SP Acoustics SP1M

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The SP1M is the professional, studio monitor version of SP Acoustics' SP1 hifi speaker. It is a large, 3-way passive design comprising a 19mm fabric dome tweeter, a 100mm paper cone midrange and two 165mm aluminium cone woofers, all housed with vertical alignment in a sealed-back (infinite baffle) cabinet with a volume of 120 litres. The pictures in the brochures show the bass and midrange drivers with an unusual magnet/chassis topology that, it is claimed, endows the drivers with very large linear excursion limits. The passive crossovers are housed in the cabinet and all have 2nd-order slopes and are hard-wired. Signal input is via a rear-mounted 4-way Speakon connector. SP Acoustics recommends that the SP1M be partnered with amplifiers from 20W to 250W maximum output (music programme) and claims a maximum output of 118dB SPL (conditions not specified). Input impedance is a nominal 6Ohms with a minimum of 3.8Ohms so they should prove relatively easy for most amplifiers to drive. The cabinet has external dimensions of 1060mm high by 460mm deep by 350mm wide and each speaker weighs a whopping 45kg. The SP1M is also available as an active speaker, the SP1MA, with built-in amplifiers and digital crossovers and with a landscape arrangement (SP1ML(A)).

Figure 1 shows the on-axis frequency response and harmonic distortion performance for the SP1M. Although somewhat uneven, the response lies within +/-3dB limits from 52Hz to 18kHz, and the low-frequency roll-off is 2nd-order with -10dB at an impressively low 30Hz. Harmonic distortion is low, with the 2nd and 3rd harmonics showing very similar characteristics remaining below -40dB (1%) above 55Hz and peaking at only -20dB (10%) at 28Hz. There is a rise in 2nd-harmonic distortion at 1.2kHz, but this is only to -46dB (0.5%) so may not be audible. The low-frequency extension and distortion performance, at least at the level of these tests — 90dB SPL at 1m — is comparable to many monitors that have the benefit of bass-reflex porting and high-pass protection circuitry, both of which can compromise low-frequency transient accuracy when compared with the 2nd-order alignment of the SP1M.

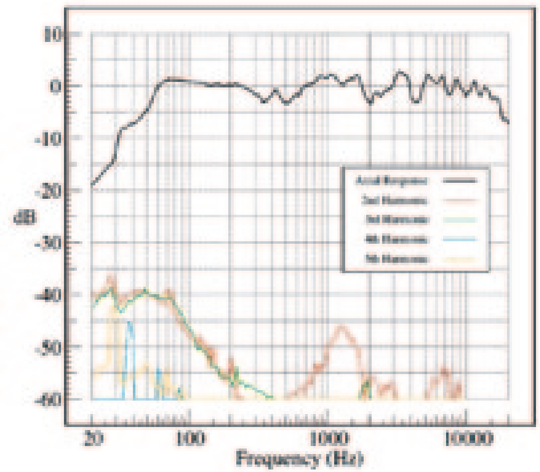

Fig. 1. On-axis frequency response and distortion.

To demonstrate this, Figure 2 shows that the acoustic source position only moves to around 1.8m behind the speaker at low frequencies which is less than half of that encountered with some higher-order alignments. The waterfall plot (Figure 3) shows a rapid initial decay at low frequencies which, when coupled to the acoustic source position, suggests that the SP1M should be very accurate at reproducing low-frequency transient signals. The horizontal off-axis response is shown in Figure 4. The directivity is seen to be very well behaved with the response at all frequencies gradually falling off as angle is increased with no mid-range narrowing or high-frequency lobeing. The tell-tale crossover interference notches are clearly visible in the vertical directivity (Figure 5) with a deep notch at 3kHz in the upward and downward directions and a further notch at 500Hz in the downward direction. These notches are inevitable given the vertical spacing

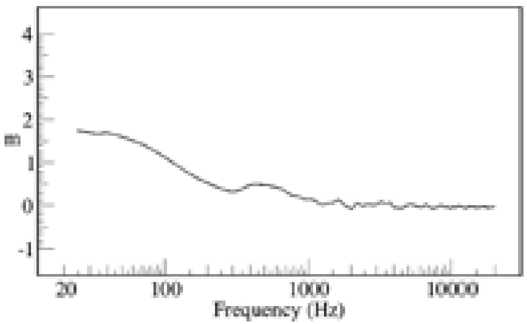

Fig. 2. Acoustic source position.

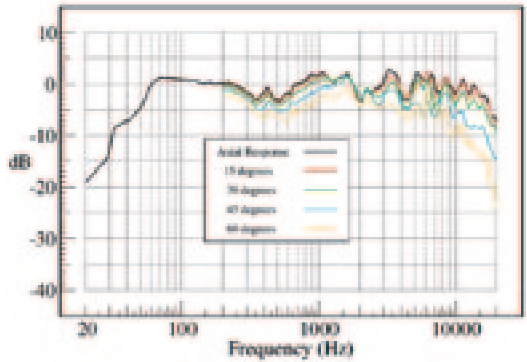

Fig. 4. Horizontal off-axis response.

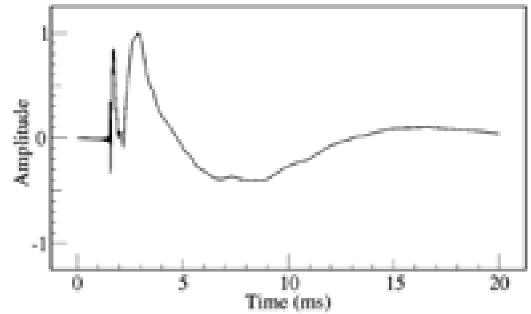

Fig. 6. Step response.

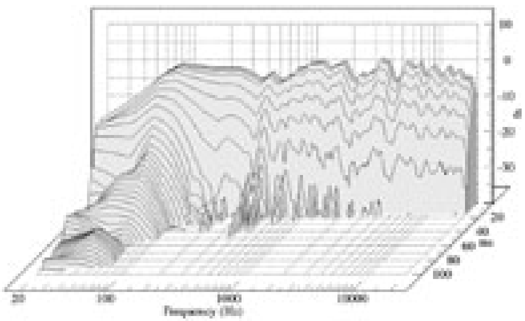

Fig. 3. Waterfall plot.

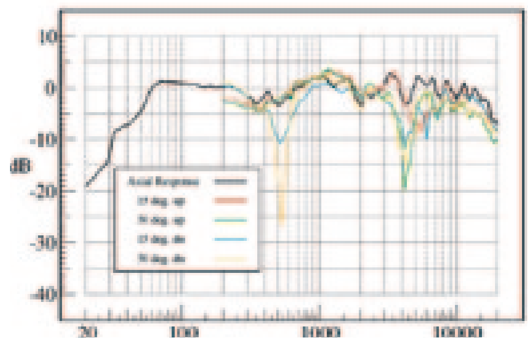

Fig. 5. Vertical off-axis response.

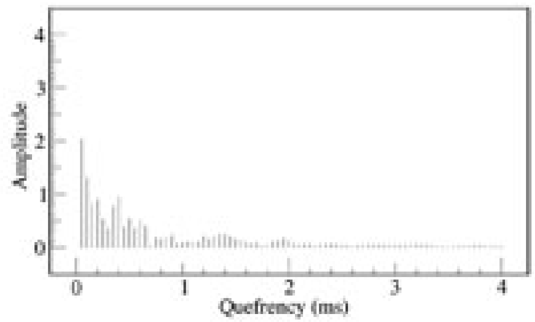

Fig. 7. Power cepstrum.

of the drivers and are found in most designs.

The step response of the SP1M is shown in Figure 6. The high- and mid-frequencies are well aligned and there is around 1ms of time-smearing between the mid- and low-frequencies as a consequence of the low crossover frequency. The power cepstrum (Figure 7) shows some evidence of an echo at a quefrency (read delay) of around 400 microseconds which may give a clue as to the origin of the slightly uneven frequency response noted above, and further clues may be evident from the waterfall plot, which shows some resonant behaviour at around 500Hz. The non-resonant peaks and troughs at higher frequencies suggest interference effects, however, which may be less audible.

Overall, the SP1M is an impressive performer. It manages to come close to being 'all things to all men'" (except small) in that it has very good bass extension with low distortion coupled with accurate low-frequency transient reproduction. This performance is made possible, mostly, by adopting a very large cabinet, which may restrict its appeal. However, for those who have the space to accommodate these speakers they are well worth trying.. ■