

Speaker Directionality

KEITH HOWARD EXAMINES A NEW TREND THAT CONTROLS LOUDSPEAKER DIRECTIONALITY THROUGH DSP AND ACTIVE DRIVE

Some hi-fi controversies are so persistent that, were we gardeners we'd classify them as hardy perennials (or maybe something less welcome, such as Japanese knotweed). The analogy is appropriate because while some of us relish longstanding sources of disagreement – analogue versus digital being one obvious example – others might prefer that all the back-breaking work which has been put into understanding these issues might have eradicated them as controversies altogether.

Loudspeakers provide a rich vein of persistent controversial topics: the merits of horn loading; whether linear phase crossovers are beneficial; closed box versus vented box (reflex) bass loading; the importance or otherwise of re-radiation from cabinet edges, etc, etc. Of these, few if any have had the legs of loudspeaker directivity.

Reaching back at least to the 1950s, pundits have espoused the virtues of (on the one hand) omnidirectional speakers, which spray sound with equal intensity to all points of the compass (notionally, at least, if not usually in actuality); or (on the other hand), directional speakers in which the output is, as far as possible, constrained to a preferred radiating axis.

If you thought that this disagreement was pretty much settled back in the 1960s and '70s with the ritual humiliation in many UK hi-fi magazines of Stig Carlsson's Sonab designs and Amar Bose's 901 – both of which, in their different ways, sought to engage the listening room much more than was considered 'proper' at the time – then you've not been paying attention. Not only are there long-standing adherents to the omnidirectional creed like MBL with its segmented Radialstrahler driver and German Physiks with its DDD, but new recruits like Larsen, whose products are modern takes on the classic Carlsson designs, and Canadian newcomer Muraudio whose hybrid ESLs achieve omnidirectional output in the horizontal plane by joining three 120-degree curved electrostatic panels to form what is almost a cylinder. (Not quite because the panels are also curved, albeit less tightly, in the other plane to aid vertical dispersion.)

Certain other speaker manufacturers, meanwhile, are marching determinedly in the opposite direction. Not content with the status quo – which in this context means loudspeakers that radiate

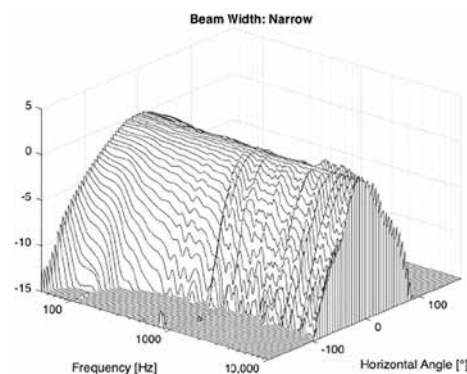


Fig 1. Directivity versus frequency for the BeoLab 90 in Narrow mode

omnidirectionally at low frequencies but become directional at high frequencies, as most do – they are creating loudspeakers which radiate sound over a more nearly constant, but constrained, angle. The daddy of these is unquestionably the *BeoLab 90*, which uses no fewer than 18 drive units and no less than 8.2kW of amplification per speaker to achieve a horizontal polar pattern that, in Narrow mode, closely mimics the directional characteristics of a cardioid microphone, and does so from below 100Hz (Fig 1). The DSP that coordinates all those drive units to achieve this feat also provides Wide and Omni modes, but those are for situations when a larger number of listeners need to be accommodated. When you commune alone with a *BeoLab 90* you are expected to use Narrow mode and thereby significantly reduce the acoustic contribution of the room to the sound you experience.

Were such large and costly speakers necessary to achieve this, the *BeoLab 90* would be a notable exception rather than, perhaps, the harbinger of a new trend. But with the introduction of the *Kii Three* – from Kii Audio, the latest venture of Bruno Putzeys, creator of what are widely acknowledged to be the best (Hypex) class D amplifiers – the desire to achieve better-controlled directivity reaches a far more accessible price point. Honourable mention should also go to Finnish manufacturer Gradient Labs, which has been ploughing the cardioid directivity furrow for years, to good reviews but without initiating a paradigm shift. B&O and Kii, perhaps, will help the constant directivity loudspeaker at last reach critical mass.