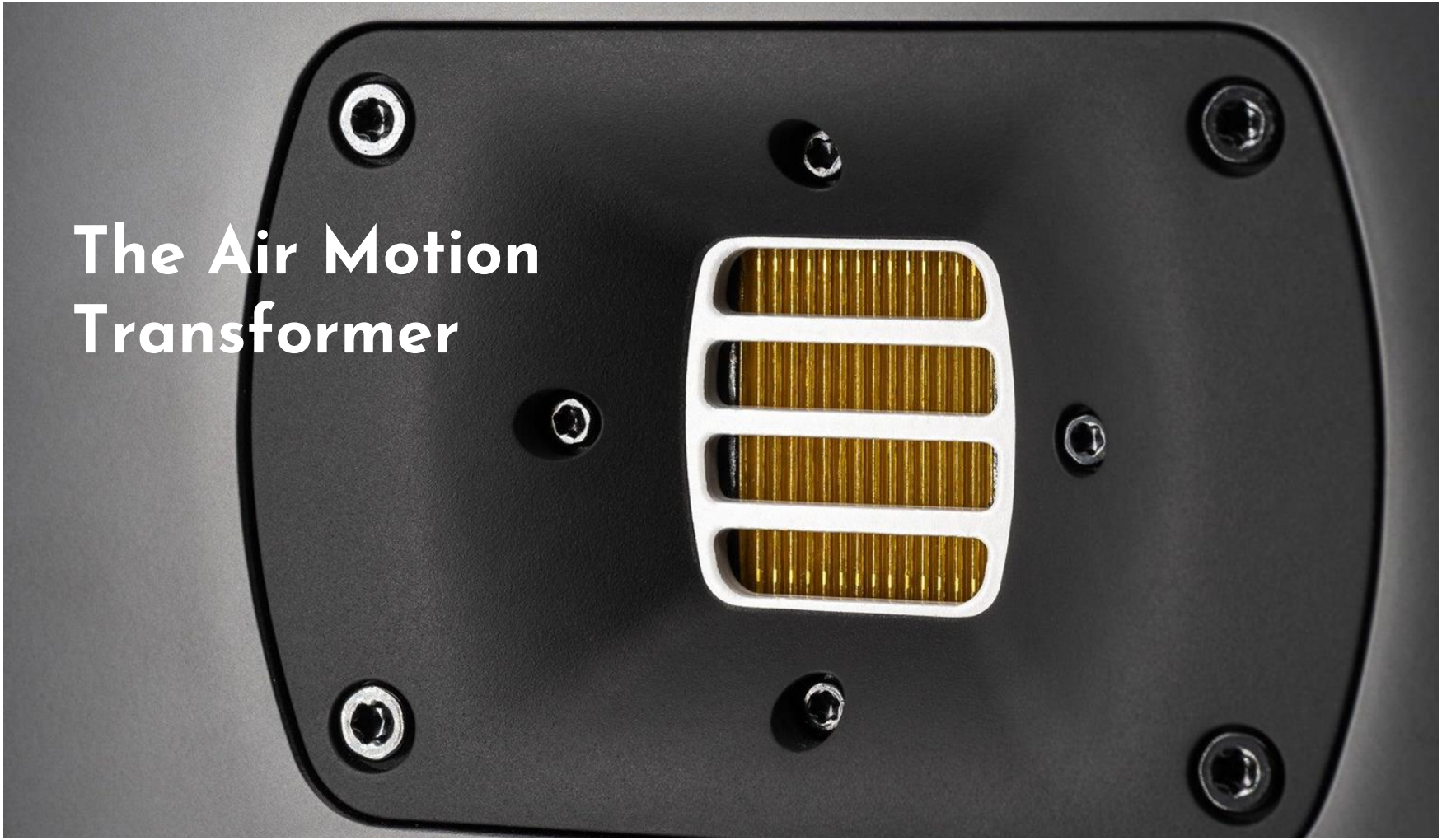
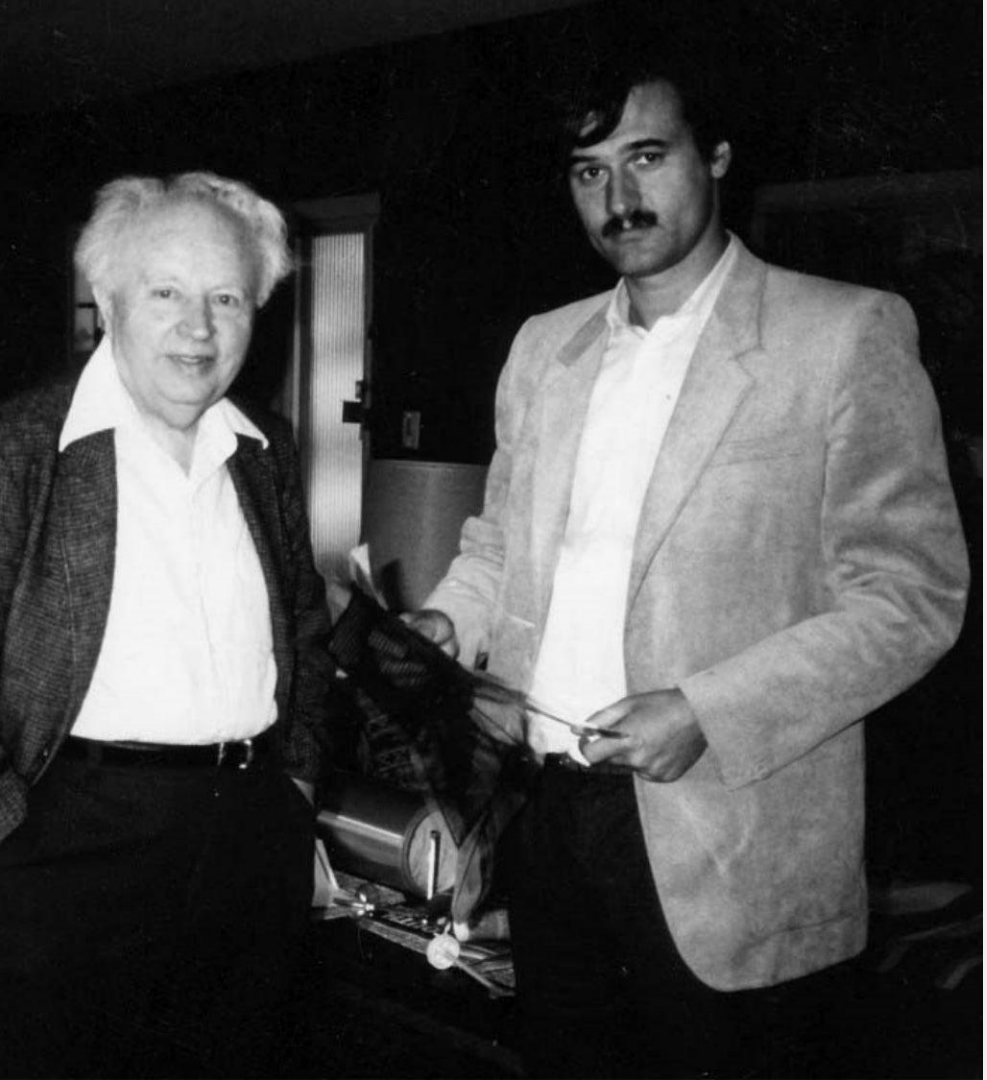

The Air Motion
Transformer

A German Invention

The Air Motion Transformer was invented in the 1960s by German electrical engineer Oskar Heil as an alternative to the piston-like diaphragm that underpinned transducer designs.

Using a folded elastic diaphragm design, in an AMT driver single folds open and close in an alternating pattern, similar to “breathing” air in and out.

The result was well suited for mid-range and high frequencies reproduction and it was first put into commercial use in the AMT1 speaker, manufactured by, ESS in 1972.



In the early 1980s, a German physicist with a keen interest in sound named Klaus Heinz travelled to California to meet with Heil, drawn by his experience with the ESS speaker.

Heinz studied under Heil and eventually worked to make the original design more compact and reliable. One result was the X-ART tweeter, which Heinz developed for ADAM Audio, a company he'd founded in the late 1990s.

By enabling the use of AMT in a broader range of professional audio products, Heinz helped to revolutionize the speaker landscape from hi-fis to studio monitors.

But there was still more that Heinz wanted to do with design and sound.

HEDD Audio

Loud and Clear

Heinz founded Heinz Electrodynamic Design (HEDD) with his son, Frederik Knop, in 2015. Together they worked to design speakers that could achieve heavy bass and brilliant sound.

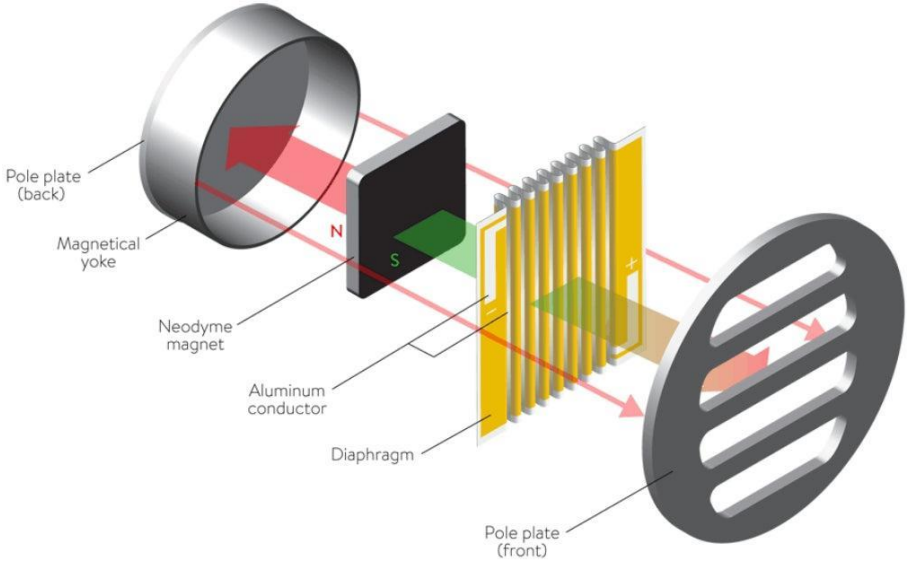
This approach underpins the HEDD monitor range which uses a new generation of AMT tweeter designs, handmade in Berlin and known for providing transparent high frequencies with no distortion in reproduction. Combined with the Closed-or-Ported design, these monitors can also deliver new levels of texture details and low-end harmonics.

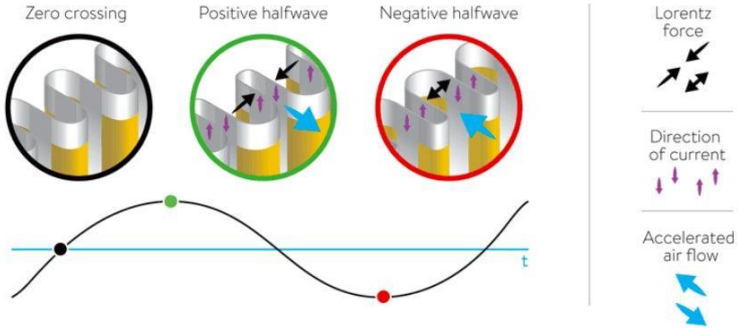
AMT, in your ears

The next major evolution in AMT design led by Klaus Heinz came in 2020 with the world's first full-range AMT headphone: the HEDDphone.

One of the key properties of the original AMT driver geometry was rethought by replacing folds of exact shape with folds that vary in both width and depth, allowing for the reproduction of the full audio spectrum from 10 to 40 kHz.

This evolutionary step of the Air Motion Transformer was named VVT: Variable Velocity Transform.





Design & Principle

The Air Motion Transformer is an electromagnetic driver, based on the Lorentz force that moves the air in the single folds.

The diaphragm itself has an aluminum circuit printed on it (violet arrows) and is surrounded by a strong magnetic field.

The graphics in the bottom half of the display show the motion of the individual foils producing a sinusoidal waveform: from where it starts (black circle) through the positive (green circle) and negative (red circle) half-waves.

The resulting air flow (blue arrows) is four (!) times faster than the speed in which the individual folds move, a big advantage when it comes to reproducing music signals with fast transients (cymbals, plugged guitar strings, etc).

HEDD **Air Motion Transformer:**
Made in Berlin. Heard the world over.