

# HIFICRITIC

AUDIO REVIEW MAGAZINE

£15 Vol6/No4 OCT - DEC 2012

## USB CABLES COMPARED

We discover some quite obvious differences between some fifteen types of USB cables

## GATHERING MOMENTUM

Dan D'Agostino's striking new stereo Momentum amplifier

## BEAUTIFUL BODNAR?

A high value, high sensitivity single-driver speaker from Poland

## A FINE IDEA

This compact floorstander provides a new entry level to Avalon's range

## ULTIMATE VINYL?

CB finds that the Thrax Orpheus phono stage sets a new benchmark for vinyl replay

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Under the shadow of an FM switch-off, the DAB steamroller lurches on

## MUSIC & MUCH MORE

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ORTOFON ANNA

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CAD DAC 1543

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DACMAGIC PLUS

BULLY SOUND BSC-100M

AVALON IDEA

NEAT IOTA

USB CABLES FROM AUDIOQUEST,  
CARDAS, CHORD, FURUTECH,  
KIMBER, QED, SUPRA and WIREWORLD





Krell designer Dan D'Agostino had the misfortune to become embroiled in corporate issues regarding the company he started and guided for some 30 years, regretfully departing to found Dan D'Agostino Master Audio Systems. The new company began operations with the *Momentum* monoblock power amplifiers, 300W devices that sold for £35,000 a pair, and has followed this up nearly a year later with the stereo *Momentum*, reviewed here. A pre-amplifier in similarly extrovert styling is also anticipated. (His audio electronics designer son Bret also left Krell and has started his own audio company called Bully Sound, commencing with 100W enriched Class A monoblocks at about £12,000 a pair.)

Deceptively compact in the flesh, the two-channel *Momentum* is just half the size of our reference Krell *Evo 402e*, and its black (or silver) satin anodised aluminium casing and heavily sculpted satin copper flanks could not look more different. The fascia is dominated by a Cyclopiian angled instrument window, its cream dial softly illuminated in tungsten and green LED lighting, wherein two opposing moving-coil meters with clock-hand needles describe a largely non-calibrated arc that's vaguely indicative of output power. A micro slide switch allows settings for 50W, 100W and 250W (full power), on an approximate peak reading, slow decay ballistic response; illumination brightness may be adjusted too.

Certainly not included for decoration, those massive side panels are billets of machined copper, acting as high thermal capacity heatsinks with stepped machined apertures to encourage venturi airflow with higher local velocity for increased heat

# Gathering Momentum

DAN D'AGOSTINO FOUNDED, DESIGNED AND HEADED KRELL AMPLIFIERS FOR THIRTY YEARS. NOW HE'S STARTED A NEW COMPANY AND HAS INTRODUCED THE STRIKING *MOMENTUM* AMPLIFIERS. MARTIN COLLOMS GETS TO GRIPS WITH THE STEREO POWER AMP.

MARTIN COLLOMS

dissipation. The use of copper in such a quantity also substantially stabilises the operating temperatures of the output transistors, and will cool them more rapidly following high power transients, since copper has nearly double the thermal conductivity of aluminium at these temperatures. The sheer mass of copper used here offsets its numerically lower specific heat value, and its inherently non-resonant nature also helps reduce microphony and control vibration. (Output transistors are inherently silicon crystals, and are consequently somewhat microphonic.) Copper's high performance thermal and mechanical foundation should maximise signal transparency under transient signal demands.

Each channel uses an array of 16 Sanken high speed, 69MHz ft (transition frequency), locally network stabilised power transistors, arranged in

*“Beware of making premature judgement on the basis of its seductive cosmetics and a seemingly blatant ‘audio jewellery’ appeal to the international rich. Regardless of its glitzy attire, this amplifier is not mere decoration”*

complementary pairs, of which two are the local drivers. High tensile non-magnetic stainless steel fixings are used with optimised thermal coupling. The internal build of the mono and stereo amplifiers is very similar and a stereo unit can quite quickly be converted to the 300W/ch monoblock if future upgrading is required; simply some wiring changeover, a new meter and a rear terminal panel.

Low feedback means that distortion products will also be low order with some aurally agreeable even harmonic content. Precisely gain-matching the PNP/NPN complementary output transistors also helps minimise distortion. The amplifier is actually built up from below; the whole top, front and rear are carved from a single aircraft grade alloy billet. There are no microprocessors, no complex dynamic biasing schemes, just wideband, highly linear circuitry with low loop feedback. The open loop gain is only 30dB, leaving just 5dB for negative feedback, one of the lowest in the business.

The technology is enriched class A/B, idling at 45W/ch (about 35 degrees Centigrade, depending on ambient). It has a clean short signal path, using discrete, wide bandwidth, all DC-coupled electronics with pre-tested components and through-hole plated PCB construction for optimal, reliable electrical connections. A smaller toroid transformer looks after low level supplies and housekeeping, including the 12V standby/remote switching loop and the display metering. The main power toroid, custom built for low noise and high regulation, is rated at 1.6kW.

The ‘on’ microswitch engages the start up relay, applies power and after a few seconds output is unmuted. Overload conditions will usually

instantaneously engage the input mute relay; if not the main power fuse (sufficient for a maximum short term music output into 2ohm of nearly 900+ 900W) will blow. Despite its compact dimensions, D’Agostino’s trademark freedom from current clipping into tough loads is clearly maintained.

Audio inputs are XLR balanced, and RCA/phono adapters are included (compatible for such connection as the balanced circuitry is internally cross-coupled). Those using single-ended RCA/phono output control units may well commission custom audio cables to avoid the adapter, which we did with a set of Transparent *mm2*.

The speaker terminals deserve criticism. Although we coped, these are partly tucked under the small overhang of the alloy casing, are uninsulated and too closely spaced for comfort with larger audiophile cables, while the 13A IEC mains socket, 7.5A fuse and XLR audio terminals makes it all rather cramped. Transparent is considering speaker cables with more compact, right angle terminations specifically to accommodate this amplifier; a nut spinner is essential to obtain a stable, safe, tight contact.

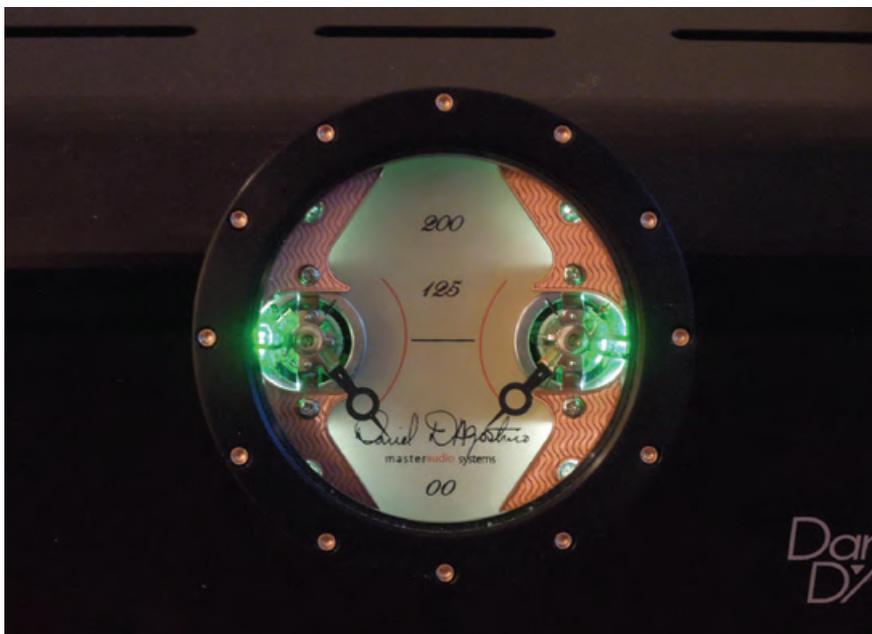
When in standby mode the amplifier is in a very low power (2W) quiescent state, and is set into operation by a microswitch found under the front panel, below the meter. Large fingers may not quite handle this as the low profile semi-rigid feet give little clearance. A custom aluminium alloy support base is in the pipeline, and we also tried a trio of Alto Extremo *Fat Boy II* accessory feet (*Vol5 No4*) with some success.

Specifications tell of a nominal power of 200W/ch 8ohm, 400W/ch 4 ohm and 800W/ch 2ohm; a -1dB frequency response from 1Hz to 200kHz; full power midband distortion (8ohm) of 0.15%; a 105 dB unweighted S/N ratio; and 24.5dB (x17) of voltage gain from balanced or single-ended inputs. Note that the lacquered copper finish does need careful handling. The amplifier has a five year warranty.

### Sound Quality

Beware of making premature judgement on the basis of its seductive cosmetics and a seemingly blatant ‘audio jewellery’ appeal to the international rich. Regardless of its glitzy attire, this amplifier is not mere decoration.

Almost unnoticed, this stealthy creation insinuates itself into the aural subconscious. Like a panther, dark and lithe, it makes no false sound to betray its movements and fluidity. Music glides from it, untrammelled by the more common and familiar operational sounds of active electronics, with their subtle accompaniment of breathing, rustling, and grinding of the music signals flowing thorough



them. The *Momentum* does not sound like electronic ‘machinery’ when reproducing sound. Most people would be unaware that such a ‘pure’ quality is possible, were it not for the example of this amplifier or a Robert Koda *Takumi T70*. (Hints of such noiseless purity, albeit necessarily at modest power outputs, may also be heard from the best single-ended triode amplification.)

Great as the current Krell *Evo* series is, not least our reference *Evo 402e*, which remains a class leader when properly used with matching cables and supports, D’Agostino has clearly gone back to first principles, applying all he has discovered over the years in a new a refreshing way, and it really shows. *Momentum* amplifier technology cannot be termed a progressive improvement or a reworking of existing designs; instead it breaks new ground in reflecting a cogent balance of goal-directed audio engineering. The resulting improvement in sound quality is unmistakable and in my opinion rather more than incremental.

While I truly enjoy getting to understand and appreciate incoming review gear, I only rarely encounter difficulty in deciding when and how long to listen. Not so with the stereo *Momentum*, which immediately proved addictive. In order to get other work done I found that I had to pace myself severely. It’s hard to know where to start, but there’s an unmistakable rightness about the sound quality, a strong sense that all the disparate strands of previously disseminated but frequently impressive sounds are now boldly brought together in a convincing, coherent, composite whole.

Sampling a variety of extracts proved impossible. So much more was going on in the soundstage, and in such a musically consonant manner, that it seemed impolite to curtail a work. Throughout, this amplifier illustrated abundantly powerful musical communication skills, insisting that the listener respects the composers and performers and allows them to complete their works. I dipped into Haitink conducting Vaughan Williams’ *Symphony Antarctica*, and then found I had to play it all the way through. The same thing happened with Leftfield’s *Leftfield*, and so on.

Recognisable aspects of system sound quality improvement – links in the sound quality chain which I had painstakingly crafted over many years – were firmly brought together, validated, clearly focused, and were somehow concentrated in the overall sound of the *Momentum*. Rather like the Wilson Audio *MAXX 3*, it makes friends with the listener, and is fun to be with.

From one viewpoint this amplifier simply sounds unusually correct, confirming that those sadly



infrequent glimpses of quality, heard separately and to various degrees, had been correctly identified after all, and are now presented as a near totality, and in a rather convincing combination.

In an audio chain, equipment performances are relative, and we struggle with alternatives and comparisons for each link trying to define the quality and limitations of each. When a product truly jumps forward in such a quality sequence our reaction can be instinctive and reliable; in an established context you simply *know* when it sounds right.

There’s something of the quality of the fabled *Ongaku* here; something of the Cary *300B SE*; something of the Koda *Takumi T-70*, some of the Krell *KSA50*, some of the *Evolution 600e* monoblocks, some of the Audio Research *D150*. Experience has generally shown that brighter and more forward sounds are probably less correct. The *Momentum* is more distant and a little darker than nearly all the above, and in a system balanced for a ‘normal’ sound it might sound restrained. I had just that experience with the fine Magico *Q1*, for which I preferred the *Evolution 402e* on the day, at least with my sources and cable combinations.

As you listen at greater length the deep, deep perspectives, the remarkable illumination of the far soundstage, showing new revelations with so many familiar recordings, is close to astonishing, and thoroughly convincing. In comparison, seriously good amplifiers are left sounding dynamically restrained and masked in depth and clarity. The more care taken with the system, the more this D’Agostino creation revealed in the music replay. Clearly pretty good out of the box and without great adjustment, skilled system tuning then continued to bring significant rewards in musicality and detail.

Our general description of sound quality could simply be a list of excellents: for focus, stage width and depth, natural timbres, the well extended and balanced frequency response, the power and precision, the exciting and vital transient power, and the very fine rhythm and timing. Such depictions

*“This amplifier seems quite free from grain or hardness, capturing more of the innate tonal colour of each instrument and allowing complex themes to be followed. Piano is seriously convincing, firmly conveying the sense of performance in a beguiling manner”*

should also include the sense of liquid transparency; the subtle resolution and differentiation of instrumental colour the lively attack on percussion; the preservation of instrumental character and identity; the ability to render numerous instrumentals and themes playing simultaneously in separate registration, yet continuing to hold the composition tightly together.

This amplifier seems quite free from grain or hardness, capturing more of the innate tonal colour of each instrument and allowing complex themes to be followed. Piano is seriously convincing, firmly conveying the sense of performance in a beguiling manner.

While the above commentary rather describes the effect the amplifier has on the listener, the bottom line is that it simply more accurate than most designs we have heard, and by some margin. Working with various system components, it is seriously good straight out of its transport case, but a 15-30 minute warm-up is required to reach optimum performance. After careful comparisons with references and previous tests the stereo *Momentum* achieved a record sound quality score of 210, and is a clear class winner.

**Lab Report**

Somewhat ironically in view of its great sound quality, the lab results are not as good as D’Agostino’s preceding Krell Evo series such as our *402e*, and some mild, low order crossover or notch distortion is also detectable.

Investigating crossover distortion (low order, thanks to the minimal feedback), there is some third and fifth, but second harmonic is only a few dB lower, aurally leavening this mix. The distortion spectrum at 1W (*Fig1* and corresponding scope trace *1b*) compares with the 160W 4ohm result (waveform *1c*) which is a bit rougher with visible higher harmonic transitions. But I do not think this higher distortion matters at

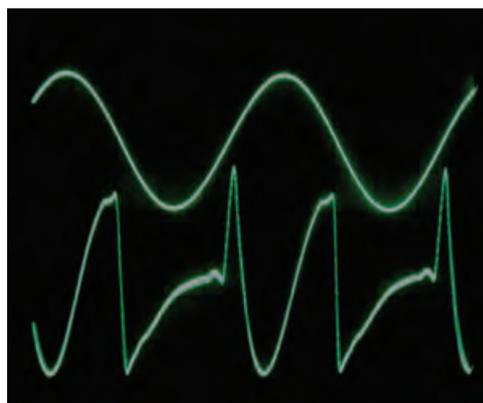
such a high power, where the overall distortion level is still a pretty harmless -53dB (about 0.2%).

On our early sample there was also a trace of supply hum on the right channel (the one nearest the mains socket). Thus the unweighted, 1W figures are 81/85dB (right/left), low enough to be inaudible with an ear to the review loudspeaker, but perhaps not suitable for an unlikely pairing with a 105dB sensitivity horn loudspeaker. Relative to full power the results are 95/105dB unweighted, and 105dBA for both channels excluding hum. As is usual, distortion increases with power and loading, here for example to an average of 0.2% by 80W into 4ohms.

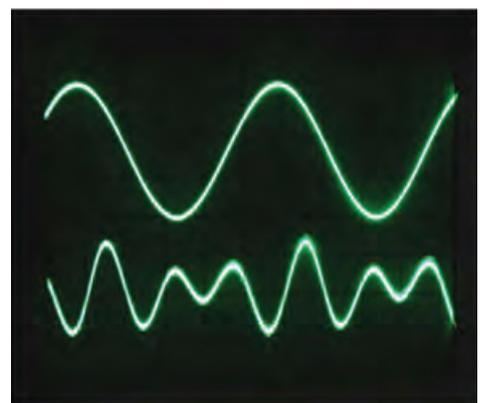
Perhaps surprising is a near absence of distortion increase towards higher frequencies. At 1W the THD remained the same at just 0.06%, from 10Hz to an amazing 200kHz (noting a small power decrement at high frequencies). I ran the same graph for 50W and the distortion did not exceed 0.3% until beyond 100kHz, again showing impressive bandwidth and high frequency linearity. Here the high frequency power and load drive advantage over Class D designs is absolute. The 1W 19.5/20.5kHz high frequency intermodulation was also a very good -70dB, and a fine -63.5dB (0.07%) at full 240W/8ohm power.

Output impedance is typically 0.3ohm, quite low enough, and again very constant with frequency. Frequency response, channel balance and near DC to 200kHz power bandwidth are excellent, while peak current is almost 50 amps, ample for the most taxing speaker load. High frequency intermodulation results are very good (see *Fig 2*), just 0.03% at 1W cruising power. Found difficult to measure, I estimate the input impedance is a high 200kohm, imposing minimal loading on sources (especially beneficial for valve pre-amps). Standby power consumption is next to zero, while for the class and the high power output, the on call idle power is also modest at 90w.

D’Agostino 160W 4ohm distortion waveform



D’Agostino 1W 8ohm distortion waveform



Channel separation was a fine 85dB midband, and 69dB by 20kHz.

For the record, maximum output (242V mains) was 240W into 8ohms 20Hz to 20kHz, both channels driven, and over 445W per channel into 4ohms 20Hz to 20kHz. A single channel into 2ohms produced over 800W and into 1ohm single channel (now on music pulses) some 1.3kW. This amplifier is clearly very powerful and very load capable. It's also phase-correct and has negligible DC offset.

### Conclusions

Not unexpectedly, a low feedback amplifier such as this doesn't break any records for numerical distortion results. Nevertheless the technical performance remains way better than required for consistently accurate sound. And we have long known that low distortion per se is not a reliable quality indicator.

From an evolutionary viewpoint, D'Agostino has spent years perfecting amplification in all aspects including technical parameters, but this has resulted in significant complexity in recent times. For the *Momentum* models he has gone back to first principles, with simplicity the watchword. The prime effort has been directed towards perfecting sound quality while nevertheless maintaining the load tolerance and generous power reserves for which his amplifiers are so well known.

Mechanically and electrically silent, the build quality and finish is also first class, as indeed it should be at the price. But the sound is something else: highly truthful to instrumental timbres, dynamic, focused and transparent, with massive soundstages. It's also upbeat and musically involving. At the present state of the art you could hardly want for more. Highly recommended, this surprisingly compact *Momentum* stereo power amplifier represents a substantial advance in the state of the art.

### Review System

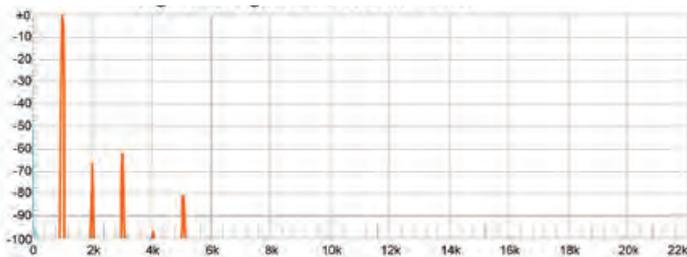
Krell *Evolution 402E* power amp; Audio Research *REF5 SE* and Townshend *Allegri* control units; Linn *LP12/Radikal/Keel*, Naim *ARO*, Ortofon *Anna*, Koetsu *Urishi Vermilion* vinyl sources; Naim *Superline/SupercapDR* phono stage; Naim *Uniti/Serve*, MSB *Platinum Signature* DAC + *Diamond* power supply, network audio; Wilson Audio *Sophia 3*, 15ohm BBC *LS3/5a* and Quad *ESL63* speakers; Finite Elemente *Pagode*, Extrema *Fat Boy* and Synergistic *MIG* supports; Transparent, Yter, Van den Hul and DNM cables.

HIFICRITIC  
AUDIO EXCELLENCE

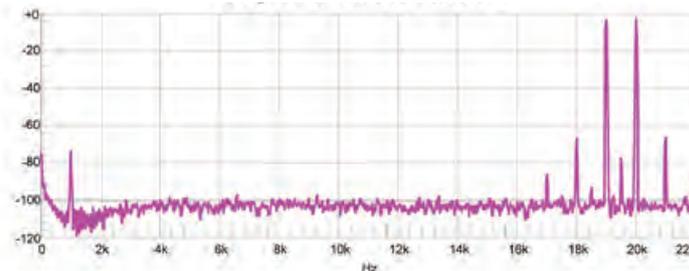
### POWER AMPLIFIER TEST RESULTS

Make D'Agostino	Date 2012-10-09		
Model Momentum (stereo)	Ser. No.		
POWER OUTPUT	20Hz	1kHz	20kHz
Continuous 8 ohm 2 channel	240 W	240 W	238 W
Continuous 4 ohm 1 channel	447 W	448 W	446 W
Pulsed 2 ohm/1ohm 1 channel	823/1,300 W		
Output impedance (ohms)	0.28 ohms	0.29 ohms	0.31 ohms
Peak Current	49 A		
Distortion, THD inc. noise 10W	-55 dB	-55 dB	-54 dB
Channel separation	88 dB	85 dB	69 dB
Channel Balance Right is ref at 0dB	<0.05 dB	<0.05 dB	<0.05 dB
Frequency response	-0.05 dB	0 dB	-0.1 dB
Intermodulation Distortion 19.5kHz/20.5kHz 1:1 rated power, 8 ohms	-63.3 dB		
Intermodulation Distortion 19.5kHz/20.5kHz 1:1, 1W, 8 ohms	-70.2 dB		
Signal to noise ratio ref. 1W 8ohms	77/81 dB unwt'd	82/82 dBA	79.5/79.2 dB CCIR1
Signal to noise ratio ref. rated power	105/95 dB unwt'd	105/105 dBA	94/95 dB CCIR1
DC offset	Left 3.3 mV	Right 4.3 mV	
Aux input balanced sensitivity (full power 2.6V)	1W, 171 mV	200k ohms	- nF
Aux input single ended sensitivity	1W, 171 mV	200k ohms	- nF
Absolute Phase	Correct		
Size: Width x Height x Depth	31.8 cm	15 cm	53.3 cm
Price	£25,000		
Finish	Lacquered copper sides, plus black or silver alloy casework		

D'Agostino 1W 8ohm 1kHz spectrum



D'Agostino I/M odB 19/20kHz



Contact:  
Absolute Sounds  
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# Subjective Sounds

PAUL MESSENGER

## HIFICRITIC

AUDIO AND MUSIC JOURNAL

BECAUSE HIFICRITIC IS FUNDED BY ITS READERS THE SUBSCRIPTION COST IS NECESSARILY HIGHER THAN FOR MAGAZINES SUBSIDISED BY ADVERTISING REVENUE, THOUGH CERTAINLY NOT AS HIGH AS PROFESSIONAL SPECIALIST JOURNALS.

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Martin Colloms, Publisher

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My limited experiences with room treatment techniques have hitherto been rather disappointing. I do use some melamine foam panels between a couple of beams on the ceiling, and across a large bow window behind my main listening zone, in order to minimise midband coloration and improve stereo imaging, but more dramatic attempts to modify the behaviour of the room have not been too successful thus far.

The whole issue of room treatment is controversial. Some reckon that less is more, and that one shouldn't remove any energy from the system. Others point to the fact that recording and broadcast studios use all manner of treatments to cope with the idiosyncrasies of their rooms.

Irrespective of one's views, there's no denying that the room has a significant role in the sound of a system, and my personal scepticism was well and truly tested when a friendly Dane named Ole Lund Christensen dropped off some of his large Mumax (musicus maximus!) AMA2 panels for me to try. At £999 for two Air Motion Absorber panels they're not exactly cheap, but then neither are high quality hi-fi cables these days.

The panels are by no means universally applicable, but they do seem effective at countering the effects of unwanted room modes. They're not unattractive to look at, but because they're 195cm tall and 66cm wide (effectively doubling the latter, as they're normally sold as freestanding hinged pairs) they're unavoidably intrusive, especially as they're intended to be sited well clear of a wall – a key disadvantage, especially as the speakers themselves must naturally be still further out into the room.

It's all to do with interfering with the velocity components of the sound energy, and as I understand it the panels need to be well out from a wall in order to affect the low frequency sound waves. Furthermore, the materials used have been carefully selected: one crucial element is a special paint that reduces the absorption at mid and high frequencies, so that the panels operate evenly right across the frequency band.

Although there's no denying their intrusiveness, these panels do really work, quite dramatically so in fact. To assess them I first brought in a pair of Spendor BCIs, a free space design with a magical midband but a known mid-bass excess. To my surprise, putting two (or three) AMM2s behind the speakers totally changed both the balance and the stereo imaging of the speakers. In this case it wasn't necessarily an improvement, but that's not relevant: what's much more significant is that the change was far more dramatic than, for example, changing cables or support furniture.

The previous and significant 50Hz peak was reduced by a hefty 5dB, which is clearly a good thing, though the somewhat smaller 100Hz peak was increased by around 4dB. In effect, the room mode interaction of the speakers was changed considerably (though it's difficult to say whether this represented a net improvement on the BCI's already good behaviour). Although not susceptible to measurement analysis, the change in imaging was no less dramatic, as the addition of the panels considerably enhanced soundstage precision and instrumental focus. Broadly similar effects were also found using a pair of Nightingale dipole speakers, which certainly seemed improved by the panels.

There's clearly scope for much more work on these Mumax panels, as I want to investigate different speakers and AMA2 positioning. Pro tem I'll merely say that they do work, and are one of the most interesting hi-fi 'components' I've come across recently. Check out [www.actem.de](http://www.actem.de) for more info (assuming Christensen gets around to updating his website soon).