Introducing the first loudspeaker that combines utmost musicality with unprecedented accuracy.

Features

- •Two-way active loudspeaker with DSP crossover and correction
- •Extremely accurate frequency and time domain response
- •Minimum phase, zero pre-echo impulse response
- •Sealed enclosure: precisely controlled bass response
- •Wide baffle: controlled dispersion down to 250Hz
- •Digital and analogue inputs
- •Midi I/O
- •Daisy-chainable
- •Easy subwoofer integration
- •User-settable low corner and baffle step correction
- •Compatible with 32kHz to 192kHz sampling rates

Specifications

- •Frequency response: 55Hz-30kHz +/-0.5dB. 45Hz-40kHz -3dB. (Low corner is user-settable between 35Hz and 100Hz, Q=0.7 or 0.5)
- •Deviation from minimum phase +/-2°
- •Amplifier power: 2x120W
- •Max SPL: 109dB/1m
- •SNR: 114dB (unweighted)
- •Crossover function: 1.55kHz LR4, sum corrected to minimum phase.
- •Latency: 2ms
- •Internal volume: 14 litres
- •Height: 1450mm, 1150mm available on demand.
- •Width, depth: 520mm x 160mm

The Grimm LS1 is the result of research into the common observations that speakers may be accurate or musical but rarely both. The first finding was that strategically (or fortuitously!) placed dips in the power response are perceived as heightening "accuracy" while clearly being far from it in reality. Although impressive, this character indeed conflicts with musicality. Engineers find themselves fighting colouration with colouration. This is the root cause of unpredictable mix translation.

It was quickly realised that consistent accuracy as measured on all counts is in fact highly conducive to musicality while at the same time delivering peerless detail. A sure sign of true accuracy is a speaker that is at equal ease in tracking, mixing and mastering studios as well as the home (at least sonically, if not visually).

Acoustic design

Returning to theoretical groundwork laid in the 30s and 40s, the cabinet is flat and wide. The shallow depth places the dominant internal resonance frequency substantially above the crossover frequency, greatly reducing "boxiness" even before DSP correction is applied. The wide baffle shifts the baffle step frequency to approximately 250Hz, guaranteeing a consistent reverberant response across the entire midrange.

Cabinet diffractions that normally plague wide-baffle designs are combated by rounding the offending edges down to half cylinders. These elements combine to insure that remaining response aberrations are consistent across a wide listening area, making them easy targets for DSP correction.

The magnesium woofer maintains pistonic behaviour over its entire operating range, resulting in a more constant dispersion than paper-coned woofers. The tweeter has a constant-directivity waveguide attached which keeps dispersion constant, as opposed to typical tweeters which have wide dispersion around the crossover frequency and narrow dispersion higher up. The low crossover frequency improves vertical dispersion

DSP

The role of the DSP crossover is both crucial and modest. Thanks to the cabinet design, only a small number of minimum phase, low Q IIR sections suffice to achieve amplitude and phase linearity. The correction and crossover is manually tuned based on a large set of close-up and near-field measurements; automated design algorithms have no way of telling actual response errors from measurement artefacts, however good the anechoic room (one of Europe's biggest, as it happens). The sum response is finally phase-corrected to obtain a minimum phase result while avoiding the latency and pre-echos that would result from a linear-phase correction.

Electronics

Digital input signals are re-clocked by an ASRC circuit driven by the same oscillator circuit as found in the award winning Grimm CC1. AD/DA is 24 bits at 93.75kHz, an odd frequency deliberately chosen to be clear of any multiple of common audio rates. The DSP is a 48-bit unit with a 76-bit accumulator. The output signal from the D/A circuit is directly fed to a pair of 120W "Ncore" high-efficiency amplifiers.

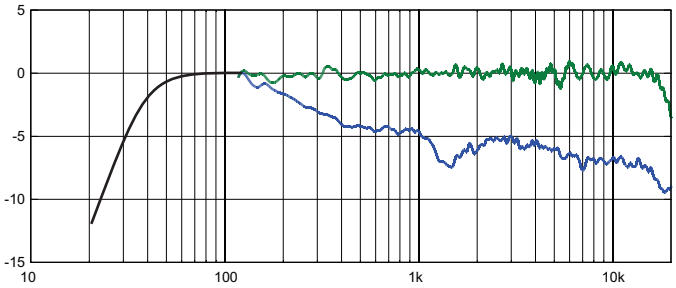

Figure 1: On-axis and power response. Near-field measurement used below 150Hz.

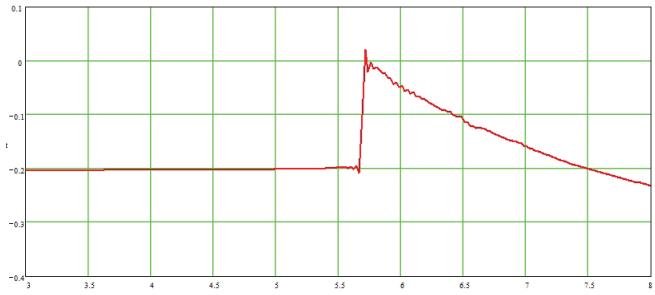

Figure 2: Step response

For more information and data, visit www.grimmaudio.com