

# Magico – the strongest form of music

HAVING ALREADY BEEN CAPTIVATED BY THE MAGICO A3 LOUDSPEAKER EARLIER IN 2022, MARTIN COLLOMS TURNS HIS ATTENTION TO THE LARGER A5 FLOORSTANDING MODEL, AND FINDS THE ADVANCES ARE MORE THAN SIMPLY NUMERICAL

**The Magico A3, reviewed in HIFICRITIC's April-June issue, was impressive enough: now the opportunity has arisen to move up the range to the A5, another floorstander and – for the moment at least – the largest speaker in in the 'A' series, which is a well-coordinated line-up including both bookshelf and floorstanding designs, plus matching home theatre loudspeakers including sophisticated active subwoofers of notable performance.**

The aim of the 'A' series is to provide high performance at substantially reduced costs – well, at least when compared with Magico's 'S' and 'M' ranges – through revisions to material choices, manufacturing and handling methods, all of which deliver more competitive costings.

The A3 to A5 model upshift is a greater jump than that simple numeric designation might suggest, as one might hope from the price increment: the A3 is £20,998 a pair, while the A5 will leave you a couple of pounds of change from £36k. Qualifying that increase, the larger speaker has three 9in/22cm bass units compared with the A3's pair of 7in/18cm drivers, and when the A5 pair turns up in your listening room – quite a task, given the 180lb/high-on-82kg mass of each speaker – it's impossible to ignore the significant physical presence of each 1.14m tall enclosure, and their monumental build.

## **Packed with drivers**

The front elevation is seemingly packed with drivers – as well as that trio of bass units, there's a 6in/15cm midrange driver and a 'one-inch' (actually 28mm) tweeter – , yet once installed, the largely matt and satin black A5 seems to settle in nicely and is visually relatively slim, barely wider than the bass drivers themselves at just 10.5in/27cm across. The cabinet is deeper than it is wide, at 14.9in (or just over 38cm) front-to-back, giving it some useful internal volume, and that impressive mass means that relatively small footprint is well-grounded on heavy-duty locking floor-spikes, provided with steel footers for use on polished wood floors.

While most will choose to use the speakers 'naked', magnetically-attached perforated metal grilles, similar to those for the S series, are available to order at an extra cost £1198/pr. In a family

environment those grilles would protect the delicate tweeter domes from accidental damage, and their decent acoustic transparency means they're fine if left in place for less-than-ultra-critical listening.

## **Aircraft alloy**

The A5 is an almost ascetically slim pillar in satin black, aesthetically rectangular, and significantly distanced from the distinctive curvilinear profiling of the earlier 'S' series, not to mention the more flowing forms of the prestige 'M' series. While the latter designs are built using advanced, formed carbon fibre composites, the more straightforward use of stock bar and plate aluminium alloy – manufactured in bulk largely for aircraft – makes the 'A' series more economical, and from an engineering viewpoint facilitates factory handling during assembly. It all helps control manufacturing costs for a design of such high engineering quality.

You'd expect bigger bass from this larger loudspeaker, and it delivers: considering the potential low frequency output on the basis of drive unit piston swept area, it's possible to estimate the greater low frequency output, but the addition of 'volume velocity' – which includes the diaphragm throw or excursion – is the true measure of the low-frequency capability. The two bass drivers of the A3 are the equivalent of one of the A5's larger unit, but here we have a close-coupled array of the 9in/22cm units to get you something substantially larger: the equivalent of a massive 13in/32cm bass driver.

That means potentially four times the low-frequency output of the smaller A3, especially as these larger drivers also have that greater excursion or 'throw' and still better coupling of this acoustic array to the environment. In my large open-plan room, the A3 thundered well enough, but the A5

undeniably sounded very substantially larger, with a more powerful, more dynamic, and more deeply plumbed bass – as well as clearly being capable of substantially higher sound levels.

To make sure of this, I borrowed a D'Agostino Progression 350 stereo power amplifier from Absolute Sounds, capable of a continuous 600W/channel into the A5's nominal 4ohm load. The Magicos simply lapped up this massive power.

### Tech story

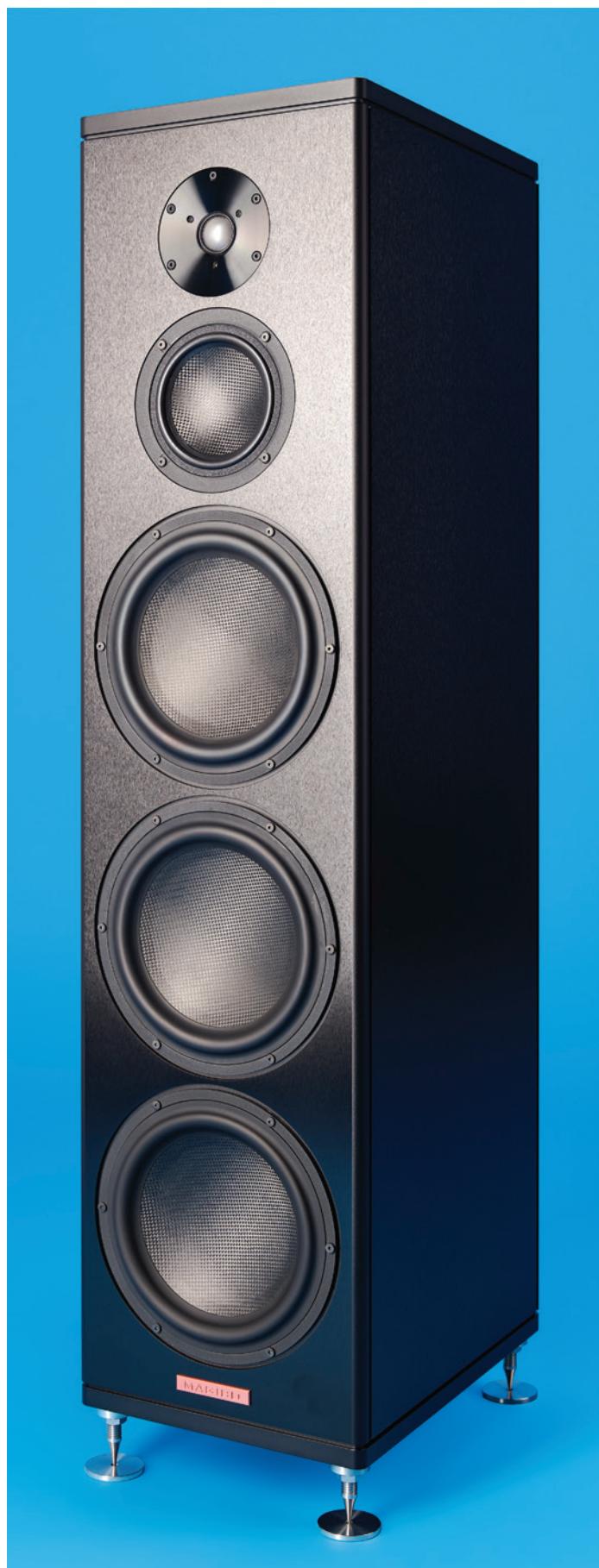
Building on the conceptual foundation of the floorstanding A3, the A5 has enjoyed a year or two of further development since that smaller loudspeaker was released. The original and highly regarded 5-inch/11cm, graphene reinforced midrange driver of the A3 has been transformed for the A5, this new unit being largely derived from that in the company's super flagship M9 speaker – which is well into 'price on application' territory – and now boasts a superlight, high performance composite sandwich diaphragm. This is constructed from a hard-to-make concave profile micro tech aluminium alloy honeycomb core bonded to super-stiff skins of woven graphene nano filament, Magico dubbing this technology *Nano-Tec*.

This construction holds considerable promise for a notable advance in midrange sound quality, its lightweight moving assembly promising low stored energy with low coloration and a super-fast transient response. Earlier drivers for mid-range application were frequently based on a cone technology intended to act both as a mid/bass for two-way designs and as a pure midrange in three-way models, but for the A5 project the objective was to maximise midrange performance exclusively and avoid that compromise.

One key to the midrange driver development puzzle concerns the design approach to the outer suspension, which – in many units of this kind – suffers some compromise in that attempt to reconcile differences in technical requirements: linear excursion for useful bass but then subsequent control and termination of upper midrange excitations inevitably arriving at the edge of the cone.

### Stiff and light

The newly developed honeycomb composite for the A5's midrange cone is so exceptionally stiff and light that fresh material and structural solutions were required to found to support and control it, lest it ring like a bell due to the internal damping being intentionally set very low for this ultra-responsive, ultra-low mass diaphragm. This minimal damping also helps to maximise the desired parameters of signal transparency, a speedy impulse response and a wide frequency range, so here a newly-designed, lower-mass surround/suspension of a laminated





foam polymer helps to deliver a faster settling time for improved clarity and lower distortion. The design also has a graded termination for cone excitations, with the required mechanical damping controlled over a wider frequency range.

The substantial diecast alloy frame has an open-back structure for minimal reflections, as is evident from my midrange measurements, while the high temperature titanium voice coil former operates in a highly linear magnetic field using twin ferrite magnets, enhanced by a substantial eddy-current-suppressing, distortion-minimising copper cladding on the massive pole plate.

As would be expected the acoustic loading for the mid unit is critically tuned to match the crossover alignment, this driver operating in its own alloy enclosure, the anti-reflective interior enhanced by computer modelling of its geometry and spatial absorption behaviour.

#### **Magico's best midrange yet**

This midrange driver, nominally covering 350Hz-2.2kHz, is undoubtedly Magico's best unit of this kind to date, and much attention has also been paid to the new bass drivers: their 9in/22cm size is unusual, Magico explaining it's the largest that could be shoe-horned into the A5 baffle, but their exceptional throw allows each to perform much like a typical full size 10in/25.4cm unit.

The engineering is quite special: built on a new compact chassis is a huge ferro-ceramic powered motor, boasting a massive 5in/125mm voice coil wound on a high temperature titanium former, here including a copper clad pole, with particular attention paid to stabilising motor inductance in the face of substantial excursion or throw. If neglected this may be a source of higher order masking distortion which can also affect midrange transparency and dynamics, even to add a 'nasal' coloration to bass tones.

The exceptional magnetic field linearity facilitates a higher power low frequency bass output, here specified at a thundering 115 dB SPL claimed maximum at this frequency (@ 50 Hz, 1 meter with a short term 1000 W), while the graphene reinforced diaphragms are designed to operate as pure pistons in their working range of at least up to a few hundred Hertz.

#### **Flagship tweeter tech**

Magico explains that the 'one inch' tweeter dome of the A5 is based on the design of its flagship M-Series tweeters, and shared with the other A-Series models. In this version the 28mm pure beryllium dome does without the deposited diamond layer of the 'M' unit, and computer modelling was applied to optimise the behaviour, in respect of both timbre

and frequency response, and not just for maximum extension into the ultrasonic region.

Its compact, low-distortion neodymium motor system operates with a hollow pole leading to a rear chamber having anti-reflection, graded, back-wave absorption, while the milled alloy faceplate offers a shade of a shallow waveguide loading, while just sinking the dome apex below the front baffle plane. The naturally falling output at the extreme octave is not resonated or 'corrected' here, as this would impair the carefully designed time decay behaviour, which is notably free of overshoot or ringing.

Further supporting the claim to numerous original design features, the A5 is the first to adopt, after extensive testing, the latest and best power resistors from component and crossover specialist Mundorf, which company exhaustively tests its components, right through to highly critical listening tests – which I can confirm from personal experience are possible, showing that every part used in such a design makes some contribution to the whole loudspeaker.

Used in the A5 are the new M-Resist Ultra foil resistors, a world first usage in production and the result of years of development to deliver pure metal alloy on-substrate/heatsink resistors which claim greater power handling, with better transparency and 'tonal liquidity'. The Magico three-way crossover topology electrically marries the five drivers for best acoustic integration in the listener far field, where Mundorf build these crossovers to Magico's exacting specifications. Here the 'target function' is typically a precision 24 dB per octave Linkwitz-Riley filter, critically voiced in the acoustic domain, this including the driver responses, specified to 'maximize frequency bandwidth while preserving phase linearity and minimizing intermodulation distortion', which is fair enough.

Very high-quality components are fitted in the substantially dimensioned mid-treble crossover, including MCap Evo series PP/Alu-foil capacitors, air core inductors and those special high power metal foil resistors. Magico takes the crossover build very seriously, specify the use of 'high end' audiophile grade components where many designers may well take the crossover electronics for granted.

#### **Sound Quality**

From first hearing, the A5 was evidently and substantially musical, while remaining wholly unexaggerated when compared with many rivals I have experienced. Somehow it vaults those familiar physical limitations of sound reproduction I thought I knew so well, to create a genuinely close-your-eyes experience. The sound doesn't jump at you with a false sense of excitement, even though it will growl and roar well enough if fed a generous diet of clean



power; rather, your ears feel caressed by a superbly blended frequency range of great purity and musical proportion, which renders beautiful sounds beautifully. Yet there is ample power available, although this is more the sensation brought by the likes of a normally aspirated 5-litre engine than a 3-litre high-revving turbo.

Loudspeakers are machines of a kind, made of steel and aluminium, adhesives and polymers, springs and magnets, copper wires, plastic sheets, high tensile fibres, fed current via electronic components in the crossover network, these the power filters dividing the frequency ranges between the drivers. Yet somehow, the A5 allows you completely forget that it's such a machine, such a complex assembly of mechanical and electrical parts.

Early impressions were of a satisfyingly subtle transparency, with superb sense of space and air, conveyed without any identifiable emphasis or exaggeration. With the acoustic of 'There Were Swallows' on the ECM recording *Twelve Moons* by Jan Garbarek, I was drawn inexorably into a mystical world of enveloping spatiality, full of imaginary constructs of place, ambience, tonality, micro percussion, impact, and subtle timbre.

A week in, experiences such as these continued, soon becoming addictive. The A5 sound is not out and out impressive per se, just genuinely lovely to experience – and then you find you can't turn them off. With every track played you find further nuances, renewed musicality, superior expression, new meanings in what were familiar tracks. Such is the exceptional resolution and musicality on offer that these speakers seemingly turn silver into gold, old 16 bit/44.1kHz recordings into hi-def masters and more.

Somehow this design transcends the mechanics of sound reproduction, performing at a recognisably higher level where acoustical musical instruments sound genuinely musical, made of gut and tensioned wire and of wood and of resonating pipes, not of plastic and tin and varnished cardboard, and with no detectable ringing, hardness, or compression.

This is a performance level where vocals are sweetly voiced, articulate and expressive, and at times it was hard to play the part of the critic while set adrift in such sumptuous and expansive soundscapes. There's an inner balance, a sense of poise, a quality for which many designers strive, but very few attain. It's an innate timbre where sounds are natural at their natural loudness in situ. For a vocalist it is akin to singing from the chest and not just from the mouth.

There's no need to wind up a symphony recording to hear the double basses voiced with a natural weight, although turning up the volume

with the A5 engenders no sense of strain or hardness: this genuinely powerful design retains its composure at all sound levels – even at 600W/channel/4ohm peak programme levels.

It's striking that the innate timbre arrived at by the Magico design team is one which sounds remarkably stable over whole range of loudness: there's no sense of false 'bite' encroaching at a peak levels, just cascading maximae of sweet, encompassing, enveloping and powerful sounds. Conversely, I've listened for hours at near whisper quiet loudness, late into the night, the decorative needles of the Progression amp's loudness meters barely twitching from their rest position while I drifted away on a calm sea of musical beauty as the clarity, high resolution and natural timbre remained in place. Could this be its most impressive quality?

The 'join' between mid and treble is quite seamless, wholly natural and beautifully integrated, with no trace of whine or shout even when driven hard. Transients are outstanding, for example where the crystal-clear exposition in time and space of the complex percussion and rich harmonics of Reich's *Music for Mallet Instruments* is something of a revelation. While the reproduction of rock and pop is very, very good, it is with natural musical instruments and voice that there is an unmistakable ring of truth to the timbre, the tonal balance, particularly with more subtle pieces where the richness and detail on offer for diverse timbres is extraordinary, and consistently rewarding.

With John Lee Hooker's *The Healer*, the Magico takes the listener straight into the studio acoustic, the musicians sounding convincingly live throughout the entire recording. Favourites from Ricky Lee Jones were exemplary, sounding close to personal listening on electrostatic headphones and wonderfully articulate with the clarity and rocking beat on her eponymous first LP release.

You can't help but catch your breath when heavy stuff such as Christine and the Queens' *5 Dols* – the French language version – comes pounding in, filling the listening space, with the Progression 350 imbuing the A5s with seemingly unlimited bass.

Marilyn Manson once commented that 'Music is the strongest form of magic' – this Magico proves that the converse is also very much the case.

### Conclusion

Yes, I could mention the rather average efficiency and the tougher than average sub-4ohm loading; and note the substantial height, price and weight; or perhaps mention the skilled use of hi-tech carbon fibre, aluminium honeycomb and graphene composites, beryllium, and aircraft alloys; or even comment on the number of drive units. Instead, I applaud a sound reproducer of outstanding



*New M-Resist Ultra foil resistors from Mundorf make their world debut in the A5 crossovers*

### The System

Townshend Allegri Reference control unit, Naim NAP250DR power amplifier, D'Agostino Progression 350 stereo power amplifier, Naim SuperLine-Supercap DR phono pre with Linn LP12 player with Keel chassis, Karousel main bearing and Radikal motor control, Naim ARO arm, Lyra Delos cartridge, Naim UnitiCore network server and S/PDIF source, Roon Nucleus Plus server control with Qobuz; Linn Klimax DSM streamer-DAC, NAIM ND555 Streamer-DAC, 555 PS x2 (DR), Wilson Audio Sabrina X, Magico S-5II, FinkTeam KIM, BBC LS3/5a (15ohm), loudspeakers, Naim 4 tier Fraim racks, Transparent XL MM2, Naim NAC A5 speaker cables, Naim Super Lumina, Transparent MM2 and van den Hul Carbon TFU interconnect cables. Transparent XL series supply and loudspeaker cables.

musicality, bringing joy to the listening experience. Its transcendent quality seemingly reaches beyond that of the equipment used with it while bringing out the best in the music. With a surprisingly compact footprint, it performs musically way beyond size and price, and is clearly one of the world's finest-sounding loudspeakers. What price can you put on that?

**Lab report**

**1. Sensitivity**

88.0 dB 2.83V, 1W (8ohms) but note that this is a 4ohm load. Due to the array height a scaled 2m microphone position was used to improve accuracy. A first-class pair match was found, +/- 0.75 dB from 200Hz to 15kHz, supporting the crisp stereo focus observed.

**2. Frequency responses**

In the optimal 5-degree toed-in orientation, and at about 3 degrees below the tweeter axis, the broad midrange was extraordinarily uniform, where the 300Hz -5kHz span meets an amazingly accurate +/- 1.25dB tolerance. In the last treble octave, beyond 12kHz, the high frequency output is a couple of dB down, which might lend a touch of sweetness, but not so much that I really noticed.

(Note: If the loudspeaker has been warehoused in colder weather a newly installed example may take several days to attain the local ambient working temperature, so great is its thermal mass. Many driver suspensions stiffen up below 20C)

Magico has the technical resources to achieve any frequency response it desires, ruler-flat if that's what it considers correct. But axial frequency response is only an indication, just a part of the story. What matters more is the 'timbre', or tonal balance of the sound energy envelope driving the

forward space, and then the room as a whole, taking into account the enclosure geometry, the radiation patterns of the drivers, crossover network integration and how all this coalesces to a uniform sound in the listener region.

For the radiated low frequencies, the substantial vertical bass driver array smoothes the floor-to-ceiling bounce/reflection, so delivering more even, tuneful bass to the room acoustic.

Trying to get a measurement handle on this behaviour, a 2m mic-to-loudspeaker spacing – together with off axis readings and reference to the overall far-field power drive to the room – provided data helpful in explaining how superbly coherent, natural and highly dimensional this loudspeaker actually sounds. The aurally dominant midband, in the range 300Hz to 5kHz, is quite exceptionally smooth, well-balanced over frequency, and notably uniform in directivity.

This sound power is delivered by the state-of-the-art mid driver, a unit of near electrostatic time domain behaviour, and with a complementary subjective transparency. Right away you know instinctively a 'good one' when you hear it, and this is undoubtedly one of the best of the genre.

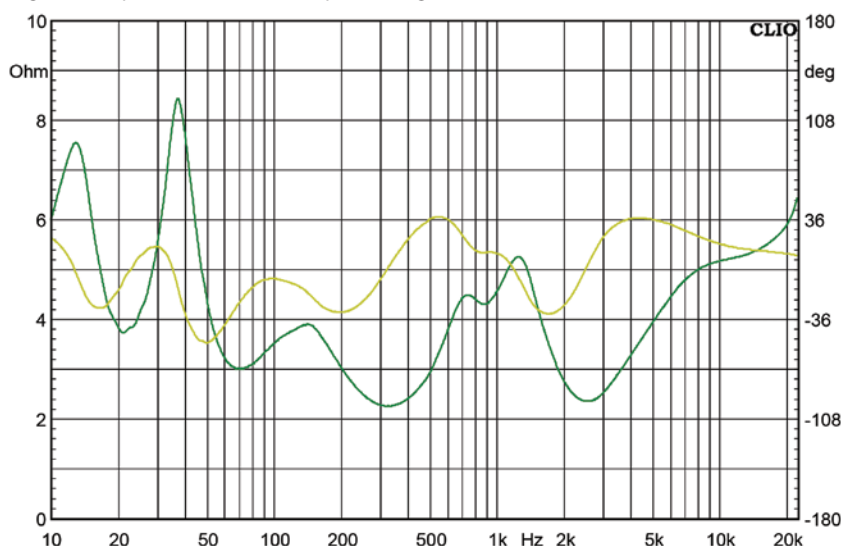
Several measurements were made to assess timbre, i.e., mid band frequency uniformity over the listening area, for 200Hz to 7.5kHz, the broad, five octave mid band. Here, over this primary frequency range the driven room energy measured a truly excellent +/- 1.5dB averaged for the pair, one of the best I have ever assessed.

In the vertical plane, both above and below axis, the only significant variation in output was tightly confined to the 2.5 to 4.2 kHz range, with the data showing excellent crossover control: here just +2, -3dB of overall variation observed, centred on 3kHz, the crossover frequency. The driver outputs are thus considered to be very well integrated acoustically, if a little better *below* than *above* axis, thus suiting the normal listener position in respect of this tall transducer.

Above the optimum axis, i.e. above ear level, there's a minor notch near 4.2kHz but this shouldn't be mistaken for the primary axis: when trying these speakers out in a demonstration, it's essential to take a seat.

When driving my large open-plan room, the A5 achieved a very well extended -3dB low-frequency point of 25Hz, with exceptionally powerful and uniform sounding bass, though to achieve this condition I spent some time on optimising locations for both the listener and loudspeaker and, as already mentioned, commission a more powerful amplifier. My chair was moved back 55cm while the loudspeakers were also moved forward by 15cm from the front wall from the usual location.

Magico A5 impedance (resistive component in green)



## REVIEW

### 3. Distortion checks

**Low Frequency:** At a very low 25Hz frequency, and with over 12W (8-ohm ref) of continuous sinewave input (actually a 24W rms input), the A5 begins to 'double', introducing some mild 50 Hz, 2<sup>nd</sup> harmonic, though hardly audible on music, but is rock solid at levels below such a massive, room shaking test input. At the higher frequency and more commonly encountered 40Hz, the bass guitar fundamental region, a 1W continuous input sounds really loud in the room, like thunder, but with no audible distortion. Here, when measured for distortion in the nearfield, we got 0.6% for 2<sup>nd</sup>, 2% for 3<sup>rd</sup> and 0.5% for 5<sup>th</sup>, very fine performance at this power and frequency, and with the rest of the spectral components comprising inaudible higher harmonics, a great result.

Power handing was exceptionally good, this loudspeaker seen capable of accepting 23Vrms (130W rms/4 ohms) at 40Hz, this approaching its short-term maximum sinewave power rating and delivering a massive 105dB sound level in-room (110dB for a pair in this space!). And it loved electric bass guitar. By 100Hz distortion was very low: for a representative 'loud' 86dB sound level at 100Hz, 2<sup>nd</sup> harmonic was an inaudible 0.2%, with 3<sup>rd</sup> harmonic similarly good sounding, also with no 4<sup>th</sup> harmonic, while here 5<sup>th</sup> was just 0.05%, -66dB, again confirming the excellent motor and suspension design. For 200Hz, the 'upper bass' region, if psychoacoustically more strictly the 'lower mid band', it measured better than 0.03% for second harmonic at a 'loud' 86dB, and here the critical third component was also excellent at just 0.05%.

The bass sounds noticeably 'quiet', as it should, free of audible 'harmonic noise' and thus it will not contaminate the mid-range clarity. 75W short term sinewave input was also possible at a really low 35 Hz, and it entertained a near infrasonic 20Hz tone at 25W, subjectively very loud, (in practice this is a 50W sine wave drive from this 8ohm rated amplifier). The A5 certainly can thunder. By 25Hz distortion is already remarkably low promising negligible masking of higher frequency information. For example, at 86dB spl, 25Hz, the third harmonic was better than 0.8% and was quite inaudible, with second even better at a wholly negligible 0.15%.

That honeycomb cored mid driver is a real honey: for example, the 2<sup>nd</sup>, 3<sup>rd</sup> and 4<sup>th</sup> harmonics measured just 0.03%, 0.015% and 0.01 % respectively at 88dB spl in the mid band, these super low and inaudible values and rivalling some power amplifiers. An ear-splitting 8 ohm and very short term 'watt' into the tweeter (I wore ear defenders!) gave 0.1% of 2<sup>nd</sup>, and just 0.025% for the critical third harmonic, 0.01% of 4<sup>th</sup>, here -80 dB, and little else. At still lower powers the distortions reduce decrementally: excellent results.



*Beryllium-dome tweeter is based on technology from Magico's M-Series flagship speakers*

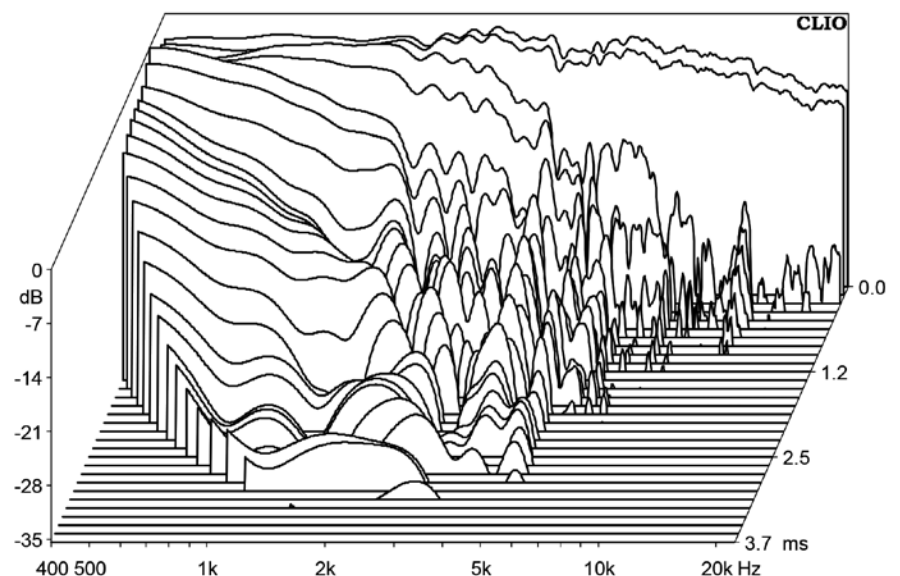


*Bass driver is of an unusual 9in/22cm size – any larger and it wouldn't fit into the baffle! But then are three of them...*

### 4. Amplifier Load Impedance and Sensitivity

Unrelenting in my campaign for better load impedance behaviour from loudspeakers I must truthfully report that the A5 is essentially a 4ohm loudspeaker, as is correctly declared by Magico. This does make significant demands on cable, connectors, connector tightness and not least the amplifier choice: while an amplifier may well have been chosen for tolerance of awkward loads it does

Magico A5 CSD Time decay spectrum





**HIFICRITIC**  
AUDIO EXCELLENCE

**Specifications**

|                           |   |
|---------------------------|---|
| Sensitivity               | 88dB/1m, 2.83 V   |
| Impedance                 | 4 Ohms  |
| Frequency Response        | 24 Hz – 50 kHz nominal (-6dB)   |
| Drive units               | 1in/28mm beryllium dome tweeter<br>6in/15cm Graphene honeycomb Nano-Tec midrange<br>Three 9in/22cm graphene Nano-Tec bass drivers |
| Minimum Recommended Power | 50 Watts RMS  |
| Maximum                   | 1000 Watts RMS  |
| Dimensions                | 44.75" H x 14.9" D x 10.5" W<br>(112cm x 27cm x 23cm)   |
| Weight                    | 180 lbs. (82 Kg)  |
| Price                     | £35,998/pr UK   |



not mean that we should approve the practice of obtaining a greater apparent sensitivity by dragging in more current via a designed lower load impedance. In my experience amplifiers and cables almost invariably sound better dynamically when the loading is kinder, here a free audio lunch is available to designers if they wish to take it. Clearly compatible with higher current amplifiers, the typical working impedance is a nominal 6 ohms where this a fair estimate for the average value. It dips to 3 ohm resistive at 90Hz and then falls to a little below 2.5 ohms at 67Hz. Generously dimensioned, corrosion and lacquer free terminals on the amplifier and the loudspeaker cables are advisable, together with very firm clamping of the connectors, so as not to miss that last drop of available magic.

The sealed box system resonance at 22C was 45 Hz, and is not overdamped, promising a healthy room-matched output down to 27Hz. Above 100Hz the load has a usefully low reactance – i.e. a modest phase angle – this being helpful for amplifier and cable matching.

The A5's 4ohm Watt referenced sensitivity is lower than average at just below 85dB, but it's likely no one will notice 'just a notch on the volume control'. Certainly, I would take some care with amplifier choice as the A5 is worth the effort: get one of very high quality and with ample power supply and current reserves. The A5 can read

amplifier power supply design and size like a book, and issues of amplifier negative feedback do not appear to come into it, not providing the solution. Conversely in the absence of a dreadnaught amplifier it will work well enough with all the major qualities in place, and you might never suspect what low frequency performance potential is available. I began with a Naim NAP250DR which offers 160W/ch. into 4ohms backed by a sophisticated, fully regulated power supply and a 1kVA transformer yet the low-frequency power upshift with the Momentum was quite substantial in audiophile terms.

**5. Spectral Decay**

I took several spectral decay measurements for the mid-treble region with broadly similar results. Firstly, the tweeter behaviour is excellent confirming that silky, sweet, and transparent sound we heard, also where the overall decay floor is better than 25dB down, which is very quick, and where upper residuals from the honeycomb coned mid driver might also be present, but which are absent, an excellent result. The first dome resonance for the high frequency unit is at 33kHz, has a low Q factor and is beyond my calibrated limit frequency for this test set up. Apart from the usual residuals there are no identifiable resonances of significance in this spectrum analysis, a fine result confirming the excellent transparency and exceedingly low colouration heard through the mid/treble range.

**6. Maximum level**

A powerful 8/4ohm rated amplifier of 200W/ch. will generate satisfying in-room sound levels of up to 108dBA for a stereo pair. We confirmed that when used with discretion a 600W/4ohm/ch. rated amplifier was possible, where abundant clean high level current output would be available such as a D'Agostino Progression Stereo 350.

This loudspeaker can 'read' the size of both the reservoir capacitors and the power transformer used in the matching power amp, as the Wilson X1 Grand SLAMM had done in my mid-1980s review for *Hi-Fi News*. On a comparative basis, an amplifier with smaller power supplies appears to subjectively choke off the bass power and extension of the loudspeaker even if the amplifier performs to specification and is not overloaded. In a seeming contradiction of amplifier theory which claims a stable low output impedance, negative feedback directed, this transient power deficiency is nevertheless easily heard on demonstration. With the Progression 350 it was readily apparent just how powerfully loud this loudspeaker could play, especially in the bass, being enough to drive my large open plan room to its practical limit.