

PSI Audio A21-M

KEITH HOLLAND

The PSI Audio A21-M is a two-way, active speaker comprising a 217mm woofer and a 25mm dome tweeter that radiates through a shallow horn. The drivers are aligned vertically above a wide (and deep) slotted port and the electronics are housed in a recess at the rear of the cabinet. On the rear panel are the usual IEC mains socket and switch along with controls for level and LF roll-off and an XLR balanced line input socket. The cabinet has external dimensions of 400mm high x 300mm deep x 250mm wide, weighs 12.8kg and is finished in a distinctive purple paint that has a subtle metallic sheen. PSI specifies a crossover frequency of 2.4kHz and states that the circuitry contains what it terms a 'compensated phase response system' as well as limiters and high- and low-pass filters for driver protection. The



integrated power amplifiers are rated at 100W and 50W, which endow a single A21-M with a claimed maximum continuous SPL of 108dB at 1m distance, and a pair with 119dB maximum at 1m on programme material.

Figure 1 shows the on-axis frequency response and harmonic distortion for the A21-M; the distortion is measured while the speaker is generating 90dB SPL at 1m. The response lies within respectable ± 3 dB limits from 40Hz to 18kHz with a rapid 6th-order low-frequency roll-off, due to the reflex port and high-pass protection filter, and a -10dB point of around 35Hz. Harmonic distortion performance is commendable with all levels below -40dB (1%) at all frequencies above 50Hz. However, there is a sharp rise to about -25dB (5.6%) 2nd harmonic

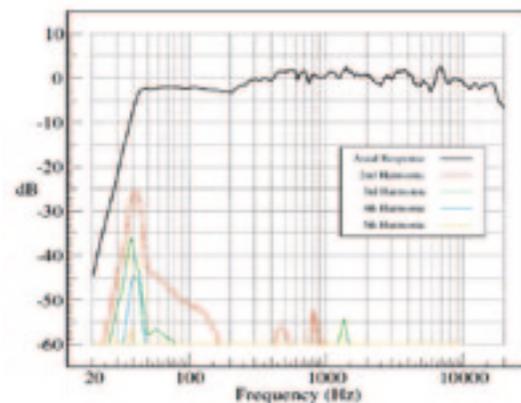


Fig. 1. On-axis frequency response and harmonic distortion.

at 40Hz. Figure 2 shows the frequency responses at four off-axis angles in the horizontal plane. The directivity is seen to narrow steadily with rising frequency except for a broadening at 3.5kHz. The vertical off-axis responses are shown in Figure 3. Here, a notch at the crossover frequency, due to interference between the sound radiated from the spaced drivers, is clearly evident at 30 degrees in both the up and down directions.

The time domain performance for the A21-M is demonstrated in Figures 4 to 7, which show the step response, acoustic source position, power cepstrum and waterfall respectively. The step response is excellent, with perfect time alignment, a rapid rise and smooth fall. This is one of only a few speakers that I have tested with this good a step response. The low-frequency time domain performance is less good however. The acoustic source position is seen to shift to 4m behind the speaker at low frequencies,

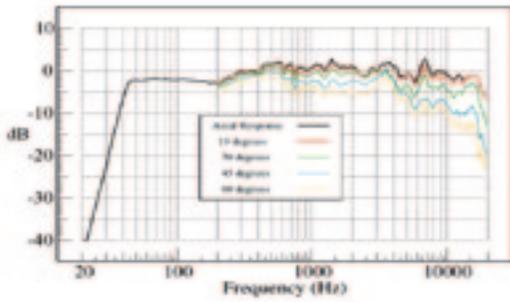


Fig. 2. Horizontal off-axis response.

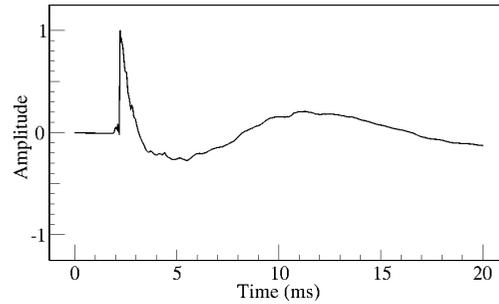


Fig. 4. Step response.

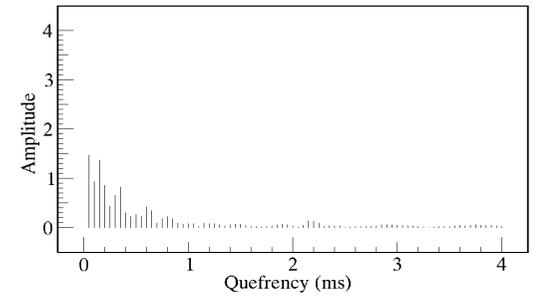


Fig. 6. Power cepstrum.

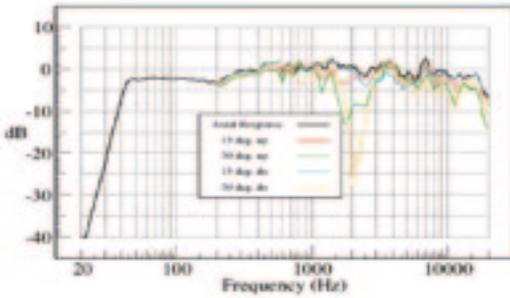


Fig. 3. Vertical off-axis response.

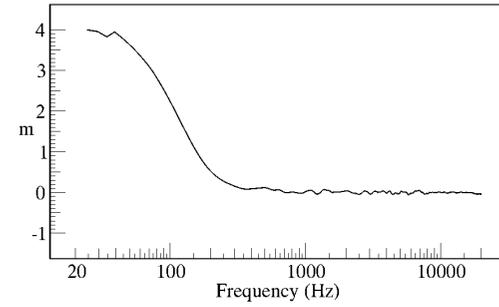


Fig. 5. Acoustic source position.

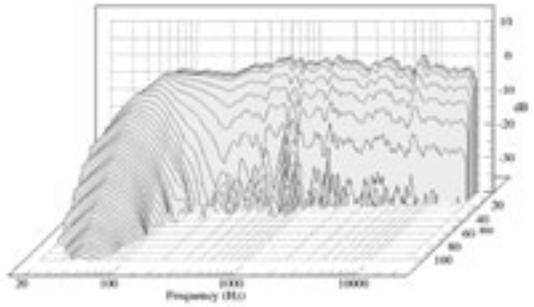


Fig. 7. Waterfall plot.

which is an almost inevitable consequence of a rapid low-frequency roll-off, and the waterfall plot shows that the decay of low-frequency energy is slow. The low-frequency components of transient signals will therefore start later and decay slower than the higher-frequency components. The power cepstrum plot shows some activity after about 150 and 350 microseconds that maybe responsible for the slight irregularities in the on-axis frequency response at mid and high frequencies.

To sum up, the PSI Audio A21-M is a very good loudspeaker. The on-axis frequency response is extended and falls within $\pm 3\text{dB}$ limits for most of the audible frequency range. Nonlinear distortion performance and off-axis response are also very good. Of particular note though is the remarkable step response, which is presumably helped by PSI Audio's 'compensated phase response system'. This accurate a time response is very rare in this type of speaker but here, PSI Audio has proved that it

is possible. On the other hand, low frequency time response accuracy can only, it seems, be achieved at the expense of low frequency extension and power handling; had PSI Audio chosen the time-accurate route the transient performance of this speaker could have been second to none. ■

Contact

PSI AUDIO, SWITZERLAND:
Website: www.psiaudio.com