DYNAUDIO Technology Information

**DDC – Dynaudio Directivity Control**

DDC reduces in-room reflections to allow a real close-to-the-recording performance

To optimise the complex interaction between the loudspeaker and the listening room, Dynaudio utilizes a completely new technology. When developing a loudspeaker, room acoustics often is no subject – unfortunately so, because every room has a strong influence on the frequency response and the direct / reflected sound wave ratio.

To make the most of High-End audio systems, vast amounts of money are spend for different amplifiers, interconnects or even tweaking products. The influence on sound quality is minor compared to the room acoustic, with loudness differences up to 20 dB. Whatever might be done with an audio system, whatever product might be changed – the room and its influence on sound quality will be the same.

Since over ten years, Dynaudio builds professional studio speakers and has a high reputation in the recording studio scene. In this area, an interesting phenomenon was recognized: CD recordings, sounding disappointing in HiFi surroundings, have a very good sound quality when played again exactly where the recording was made. Further investigations made clear that the room acoustics are the reason for these differences. Every Studio has its room optimised acoustically, damping any reflections that could affect the original sound. Also, the sound engineer listens in a near-field set-up of the loudspeakers to have the sound as pure as possible. In individual home listening rooms, several reflections are added to the direct sound from the speakers. The sound will be distorted in a degree depending on the room itself, and therefore will not be as close to the original as possible.

The most important result of these investigations is that floor reflexions and ceiling reflexions in particular have a negative impact on sound quality. Ceilings and floors are even, clean acoustic reflectors, distorting some frequencies and echoing with a short time delay. Contrary to this, side reflexions can be useful for an airy sound stage image, adding diffuse reflexions from the side walls, furniture, curtains and other room objects.

Based on these findings, the ‘Dynaudio Directivity Control’ - or DDC - was developed to make speakers less dependent from room acoustics. **DDC restricts the vertical sound radiation** by reducing the energy transmitted to ceiling and floor by 75%. This is realized with special physical and acoustical characteristics of the drivers, a special geometric driver arrangement on the front panel, and a new crossover filter technique.

DDC can be explained by having a close look on the Dynaudio Evidence drivers sound radiation, starting with the higher frequencies. Above 10 kHz, frequencies are more focused in their radiation from the tweeter dome. The lower the frequency, the more the radiation angle expands and the focus opens. At approximately 8 kHz the tweeter dome starts to have an expanded radiation, with increasing energy to
the sides and decreasing energy directly towards the listener. Room reflections would become more and more audible. At this point, a second tweeter adds to the first one, allowing to emit more energy directly. **The radiation angle is not more expanded than before**, therefore in relation the direct sound towards the listener is still more dominant than the radiated sound stimulating room reflections.

Further down the frequency range, at around 3 kHz, even the surface of two dome tweeters is too small to emit more directly than radial. At this point the two mid-drivers are blended in, **keeping the radiation angle unchanged**. Down to the bass, the first two bass drivers blend in, supported by the outer two bass drivers from 300 Hz on. Even at these lower frequencies, the vertically symmetric driver arrangement has a very good impact on the room acoustic.

This description is simplified, but explains the principles behind DDC. Implementing this technology in the Evidence and Confidence models is physically and acoustically much more complex.

The result is a loudspeaker with an unparalleled ability **to reproduce any music as it was originally recorded, independent from the individual listening room**. The extraordinary sound quality of the Evidence and Confidence loudspeakers is not reserved for sound optimised studios— it can be enjoyed in any individual personal listening room.