

Legend Acoustics

Kama 5 Monitor Loudspeakers



The Kama 5 is the latest evolution in this popular floor-standing range from Legend Acoustics. Dr Rod Crawford, chief designer at Legend, says he's managed to improve the drivers, the cabinets and the crossover networks in the Kama 5, to give 'an even-flatter frequency response and more dynamic sound.' As with almost all Legend Acoustics speakers, the new Kama 5 is magnetically shielded, so it can be used in a home theatre system.

The Equipment

The Kama 5 is a two-and-a-half way system, using two identical bass/midrange drivers and a dome tweeter. It's a layout that's very familiar for Dr Crawford, because he pioneered it when he was Senior Acoustics Engineer for Linn Products in Scotland. He used this very layout when designing the famous Kaber for Linn in 1987 and then subsequently refined it for other Linn designs.

In the case of the Kama 5, the upper of the two bass/midrange drivers operates from a completely sealed (infinite baffle)

environment that also contains the crossover network. The lower of the two bass/midrange drivers operates from a bass reflex environment that vents through a small rear-firing port. This port can be blocked off by a foam bung to create a sealed chamber if you prefer the sound of this alignment. The inside of the cabinet has a curved insert behind the driver that diverts high frequencies away to prevent them from 'bouncing back' through the cone.

Both bass/midrange drivers are identical. The cone appears to be made from coated fibre and the roll surround from rubber. The chassis is made from pressed steel and although the magnet is completely enclosed in a steel can to contain the magnetic field, the weight of the driver suggests a large magnet. The (very thick!) lead-out wires are soldered to the driver terminals. The Theile/Small diameter of this driver is 110mm, for an effective cone area of 95cm², meaning the total ECA for the system is 190cm², which is roughly equivalent to a single

driver with a T/S diameter of 156mm.

The tweeter is a 25mm soft-dome type made by Peerless. It uses a standard ferrite magnet. As with the bass/midrange drivers, the speaker lead-out wires are soldered, though Legend uses a different, thinner Swedish cable optimised for high-frequency reproduction.

The Kama 5's crossover network is very impressive. Crawford is a great fan of ribbon inductors (which use extruded metal ribbon, rather than conventional round wire) but it's impossible to include these in a sub-\$2k speaker, so he instead uses generously-sized air-cored copper wire inductors that are hand-wound on plastic formers. They're cross-mounted so there can be no magnetic interaction between them. The capacitors are for the most part huge Wima MKP4 types, with a single Solen. Only a single wirewound resistor is used, and this is located not in the crossover network, but across the terminals of the upper bass/midrange driver. The network itself is all hard-wired. It's attached to the rear of the rear-mounted bi-wirable terminal plate. Although it's not marked as such, the lower pair of the two terminals is connected to the low-pass filter, and the upper pair to the high-pass filter. The terminals themselves are large, multi-way gold-plated types. These have knurled nuts that because of their close positioning, are a little difficult to tighten.

The Kama 5 is a moderately tall speaker, standing 925mm high on its black plinth. This plinth is 238mm wide and 363mm deep, which is considerably wider and deeper than the speaker cabinet itself, so this is the footprint you'll have to allow when positioning. The measurements quoted by Legend (180mm wide and 300mm deep) are the exterior dimensions of the cabinet itself. Similarly, the 900mm height Legend quotes omits the 25mm thickness you need to allow for the plinth. You'd need to factor in additional height if you use spikes, for which the plinth has threaded sockets. Our review sample pair was finished in an attractive light oak veneer, but black oak and jarrah are also available.

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Listening Sessions

Because of the offset arrangement of the tweeter on the front baffle, the Kama 5s are supplied as matched 'Left' and 'Right' pairs. If you position them according to directions, the tweeter ends up on the 'outside' edge of each cabinet. I found this worked perfectly in the ideal set-up, where you're sitting at the apex of an equilateral triangle where each side is around two metres (i.e. the left and right speakers are two metres apart, and you're two metres from each speaker), but if you move the speakers further apart again, I found it better to swap the speakers, so the tweeters are on the inside edge. When fitting the plinths to my sample pair, the countersinks in the holes didn't seem quite large enough for the supplied screws. This was easily fixed in a few seconds with a countersink bit, and likely because my samples were rushed here 'hot off the press' for review, but this presents a good argument for having your dealer do the assembly—minimal though it is. It might also have been because, unlike most so-called 'Australian-made' speakers, Legend Acoustics speakers are 100% hand-built right here in Australia.

Crawford is renowned for designing loudspeakers that 'tell it like it is', in that they're always unfailingly accurate and completely faithful to the tonal balance intended by the recording engineer—the only codicil being that the level of bass is necessarily limited by the physical size of the design. What is unique about Legend Acoustics designs is that Crawford always allows the cabinet/driver design to be the limiting factor for bass output: he never attempts to play tricks with the tonal balance in order to artificially extend bass response. Whereas other manufacturers might artificially boost the lower midrange to gain a bit of volume in the upper bass, or falsely lift the lowest bass to try and add a few notes of bottom-end extension, Crawford instead engineers the smoothest, flattest response he can manage, then allows the bass to roll off naturally according to the design.

This tonal accuracy is immediately evident when you listen to a pair of Kama 5s. I was absolutely floored by the incredible neutrality of the sound—so much so that my first thought was that the word 'Monitor' is much-abused these days, but in the case of the Kama 5 design, it's exactly the word that

describes them: They are, indeed, true 'monitor' loudspeakers.


In the Kama 5, the faithful rendition of tonal accuracy is accompanied by a level of detail that's rare in a 2.5-way floor-standing design, reminding me more of a two-way bookshelf speaker, but of course without the dynamic limitations of a bookshelf. The high level of musical detail that's clearly audible with all types of music, from intimate chamber ensembles to rock groups, is enhanced even further by the realism of the stereo imaging. The Kama 5s deliver a beautifully focussed central image, yet individual sounds in either left or right aural fields accentuate, rather than interrupt, the feeling of there being a real performance stage at the front of your living room.

The treble was bookend-matched to the upper midrange, such that I couldn't pick the transition at all. It was also deliciously smooth. Part of this smoothness was no doubt due to the soft-dome tweeter, but it was also because the very highest of the musical harmonics were ever so slightly reduced in level. This has a number of well-documented advantages including: giving a more 'musical', fluid quality to reproduced sound; eliminating unwanted 'noise' in the recording; and enabling speakers to be played loudly without becoming fatiguing. In the case of the Kama 5, I thought the balance was perfect for normal-to-high listening levels. If you need more 'zing' in the highest treble when you're listening at lower levels, simply wind your treble control up a touch. Of course, if you're using the Kama 5s as front-channels in a home theatre system, you'll find they will reproduce movie soundtracks perfectly, since these have extra h.f. 'bite' engineered in deliberately to ensure that high frequencies are audible at the back of the movie theatre: emphasis that obviously isn't necessary in a normal-sized living room.

The bass is deep and full-bodied. I was perplexed to find that although it didn't seem overly extended, it nonetheless managed to deliver the low frequencies on all my test CDs with a completely satisfying sense of realism. In many ways, the way the Kama 5 delivers its bass into the room reminded me of a superior

transmission-line enclosure, where you don't seem to 'hear' the bass as much as realise it's simply 'there'... saving you the trouble of 'hearing it.'

Conclusion

Crawford started his career as a scientist, then continued on to become a philosopher and teacher before finally coming to loudspeaker design. This background obviously informs his approach to loudspeaker design and is, to the best of my knowledge, unique in the field of audio. To hear how unique, you need only listen to a pair of Kama 5s. You'll find they are truly exceptional loudspeakers. 

greg borrowman

Test Results

Australian HI-FI Test Laboratories measured the frequency response of the Legend Acoustics Kama 5 Monitors as extending from 47Hz to 20kHz ± 3 dB, which is an excellent result. Perhaps even more impressive, however, is the linearity of the response between 100Hz and 12.5kHz, over which span the Kama 5's response varied by no more than ± 1.25 dB! The overall linearity is also excellent. The response could be broadly characterised as being very slightly higher than average between 200Hz and 400Hz and very slightly lower than average between 1kHz and 3kHz—bearing in mind, of course, that we're talking differences of only 1.25dB! Above 12.5kHz, the tweeter's output rolls off slowly and smoothly with increasing frequency to be -3 dB at 20kHz. Above 20kHz, response continues to fall smoothly, then picks up at 30kHz and continues to rise to 40kHz, which is the measurement limit. Maximum output (+3dB) occurs at 180Hz, as you can see on the graph.

Figure 2 shows the Legend Acoustics Kama 5 frequency response with a gated sine test signal (rather than the


pink noise of Figure 1). As you can see, the response is still exceptionally flat, this time extending from the (l.f. measurement limit) at 400Hz to 14kHz ± 1.25 dB, save for a tiny dip at 3kHz, which is likely a measurement error caused by mic position/crossover frequency interaction. The slight increase in high-frequency extension is partly a function of the test signal and partly of the method of signal acquisition, but at 20kHz, the result is identical, with the tweeter being 3dB below reference.

Nearfield responses show the driver responses are fairly similar despite operating from different volumes, with the differences tending to complement each other, so that that upper driver has a smoother response between 150Hz and 400Hz than the lower driver, but the lower driver's response between 400Hz and 700Hz is smoother than that of the upper driver. Since both are operating in tandem at these frequencies, the differences tend to cancel. Overall, the bass reflex alignment looks almost the same as the infinite baffle alignment, with the substantive differences occurring only below 50Hz... as you've probably already guessed by seeing the port's output peak at 42Hz. (Ignore the blip on the traces just below 50Hz, it's some mains hum that's crept into the measurement from the test set-up.) There's very little high-frequency leakage through the port, with just a trace of signal at 275Hz.

The impedance traces (Figure 4) show excellent build quality, with the responses of the left and right speakers almost perfectly overlaid, so they look like just the one trace, with only very minor divergences between 60–100Hz and below 35Hz. You can see the major resonant peak shifts between 70Hz and 75Hz depending on whether the port

is blocked or not, which isn't a major difference and the level is 9.5Ω in both cases. In 'bass reflex' mode, the lower resonant peak is at 33Hz at 5Ω . You can see that although Legend rates the impedance of the Kama 5 design as '4 ohms, nominal', the impedance falls well below 4Ω between 125Hz and 350Hz and between 3.1kHz and 13kHz. The drop to 2.5Ω at 5kHz is not significant, because there isn't much musical energy at this frequency, so an amplifier is unlikely to be overly taxed. The same isn't true at 200Hz, where the impedance drops to 3.2Ω . While this won't present any difficulties for a well-designed amplifier, it does mean you will get better

performance from the Kama 5s if you use such an amp.

The Kama 5 proved to be less efficient than the Kama 4 that preceded it, returning a sensitivity figure of 87.1dB SPL at one metre for a 2.83-volt equivalent input, using *Australian HI-FI Test Laboratories'* very stringent testing method, which sees very few [Hardly any!...Editor] speakers reach their manufacturer's rating. On this basis, the Kama 5 performed well, but I'd still recommend veering towards the upper end of the manufacturer's recommended power range (100 watts) when selecting an amplifier. 

Steve Holding

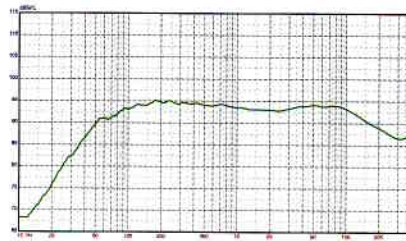


Figure 1: Pink noise frequency response (room averaged and smoothed to one-third octave).

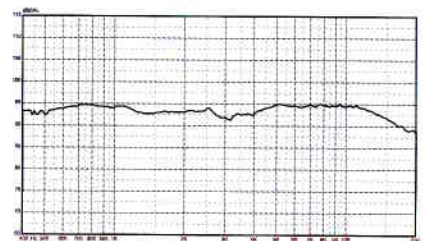


Figure 2: Gated sine frequency response (unsmoothed) at 1.0 metre.

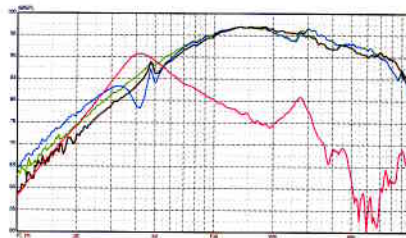


Figure 3: Nearfield frequency response of both bass/midrange drivers and reflex port. (Note data for ports has not been re-scaled to compensate for differences in radiating area.) Note: Ignore blips in traces just below 50Hz.

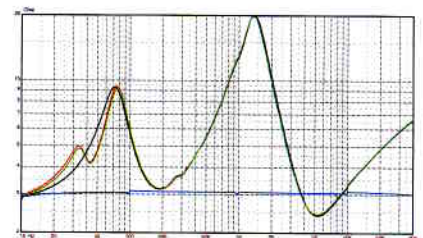


Figure 4: Impedance vs frequency, with both left and right speakers graphed without rear port blocked (red and green traces), and left speaker without rear port bung (black trace). Blue trace under is that of a reference 30Ω precision resistor.