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...with MBL's iconic Radialstrahler 101 E MkII

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MBL Radialstrahler 101 E MkII

The speaker with no sweet spot arrives on our shores, offering a sound that's as distinctive as its aesthetics
 Review & Lab: **Paul Miller**

Few loudspeakers are as instantly recognisable as the 'Radialstrahlers' – directly translated 'radial emitters' – designed and built by German brand MBL. At every international hi-fi show their appearance draws crowds while the all-encompassing sound of those iconic 'melons' keeps visitors rooted to their seats. Am I giving away the punchline? Not really. Few seasoned audiophile travellers will not have heard these incredible music machines, but we have still waited a decade for them to reach these shores and be explored, inside and out, *Hi-Fi News*-style.

Originally conceived and created by the company's founders, Meletzky, Bienenke and Lehnardt (hence 'MBL') in 1979, the Radialstrahler design has since evolved under the guidance of chief engineer Jürgen Reis [see interview, p41]. Representing the Radialstrahler clan here is the MkII version of the 101 E, priced at an eye-watering £51,000 and available in main/trim colourways including black/gold, black/chrome (as photographed), white/gold, white/chrome and arctic silver/chrome.

BIG BROTHER

Standing a little over a metre and a half tall, and weighing 80kg apiece, the loudspeaker's custom radial drivers are ordinarily protected by a huge lift-on/lift-off cage [see p41], though even Jürgen Reis recommends removing them before listening. Incidentally, this is not the grandest realisation of the Radialstrahler principle. That honour goes to the flagship System 101 X-Treme that, in broad terms, takes the form of two 101 E MkII's flipped and stacked with their tweeters nose-to-nose, and augmented by two massive active subwoofer towers. Cost, if you must ask, is £185k-£194k depending on finish.

Most loudspeakers are omni-directional at low frequencies becoming progressively less so at higher octaves, but the Radialstrahlers

are as close to full range omni-directional speakers as currently exist, and all achieved without myriad drivers, reflectors or directivity-guiding DSP.

FEELING FRUITY

I've covered off the general principle of these pulsating drivers in our boxout [p39], with specific detail of the main bass melon. Frankly, I see it as a 'rugby ball', but 'melon' seems to have stuck in the audiophile vernacular. I'd also

'I see it as a rugby ball, but "melon" seems to have stuck'

suggest the topmost high frequency driver is closer in stature to a grape than a melon, its petals fashioned from a uni-directional carbon-fibre with each segment just

130µm thick. These are very stiff segments with a longitudinal resonance pushed up to 48kHz [see Lab Report, p43].

Slightly less stiff – and with a less aggressive behaviour at breakup – are the thicker (200µm) two-layer woven carbon-fibre segments employed for the midrange melon. In both treble and mid drivers these petals are sealed and separated along their vertical edges using a lightweight silicone polymer.

The low and high frequency limits of the melon concept are governed in practice by driver dimensions and choice of material(s). There's only so far down that big 'ol melon will go, and so MBL has married



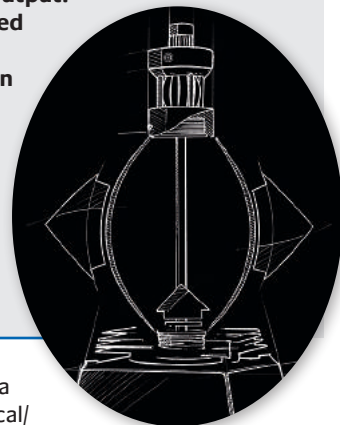
RIGHT: Treble, mid and bass are covered by pulsating 'melon' drivers that sit atop a sub-bass enclosure. The cabinet hosts a 300mm alloy-coned driver that exhausts through two front-firing ports



MEET THE MELONS

For each of these Radialstrahlers there is not one but a vertical array of three 'melons' built around a hollow spine and separated by a series of cylindrical magnet assemblies (the black discs). Each magnet drives the melon segments (petals) directly above it via a conventional voice-coil arrangement, rather like a traditional moving-coil motor but turned through 90°, pointing upwards not forwards. The top of each melon is glued into an anchor so the elements are squeezed upwards and outwards on the positive stroke and pulled downwards and inwards on the negative-going stroke, producing a 360° pulse of sound for each cycle. Only the large bass melon is supported with something like a traditional spider/suspension – the mid and treble drivers have no spider or suspension and the voice-coil is left free-floating in the air gap. For these two smaller drivers, only the petals are moving, so MBL was able to more accurately control the uniformity of their output.

The petals in the main bass melon are fashioned from an annealed aluminium/magnesium/silicon alloy. While this material is both light and rigid, in practice the segments do not deform uniformly when squeezed – they have both primary and secondary bending modes. So each alloy petal is braced by a pair of copper rods whose own behaviour smooths the transition between these modes. The gaps between the petals are air-sealed with a flexible polymer similar to that used in some soft midrange domes.



it – with surprising transparency I might add – to a sub-bass enclosure. Extensively cross-braced and covered in a high-gloss lacquer, this truncated pyramid functions as an acoustical bandpass. It's powered inside by what's described as a 300mm aluminium sandwich woofer, although the two alloy layers of this bass driver are separated only by glue – there's no cellular foam filling here.

JUGGLING ACT

At the top-end of the loudspeaker and frequency scale there's a trade-off between the physical size of the treble petals and the HF extension and sensitivity (output) that can be achieved, so the sensitivity of this 'heavy' woofer has been reduced to better match that of the melons.

MBL specifies a 4th-order electrical/acoustical crossover for the 101 E MkII, the sub-bass enclosure augmenting output below 90Hz, the main melon operating between 90-560Hz, and the midrange up to 3.5kHz before handing over to the smallest carbon-fibre driver. All the components are housed in a separate enclosure at the rear of the speaker and partially split with separate 4mm binding posts feeding the low bass and melon crossover arms. This opportunity to further adapt the sound of these speakers with bi-wiring or, more fundamentally, bi-amping with different power amps, will doubtless prove irresistible for many audiophiles!

The internal cabling passes up from the sub-bass enclosure through the spine of the speaker, the metal tube filled with a polyurethane foam to suppress any resonances. A closer inspection of the cabinet rear – despite being an 'omni' there is still clearly a front and back to this loudspeaker – reveals a series of jumper links that MBL offers to fine-tune the 101 E MkII.

Only the bass settings involve a real change in the crossover network. 'Attack' switches in an alternate LC combination in the main melon's filter, providing a little lift at 120-130Hz and 'altering the timing behaviour to counter room modes in boomier settings'. 'Smooth' is default here. The midrange 'Natural' and 'Rich' options ➞



LEFT: A huge perforated cage, colour-matched to the options available for the sub-bass enclosure, sits on four rubber pads and protects the melons from accidental damage. These should be removed before any 'serious' listening [see Lab Report, p43]

similar). Neither was I short of power with the resident Constellation Inspiration Monos [HFN Oct '19] joined in the room by Classé's Delta Monos [p44].

But I'll cut to the chase: not only are the Radialstrahlers a strange sight to behold (40 years in front of more conventional moving-coil boxes rather sets the scene) but they also reveal the musical event, well, *differently*. There is certainly a 'sound' here, not only with respect to tonal colour but also in the speaker's ability to drive the room and create a truly huge but meticulously crafted soundscape.

Whether you park yourself in a typical hot seat position or off to the left or right, the 101 E MkIIs are not physically evident in the aural landscape – close your eyes and as those alien shapes disappear, so does any clue to the origin of the sound.

SMOOTH INTEGRATION

Furthermore while the freedom from 'cabinet' is very refreshing, so is Jürgen's very careful voicing of the transition between the bass melon and bandpass subwoofer. He has almost eliminated any trace of the 'two speakers in one' effect heard with some panel/electrostatic designs married to moving-coil subs but, by way of trade-off, there's not quite the low bass wallop or 'snap' you might expect from a speaker with a sub-30Hz extension. The Linkwitz-Riley crossover doubtless has a positive impact on the audible coherence of this speaker's sound, top to bottom, but it cannot assist with the inertia of the alloy sub-bass cone or, indeed, quite recover that suggestion of lost 'air' and extreme top-end transparency.

Turning my attention to a tried-and-tested bass torture track – Massive Attack's 'Unfinished...' [Blue Lines, 2012 Remix, Virgin; 96kHz/24-bit] – the 101 E

MkIIs revealed those sampled layers with the same clarity as the haunting overtones of the vocals. The scene was suitably dark, the tenor absorbingly melancholic and I was perfectly happy to trade the immersive 'all of a piece' acoustic for some loss of low bass kick and extreme treble bite.

Melancholic for entirely different reasons, the superlative title track from Amy Winehouse's *Back To Black* [Universal] ➔

JÜRGEN REIS

Chief engineer and guiding light of MBL, Jürgen Reis is very relaxed about describing the polar pattern of the 101 E MkIIs. 'You can call them omnis', he says 'if you are not too picky! The horizontal dispersion is more uniform than the vertical, but we address this by engineering some notches in the response.'

'Meletzky, one of the three MBL founders, was convinced that a pulsating sphere must be the perfect loudspeaker. In 1979 he began with prototypes before launching a concept speaker in 1982, which is when I joined the company.'

The mid and treble drivers were developed by Jürgen with a little inspiration from a colleague who was building carbon-fibre guitar necks! The substantial bass melon remains largely unchanged but is a complex set of moving parts. 'We buy enough material for 200-300 speakers' says Jürgen, 'but there's inevitably some variation in the exact composition of the alloy and in the mechanical properties realised from the annealing process. For each production run, we tweak the low-pass crossover for the large melon – it is around 560Hz, but the value will vary between batches of speakers'.

The sensitivity of the 101 E MkII is set by the output of the treble driver. 'The length and Young's modulus [stiffness] of the treble petals sets the balance between output and extension', confirms Jürgen, 'but we have optimised this by experimenting with the resin that holds the carbon-fibre matrix together. Different percentages of fibre to resin were explored to get the best sonic result in-room'.



route the signal via air-cored or iron-cored inductors, respectively, though both have the same value. The treble settings are subtler still: 'Smooth' is connected via solid-core wiring, 'Fast' deploys silver-plated solid-core, and 'Natural' uses conventional multi-stranded copper. After some dabbling with the various options, I settled on Smooth/Natural/Natural for the bulk of my listening.

'They express music rather than just project sound'

SOUND ALL AROUND

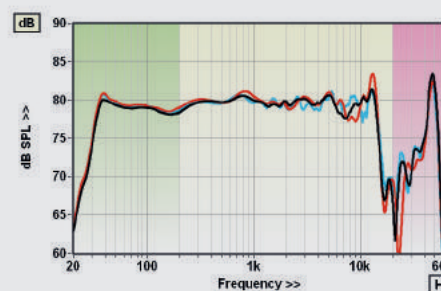
Space, and the amplification to fill your space, is everything with these astonishing loudspeakers. Placed some 1.5m from the side and rear walls of the HFN room, with limited damping behind and plain walls to the left and right, yielded benign primary reflections (this is subjectively acceptable provided the spectral content of the direct and delayed sounds is sufficiently

LAB REPORT

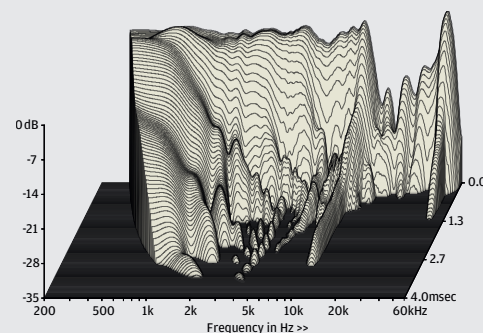
MBL RADIALSTRAHLER 101 E MKII

Measured on the tweeter magnet axis, the impact in forward response of the various 'Natural/Rich' and 'Smooth/Natural/Fast' mid/treble modes is minor – the difference between the three treble settings amounting to just $\pm 0.1\text{dB}$ (5-12kHz) while the 'Attack' Low setting offers a +0.7dB upper bass lift (100-150Hz) vs. 'Smooth'. In all instances the response of the 101 E MkII is impressively flat from 200Hz-6kHz with errors of just $\pm 1.1\text{dB}$ and $\pm 1.3\text{dB}$ and a tight 0.8dB pair matching [see Graph 1, below]. There's a mild peak in treble output at 13kHz following a limited dip from 7-10kHz, although the HF output rolls away thereafter to an early 15.4kHz (-6dB re. 10kHz). The huge grilles cause reflections appearing at 0.87msec (33cm) intervals, matching the width of the perforated cage [blue trace, Graph 1]. There's an ultrasonic peak at 48.4kHz, a resonance in the carbon-fibre petals of the treble melon [pink shaded area, Graph 1], but other in-band modes are very well controlled [see Waterfall, Graph 2].

Down below, the -6dB bandpass of the tuned bass enclosure extends over a narrow 30Hz-66Hz, peaking at 38Hz and rolling off very steeply at $\sim 24\text{dB/octave}$ ($>100\text{Hz}$), while the diffraction-corrected LF extension is a deep 28Hz (-6dB re. 200Hz). Due to the Radialstrahler's 360° output its low 'axial' sensitivities of 81dB (1kHz) and 82dB (500Hz-8kHz, all re. 2.83V/1m) are not especially indicative of the perceived in-room loudness. However, the low 3.6ohm/40Hz (3.7ohm/460Hz) impedance – typically $<8\text{ohm}$ from 50Hz-20kHz and toughest at 4.15ohm/37Hz/ -42° – suggests it must be partnered with powerful, load-tolerant amplifiers if the rated 104dB/3m SPLs are to be achieved. PM



ABOVE: Response inc. nearfield summed driver/port [green], freefield corrected to 1m at 2.83V [yellow], ultrasonic [pink]. Left, black; right, red; w. grille, blue



ABOVE: With no main cabinet, resonances are minimal, and any driver modes quickly suppressed

HI-FI NEWS SPECIFICATIONS

Sensitivity (SPL/1m/2.83V – 1kHz/Mean/IEC)	80.3dB / 79.8dB / 76.8dB
Impedance modulus: minimum & maximum (20Hz–20kHz)	3.6ohm @ 40Hz 12.4ohm @ 26Hz
Impedance phase: minimum & maximum (20Hz–20kHz)	-56° @ 32Hz $+37^\circ$ @ 612Hz
Pair matching/Resp. error (200Hz–20kHz)	2.3dB / $\pm 7.3\text{dB}$ / $\pm 9.1\text{dB}$
LF/HF extension (-6dB ref 200Hz/10kHz)	28Hz / 15.4kHz/15.3kHz
THD 100Hz/1kHz/10kHz (for 90dB SPL/1m)	0.65% / 1.1% / 3.5%
Dimensions (HWD) / Weight (each)	1526x450x540mm / 80kg

LEFT: The 4-way crossover is built into its own isolated enclosure at the rear of the speaker. Separate 4mm cable connections are offered for the sub-bass and three melon drivers alongside 'sound tuning' jumpers

constructed by producer Brian Wilson and his lyricist buddy Tony Asher, with seemingly renewed youthfulness. Interestingly, neither did it sound obviously 'mono' (Brian Wilson was deaf in one ear...).

LOVE AND DANCING

Inspired by our Ken's observations on the artificiality of The Human League's 'Don't You Want Me?' [p51] I also sought out the largely instrumental version on the 21st Anniversary Edition of *Dare – Love And Dancing* [Virgin CDVX2192]. While this remaster, with more than a tweak to pitch and reverb, lacks some of the richness of the original, the orchestration of those synthesisers is all the more vivid, punchy and squeaky-clean. Which is just as it should be, except that through these novel Radialstrahlers it's possible to hear the low, mid and high patterns radiating as if from the individual 'melons'.

Along, perhaps, with Depeche Mode, The League blended pop with the electronica of Kraftwerk and Tangerine Dream to birth a more focused audio artform just before the advent of the 'New Wave'. MBL's speakers are the perfect canvas on which – through which – to enjoy this polyphonic masterclass. ☺

HI-FI NEWS VERDICT

It was worth the wait. Nearly a decade after first seeing and hearing these loudspeakers in a less than ideal environment there was still that glimmer of magic in the air and the promise of so much more to come. I was not disappointed, and while the Radialstrahler 101 E MkII offers a musical soundscape that's as distinctive as their appearance is startling, to listen to them is never less than an *experience*.

Sound Quality: 85%



Records 00600753450628; 96kHz/24-bit rip from Blu-ray audio] found the singer pouring her heart out, nay *excoriating*, in a way never quite emulated by all those that followed in the last 15 years of the 'British Soul' movement. Emotion, and especially heartfelt vocal emotion, is something these Radialstrahlers convey with particular sensitivity. They have a way of expressing music rather than simply projecting sound. Like I say, these speakers are *different*...

Switching generations, we've probably all enjoyed the familiar strain of The Beach Boys' *Pet Sounds* [Universal UICY-40181] countless times before. But not like this. The Wrecking Crew's sparkling instrumentals set out their stall – professional, tight and with perfect timing – while the Boys' soulful harmonies, recorded and mixed some time later, proceeded through this superlative song cycle,