

COAXIAL DRIVER TECHNOLOGY

In search of the 'single point source' ideal.

In loudspeaker construction, all designers agree on the ideal of the 'point source': if it was possible to build a single and unambiguous centre of sound generation without time, phase and spatial offset over the frequency, significant acoustic imaging errors wouldn't occur, and the sound would be entirely coherent.

Coaxial drivers imitate this ideal, strive for it and – in many respects – achieve it, using a construction in which two (or sometimes more) individual driver elements, responsible for different frequency bands, are concentrically integrated. Doing this allows the sound generation centers can be congruent, allowing this construction to claim enormous spatial-temporal coherence, and thus imaging quality and precision.

A further advantage can be seen in the smaller space required when multiple

drivers are combined into the space usually occupied by a single bass driver: for that reason, coaxial drivers are often to be seen in 'custom installation' speakers designed for use in walls or ceilings, and are also common in in-car systems. However, the designer of a 'coax' needs also to be aware of the problems of such a design, in that when the outer bass or mid/bass driver moves back and forth around a central tweeter, it naturally acts as a constantly changing and thus discoloring horn affecting the high frequency output.

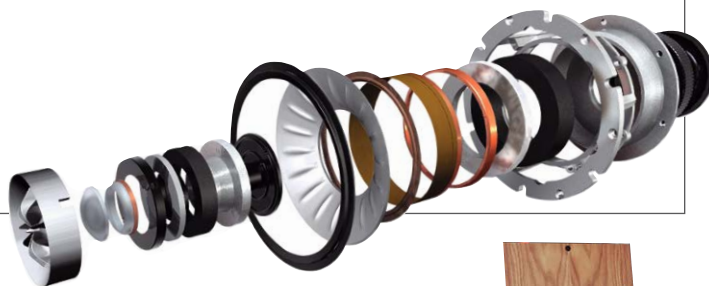


THE BEST KNOWN: KEF UNI-Q

KEF's „Uni-Q“ driver was born in 1988 in the C35 loudspeaker, meaning it's just on 30 years old – and over that time it's become a mainstay of the company's speaker thinking, from its little KHT satellite speakers for home theatre all the way up to its Blade and Muon flagships.

That first driver was used a 20cm mid/bass unit with an internal 19mm tweeter, and decoupled magnets were also experimented with. Significant progress was made in 1994 with flat profiles in the Reference series and in 1997 with casting technology, while further improvements included the switch to metal domes in 2001, the ventilation of

the tweeters and the modification of the radiation (wide dispersion) in 2006. These techniques were further perfected in combination with new diaphragm materials/geometries, large voice coils, deeper domes and new wave guides, for example for the top models of the Blade series. With Uni-Q, the tweeter is „congruent“ within the woofer voice coil, which was only made possible with strong magnetic materials. KEF understands that the cone angle of the external driver determines the dispersion of the tweeter as an advantage and works specifically with it.



THE OLDEST: TANNOY DUAL CONCENTRIC

Scottish specialist Tannoy is considered the oldest loudspeaker manufacturer in the world, and a large part in its exquisite reputation in hi-fi as well as in music and studio circles is played by the legendary „Dual Concentric“ driver, with its physically fused treble and mid/bass elements. First presented at a trade fair in 1947, this concept is still being lovingly developed today. For the high frequency range, Tannoy uses a horn system rather than the usual dome tweeter, this horn running through the woofer's voice coil to form a point

source. Due to its greater directivity compared to the tweeters found in other coaxial designs, the horn has the physical advantage of being less sensitive to the modulating membrane movements of the drivers positioned around it, so even a 15-inch Dual Concentric becomes possible. According to the Tannoy developers, the non-identical plane of the two voice coils is compensated for by the pressure chamber behavior and the longer 'throw' of the tweeter, and perfect coherence should be achieved at a listening distance of three meters or more.



These side effects can be countered by flat speaker geometries (as in KEF's Uni-Q), spherical (Cabasse SCS), directional radiation (in Tannoy's Dual Concentric) or even asymmetrical driver arrangements (as in the designs of German speaker manufacturer Geithain).

When it comes to speaker driver design, few ideas are technically as obvious as the coaxial, with its practically precise arrangement of loudspeaker elements on a single plane. And in many cases the result is spectacularly precise, vivid and lively. Yes, the full-range driver, without a crossover, is seen as a competitor to the coaxial driver as a 'point source' sound, but this seemingly simpler solution is actually harder to achieve than a coaxial driver, its multiple elements connected via a conventional crossover.

special models

Even with a tweeter that is only inductively coupled and that works inseparably in the centre of a bass-midrange driver without its own drive, the idea of the coaxial arrangement is fulfilled. Interestingly, Tannoy follows this approach with the ICT transducer in the Di5, which is designed and suitable for robust outdoor use, so perhaps this should be seen as a simplified coaxial driver for cheaper applications. We've heard this design in use, and it works well.



LIVE ACT

The name says it all - and what could be more obvious than to use precise coax drivers for lively, lively reproduction with high sound pressure levels?

MFE GEITHAIN

Especially in the studio sector, the East German specialist relies on asymmetric coaxial drivers.



PIEGA

In addition to aluminum housings, ribbons – and especially coaxial ribbons – are a specialty of the Swiss company.



PROGRESSIVE AUDIO

The Essen-based company uses coaxial drivers in their latest creations to ensure that the sound is reproduced in the right time and in the right space.



ELAC

With Andrew Jones (KEF, TAD) onboard, the development team's love for coax was strengthened to take advantage of the company's legendary JET tweeter.

