ON THE BORDER

The German Physiks Borderland crosses acoustic borders – thanks to an omni-directional DDD mid/high frequency driver, it enchants the listener with unique homogeneity.

by Holger Biermann

He's a frontier man who took a good many years to make the big step across the border into new territory: Holger Müller, a hi-fi fan since he was 13, fell in love in the 1970s with the sound of an Ohm F from Walsh – at that time one of very few bending wave transducers on the market. The energy dispersion within the room and the expansive acoustic staging fascinated him beyond all measure. He bought himself a couple - and was nevertheless not happy. Despite all its good points, the Ohm F sounded too headstrong and its maximum SPL was unsatisfying. Müller therefore started looking for work-arounds. Out of his hobby he made a profession and began developing and selling his own conventional loudspeaker drivers (under the brand name 'Manhatten Akustik'). But in the back of his mind he always had the feeling that these standard cones and domes were just doing the mandatory minimum; it had to be possible to achieve more – something like the Walsh. At the same time, engineer and mathematician Peter Dicks had already been experimenting for many years, also in Germany, on a driver very similar to the Walsh: the DDD transducer. Dicks was no high-end specialist – he merely wanted to put the principle into practice and in that he had his work cut out. Müller, on the other hand, had always been a high-ender and was searching desperately for a superior driver concept. In 1991 the two met. Müller recognised the potential of the DDD, but knew that there was still a lot to be done…

But what is it precisely that makes this transducer actually into a magic funnel? For one thing, it is what is known as a bending wave radiator. In contrast to conventional cone drivers with an ideally very stiff diaphragm, which oscillates as one in the shape of a piston, the DDD's diaphragm is as thin as possible.

Abutted by the voice coil (fitted above), the funnel-shaped surface begins to oscillate in many places at varying frequency ranges. The legendary Manger transducer and the BMR mid/high frequency driver from the Naim Ovator range work in a similar way. It is just that the DDD is also omni-directional, as a result of which the listener has to take a bit more trouble with the set-up but is then also rewarded with a particularly homogenous dispersion of sound in the high frequencies.

Back to our border-crossing Herr Müller. He joined forces with development genius Dicks, improved the system until it was ready for production and launched the first loudspeaker with a DDD transducer under the German Physiks label in 1993.

It was – and that brings us full circle – a Borderland. However, what the 1993 version had in common with the Borderland of today was only the idea and the octagonal cabinet. Where previously two 8-inch basses used to work up and down in a push/pull arrangement, now a single 12-incher (firing downwards) performs its deep mandatory duties inside the enclosed cabinet. The bass with coated paper diaphragm is high-pass filtered so that a stately bass can still be produced from the comparatively modest volume of 50 litres. "Ultimately that does make a 12-inch bass much more superior," says Müller, explaining the switch.

A large woofer firing downwards no longer produces the desired energy in the mid-frequency range – which would have been a major problem for the first-generation DDDs. However, the many stages of evolution have made the bending wave a great deal better and more resilient. The angle of the funnel, the spider, the surround and the bonded joints: all were permanently refined and the excursion capability constantly increased. "Today's DDD can be used at 150 hertz and above with no problem," says Müller.

Such a low crossover frequency is naturally a dream. Müller's transducer is thus the only driver anywhere in the world that is both a wide-bandwidth and omni-directional speaker. Even purely theoretically any greater harmony in relation to material and sound distribution is simply not possible.

Since 2006, there have been two DDD variants: with classic titanium or carbon funnel. Both materials are about equal in terms of weight. However, the carbon variant produces a minimally darker sound and has fractionally less precise resolution, but especially when touched and at very high volumes it is appreciably more robust than the tissue-thin titanium foil. Its thickness is no more than 0.025 millimetres (which, however, is stabilised and dampened with an equally thick synthetic coating), while the carbon variant is 0.15 millimetres thick. Like the transducer, the Borderland's enclosure has also been further enhanced over the last eight years.

The walls of the bass cabinet are now made of 30 millimetre thick MDF and the cabinet is stiffened in multiple places. Also glued onto the surfaces inside using permanently elastic glue are what are known as Hawaphon mats. Inside the pyramid-shaped cavities of these mats there are thousands of little metal pellets that transform vibrations into heat. This works wonderfully, but you do sometimes hear the pellets buzzing. At the end a thick layer of felt is therefore stuck onto these Hawaphon mats – that puts a stop to the buzzing too. And in order to keep the cabinet permanently calm, German Physiks developer Harald Knoll has also accommodated inside the bass cabinet

On the bottom of the closed cabinet is a stately 12-incher with a very stiff paper diaphragm. Its working range goes up to around 150 hertz.

The magic funnel with titanium foil produces an enchantingly light-footed sound, but at just 0.025 millimetres thick is extremely fragile The rule, therefore, not only for children is: hands off!

a Helmholtz resonator, which dampens the vertical standing wave at 240 hertz. Although the bass already bails out at 150 hertz, this buzzing frequency would nevertheless be irritating.

Philosophy, design and quality of finish: the Borderland makes such an all-in-all consistent and well thought-out impression that even during the research I became very keen to move on to the listening test. Especially as I had already been able to listen to the PQS 302 and the smaller Limited 11 at length and in both cases was genuinely thrilled. The Borderland too did not disappoint me. What struck me first was the picture-book bass: cleanly transparent and immensely powerful. To quote Müller: "Closed box designs are simply superior." I have no reason here to contradict him. Playing 'Barrio' by Carceres (stereoplay ultimate tunes) a kettledrum beats so powerfully at the start (and has evidently been recorded with no limiter) that the woofers of very many loudspeakers quickly seem to race. So too does the bass of the Borderland – or so I thought. Until it turned out that Borderland was exciting the ceiling so much with this piece that the latter was boisterously purring along.

Despite all their power the bass strokes, however, always remained hard and precise, so that it was a pure joy to listen to drum and bass classics like those of Kruder and Dorfmeister at forbidden SPLs. That was really fun! For building on this robust foundation there followed a delightfully clear and open mid/high frequency range, which turned out to be a cornucopia of the finest micro-details. However on the normal setting in the range between 8,000 and 12,000 hertz a little overexposure with a slight tendency to hiss creeps in. Müller: "You're right. That's not something we Europeans like. But the Asians can barely get enough of it." Anyway, it's all no problem! You simply have to set the high frequency jumper on the connection terminal to minus and, voila, this range gets elegantly linearised. Even from the rather sombre choral 'Vulnerasti cor meum' of the Saxony Vocal Ensemble (stereoplay cover CD 11/11) in this setting the Borderland gave a wonderfully coherent, sprightly and extremely life-affirming performance.

But even that all sounds very normal, doesn't it? Correct. For the real magic of the DDD drivers / the Borderland lies in their fully harmonious distribution of energy within the room. Anyone who has ever seen the directivity pattern of a classic three or four-way box will be familiar with the Christmas tree pattern distribution: in each case in their upper transmission ranges the bass, mid-frequency and mid/high frequency drivers begin to a greater or lesser degree to bundle. The lateral distribution in these ranges is poor. This limited dispersion of energy is naturally also noticeable in the tonal characteristic. And in precisely this way is audible when a loudspeaker emits all frequencies totally equally in all directions. It is exactly this point that produces effortlessness in the reproduction of cymbals or triangles, this wonderfully active acoustic image and that draws out the stage to such a wonderfully big, but never exaggerated, size. The Borderland overcomes the boundaries of 'normal' loudspeakers and seduces you with what appears to be a listening experience almost without frontiers. <

German Physiks
Borderland Mk IV

List price: €23,900
Guarantee period: 5 years
Dimensions WxHxD (cm):
40.4 x 123 x 40.4
Weight: 54 Kilo
Speaker versions:
Titanium or carbon
Cabinet finishes:
Wood trim or wood trim with high-gloss
seal (€1,700 extra)
Connections:
Bi-Wiring

Sales
DDD Manufaktur GmbH
Gutenbergstraße 4
D-63477 Maintal
Germany
Telephone:
+49 (0)6109 / 5029823
Internet:
www.german-physiks.com

Test CD
stereoplay: The perfect recording

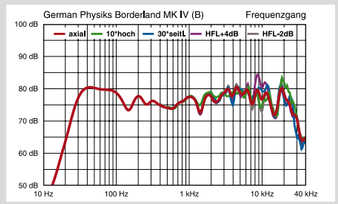
The November 2011 edition's cover CD is ideal for the Borderland: small ensembles that were all recorded with an extreme degree of acoustic mapping precision demand excellent spatial portrayal.

The Author
Holger Biermann

A former student of history, Holger Biermann has been a die-hard hi-fi fan since he was 15 and 20 years ago simply turned his hobby into a career. He has a soft spot for valve amplifiers and big loudspeakers.

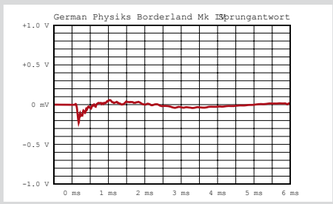
Left: The Borderland's acoustically almost 'dead' cabinet is octagonal and available in almost all wood trim variants. Right: The range between 8,000 and 12,000 hertz can be finely adjusted via jumpers.

Frequency response



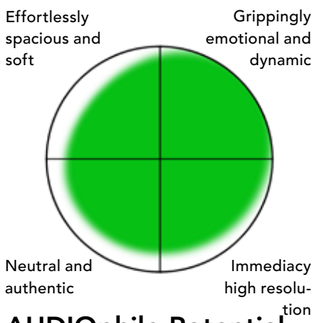
For an omni-directional bending wave transducer the frequency response of the Borderland is very good. The bass looks just as good as it sounds: reaching extremely deep. The drop-off at 15K due to the principle used is not audible. The purple and green curve show the effect of the level jumper: subtle and primarily in the range around 10kHz.

Step Response



A model example of impulse precision: while the reproducing step signal is inverted, it is on the other hand steep-flanked and time-correct with a single step, as with a wide bandwidth system. After brief transient oscillation the system very quickly comes back to rest. No stereo exaggeration and no resonance cloud the faultless image.

AUDIOphile Character



AUDIOphile Potential

Recommendation

The German Physik makes special demands: the amp should at least be powerful and the room large with well-balanced reverberation time. The DDD needs a lot of air between it and the walls.

by Wolfram Eifert

Nothing is left unchecked: Speaker developer Harald Knoll checking a crossover board before installation.

All-arounder

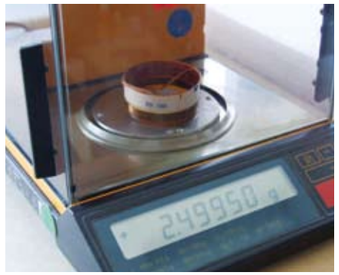
The DDD transducer is an excellent example of innovative sound technology. Production requires a lot of skill and experience.

Friends of sound and technology should really take the facts to heart: The DDD transducer from German Physiks can distribute all the relevant frequencies for timbres and staging with just a single diaphragm without any restriction of the omni-directional dispersion and without major interventions from crossovers or conductors. No other transducer technology can achieve this in such a pronounced and perfect-sounding manner. The gigantic bandwidth with more than seven octaves and the predominantly horizontal and extremely even energy dispersion, which the funnel shape provides, keep wiring requirements to low limits. Only very low frequencies need to be masked in a manner that spares the phases because the diaphragm surface only allows scant levels. Depending on the application, minor adjustments in the overtone range may also be added. Steep filters, like on common multi-band systems, are not required. Parallels can be drawn between the Dick Dipole Driver and electrostatic speakers or bending wave transducers, although they do not achieve its omni-directional dispersion.The measurements from the Borderland equipped with the DDD on the previous page are testament to the excellent acoustic properties. The frequency response is as balanced as with conventional, radically filtered multi-band systems but the room illumination is much more even and horizontally it achieves a full 360 degrees.Whilst common speakers often sound much worse as soon as the listening location and the cabinet alignment are changed, the DDD reacts in a much more docile manner. It neither has to be angled nor does it oblige the listeners to stay still. Measurements under anechoic conditions do not incorporate the interaction between the speaker and the room, which means that the graphs recorded in this manner are only of limited significance for omni-directional speakers. In practice, the dip in the lower mids is filled by the room and should therefore not be interpreted as colouration. However, users should make sure that the room is reasonably evenly dampened - more so than with direct-radiating speakers - because tonal balance shifts are otherwise to be expected. Certain clearance distances to the walls must also be observed in accordance with the size of the room and the listening distance. This is where specialist dealers are called upon to help the customer with advice and practical help.

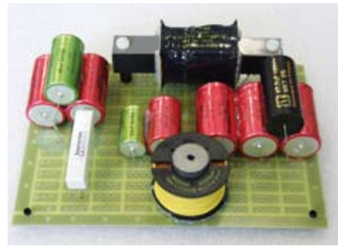
The DDD is a real watt eater by design. Despite the large 12-inchers, the same applies to the conventionally equipped bass department, which - with a passive concept - can never be louder than the rest. Wattage figures of over 100 therefore mark the introduction level. There are hardly any upper limits, especially for the really large German Physiks models such as the Emperor (shown on the left). The diaphragms of the DDD cannot simply be made larger. As a result, more than one transducer is required for higher SPL reserves. The drivers can be stacked vertically and thus they continue to emit sound omni-directionally. The reason why this technologically unique transducer concept sounds finer and more natural than most common driver designs is essentially down to its high bandwidth which in turn facilitates good, time-coherent impulse reproduction. It may not be conclusive proof, but the very good step response is an indication of the excellent fine dynamics. It is shown next to the frequency response diagram. The DDD reacts extremely quickly to pulse or step signals and resists sound-worsening ringing and resonances. German Physiks build the transducers and cabinets in Maintal in Hessen, in the heart of Germany, almost completely in their own production facilities. The photos clearly show the vast depth of production.

The Emperor (in this case with Boulder electronics) is „only" the second largest German Physiks model. Price point: €252,000.

The individual parts: The circular segments later form the diaphragm. The magnet is also the company's own production.



Above: The DDD is not centred until shortly before it is finished. This is partly done by hand.



Bottom left: The cabinet before assembly, stood on its head. Bottom right: The Hawaphon mats.

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