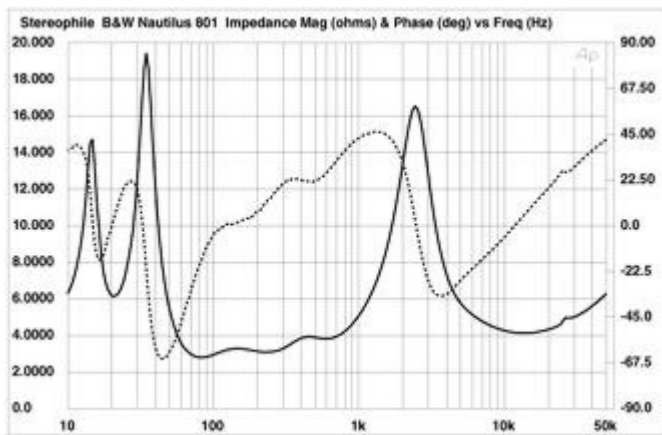


Fig.1 B&W Nautilus 801, electrical impedance (solid) and phase (dashed) (2 ohms/vertical div.).

Other than the wrinkle at 26kHz, caused by the tweeter's oil-can resonance, the impedance plot is free from any signs that the enclosure has resonant problems. Investigating the cabinet walls' vibrational behavior with a simple plastic-tape accelerometer did show that the bass enclosure's "matrix" construction reduced the levels of almost all resonant modes to very low levels. Fig.2, for example, is a cumulative spectral-decay plot calculated from the output of the accelerometer when it was attached to the side wall of the woofer enclosure.

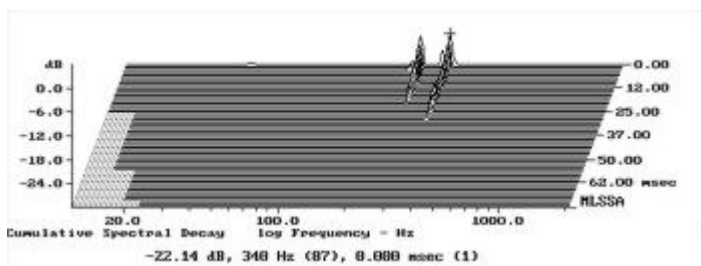


Fig.2 B&W Nautilus 801, cumulative spectral-decay plot of accelerometer output fastened to woofer-cabinet sidewall 12" from the top. (MLS driving voltage to speaker, 7.55V; measurement bandwidth, 2kHz.)

But there were a few places where more lively behavior could be found. Fig.3, for example, is a plot calculated from the accelerometer's output when it was fastened to the curved rear surface. At 78Hz, however, the mode shown will probably be too low in frequency to lead to coloration. A similar low-frequency mode could be found on the midrange enclosure---perhaps this is due to the mass/spring action of the enclosure and the isolation compound used. Again, I doubt this will have any subjective consequences.

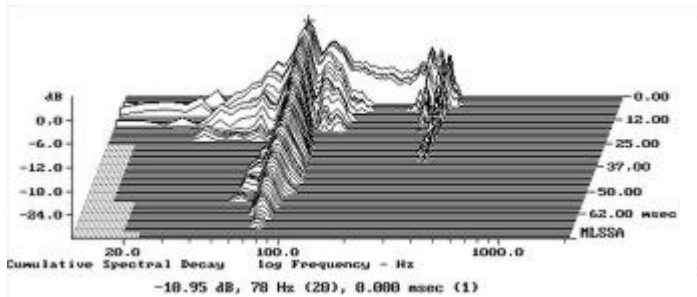


Fig.3 B&W Nautilus 801, cumulative spectral-decay plot of accelerometer output fastened to curved woofer-cabinet back surface 12" from the top. (MLS driving voltage to speaker, 7.55V; measurement bandwidth, 2kHz.)

Read more at From right to left, fig.4 shows the responses of the midrange/tweeter, the woofer, and the port. The latter covers the narrow bandpass centered on 20Hz, confirming the Nautilus' excellent bass extension. While some peakiness can be seen in its output at 300Hz, this is well down in level and will also be suppressed by the fact that the port faces downward. As expected, the woofer's minimum-motion point lies at 21Hz, with its output starting to roll off above 100Hz. The acoustic crossover to the midrange unit appears to be set at 250Hz, a little lower than specified. The slopes also seem asymmetrical: the midrange unit rolls out with a fourth-order, 24dB/octave slope, while the woofer's low-pass rolloff is more leisurely.

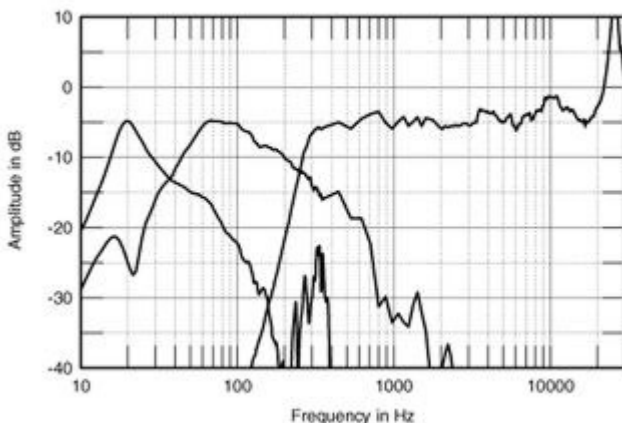


Fig.4 B&W Nautilus 801, acoustic crossover on tweeter axis at 50", corrected for microphone response, with nearfield midrange, woofer, and port responses plotted below 350Hz, 300Hz, and 1kHz, respectively. Higher in frequency, the enormous peak at 26kHz is the tweeter resonance mentioned in connection with the impedance plot. It will be inaudible, however, though it might make the speaker sound somewhat different with LP replay. (With CD replay, there just isn't enough energy above 20kHz to fully excite the resonance, while the wider bandwidth offered by an MC cartridge, which might itself have a resonance in the same region, will lead to the tweeter resonance being excited, which in turn might lead to intermodulation effects.) There appears to be a slight excess of on-axis energy centered on 10kHz, but the response trend through the region covered by the midrange unit and tweeter is otherwise very flat.

This flatness can also be seen in fig.5, which shows the Nautilus 801's overall response averaged across a 30 degree horizontal window on the tweeter axis. Below 300Hz, the traces show the complex sum (amplitude and phase) of the nearfield outputs of the midrange unit, woofer, and port. Fig.4 suggests that the woofer starts to roll out a little early, which leads to a slight lack of energy in the transition region to the midrange unit, which can be seen in fig.5. This is also the region where room boundary effects make their presence known, so predicting any subjective consequences is difficult. As this is the orchestra's "power"

region, I do wonder whether it ties in with the lack of loudness noted by WP in his auditioning, though such politeness usually correlates with a lack of presence-region energy.

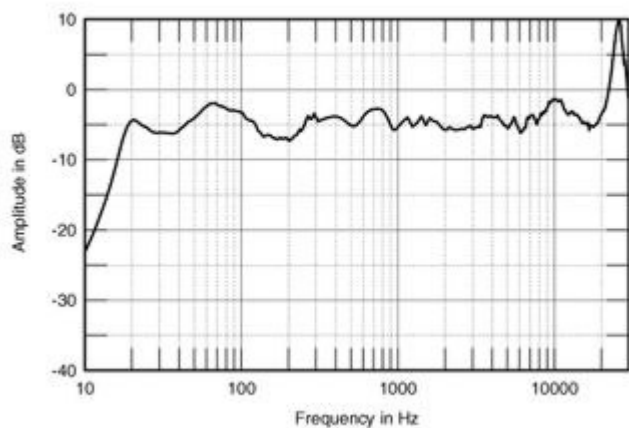


Fig.5 B&W Nautilus 801, anechoic response on tweeter axis at 50", averaged across 30 degrees horizontal window and corrected for microphone response, with complex sum of the nearfield midrange, woofer, and midrange responses plotted below 300Hz.

The horizontal dispersion plot (fig.6) does show a slight lack of presence-region energy at extreme angles to the speaker's sides. I wouldn't have thought this enough to affect the perceived balance, but if you compare the dispersion an octave lower at 1kHz, which is very wide, it is possible that the ear latches on to the contrast between the wide dispersion in this region and at the base of the tweeter's passband, and the significantly narrower dispersion in between. Note also the even spacing of the "contour lines" in fig.6, which suggests excellent control of the speaker's dispersion with respect to frequency. This always correlates with stable, well-defined imaging performance.

Fig.6 B&W Nautilus 801, horizontal response family at 50", normalized to response on tweeter axis, from back to front: differences in response 90 degrees-5 degrees off-axis; reference response; differences in response 5 degrees-90 degrees off-axis.

The Nautilus 801's tweeter is 43" from the floor, which is a little high for a person of normal height sitting in a sofa. (A survey performed some years ago by *Stereophile's* Tom Norton revealed a remarkable uniformity of ear height. Short or tall people sitting on typical domestic sofas had an ear height of 33"-39".) Fig.7, which shows the changes in the B&W's response in the vertical plane, normalized to the tweeter-axis curve, reveals that as long as the listener sits with his or her ears between the tweeter axis and the midrange axis, the perceived balance will not change too much. But if you sit so you can see the top of the speaker, or--- horrors---stand up, a deep suckout appears at the upper crossover frequency (indicated in this graph by the cursor). This lack of vertically off-axis energy in the presence region might also lead to the speaker's reverberant energy being too politely balanced.

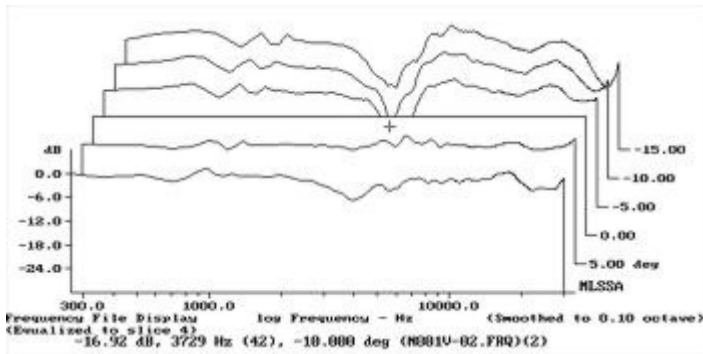


Fig.7 B&W Nautilus 801, vertical response family at 50", normalized to response on tweeter axis, from back to front: differences in response 20 degrees-5 degrees above HF axis; reference response; differences in response 5 degrees-10 degrees below HF axis.

The impulse response on the tweeter axis (not shown) is absolutely conventional, while the step response (fig.8) indicates that all three units appear to be connected with the same, positive acoustic polarity. As is usual with a high-order crossover design, however, the Nautilus 801 is not time-coherent, the tweeter's output arriving at the microphone a small fraction of a millisecond before that of the midrange unit, and the woofer's output lazily following that.

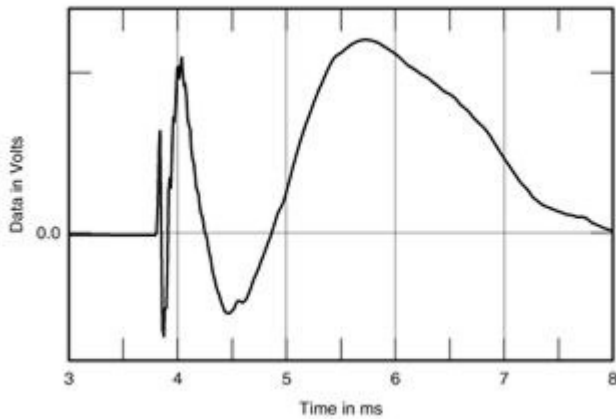


Fig.8 B&W Nautilus 801, step response on tweeter axis at 50" (5ms time window, 30kHz bandwidth).

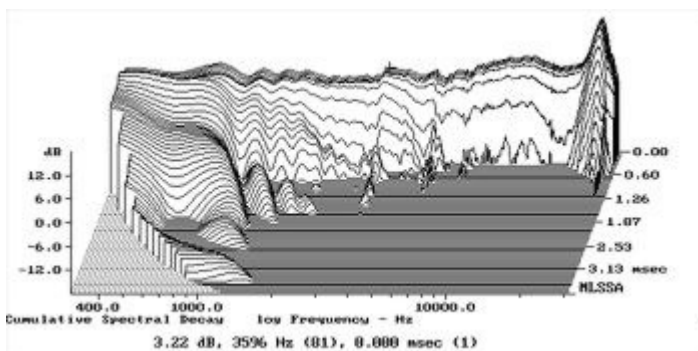


Fig.9 B&W Nautilus 801, cumulative spectral-decay plot at 50" (0.15ms risetime).

Finally, the cumulative spectral-decay plot on the tweeter axis (fig.9) is astonishingly clean and free from resonant modes. No wonder the B&W sounds so grain-free and easy on the ear.---**John Atkinson**