Smooth Directivity

Loudspeakers radiate sound in all directions which arrives at the ear both directly and indirectly. Most quality loudspeakers are designed so that the sound radiated directly forward accurately represents the electrical signal being fed to it by the amplifier. This characteristic is know as flat on-axis frequency response. It is important that this signal be flat because it reaches the listener first, directly, and with most intensity.

Sound radiating at other angles from the loudspeaker (indirect signals), also reach the listener as they are reflected from the room boundaries (floor, walls, ceilings) as well as other objects in the room. The sum total of this information becomes the reverberant sound field. It is critical that this sound field also be flat. A loudspeaker with the ability produce a flat reverberant sound field is said to have a "flat mid-band power response". Measurement of a loudspeaker's power response is time consuming, as hundreds of measurements must be made and averaged. Therefore most loudspeaker companies ignore this absolutely critical aspect of loudspeaker design.

It is the combination of the on-axis frequency response and power response that gives a speaker its tonal balance. This is the reason that quality loudspeakers, with similar, flat on-axis responses, can sound so different once they get out of the anechoic chamber and into real listening rooms. This is also why some manufacturers restrict placement options in the room and/or restrict the listener's optimum seating area. Their power response is not flat and the reflected sound must be "tuned" to disguise this shortcoming. Angstrom loudspeakers show their pedigree by the careful optimization of their on-axis and power response. Both are smooth and flat through the critical regions and the resulting loudspeakers are tonally accurate, able to reproduce all types of music with convincing realism. The ratio of on-axis power (frequency response) to total power radiated in all directions (power response) is called the directivity index (DI). Put another way, the DI plots the loudspeaker's directionality versus frequency. Thus, it not only shows how directional a loudspeaker is but, more importantly, how much and at what rate that directionality changes with frequency. The higher the DI, the greater the directionality, and the less sound power radiated to the sides of the loudspeaker, radical fluctuations in the DI will give a loudspeaker with flat on-axis frequency response an inaccurate sonic character.

Through careful selection and design of driver elements, driver placement, crossover frequencies and crossover slopes, the DI is held nearly constant in Angstrom loudspeakers from the mid-bass region to mid-treble, 200 Hz - 5000 Hz. At extreme low and high frequencies the DI is allowed to change smoothly and gradually. Special attention is paid to keeping fluctuations at a minimum at the crossover points where our ears are most sensitive but where most other designers just hope for the best. The net result of all this care and attention is a DI that is smooth and flat through most of the range. For the listener, this translates into a stable and convincing stereo image.

Angstrom has also taken care to make the dispersion as wide as possible. This maximizes the number of satisfactory listening positions. Unlike many loudspeaker systems, Angstrom loudspeakers have a large "sweet spot" and they will deliver a satisfying musical signal to most of the listening room. It is not necessary to sit in the "stereo seat" to get a full and exciting sound from any Angstrom loudspeaker.

Angstrom LOUDSPEAKERS