

HIFICRITIC



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WILSON AUDIO HAS BEEN SETTING THE HIGH END SPEAKER AGENDA SINCE THE EARLY 1980s

It was way back in 1994 when I last got to review a Wilson Audio loudspeaker. The company was already established as one of the key architects of the 'US High End', partly because of the exceptionally high quality of its various models, but also their exceptionally high prices that numerous other brands were quick to recognise and follow. Impressively, Wilson Audio not only set the original agenda, but has successfully maintained its high end speaker pre-eminence to this day.

The headlines have tended to be hogged by the company's massive, huge and costly 'statement' models like the original *WAMM* 'modular monitor' and the current *Alexandria*, so much so that it's sometimes overlooked that WA's second model was actually conceived as a professional transportable mini-monitor for location recording work. The *WATT* (where *TT* stands for *Tiny Tot*) took the mini-monitor concept to its logical conclusion, and its 1989 partnership with a *Puppy* passive subwoofer was the hit product that became the foundation of the brand's commercial success.

The basic *WATT/Puppy* combo configuration has remained a constant cornerstone in the Wilson Audio range to this day, while at the same time undergoing regular upgrades in engineering and performance. My 1994 review covered a combination of *WATT III* and *Puppy II*, while by the time Martin Colloms reviewed the then current version in these pages in 2007 (*HIFICRITIC Vol 1 No 3*), the *WATT/Puppy* combo had moved on to *System 8*.

Now it's time for yet another upgrade, but this time it's accompanied by a name change, albeit retaining a *W/P* suffix for old times' sake. The successor to and replacement for *WATT/Puppy System 8* is called *Sasha*. Cute eh? OK, not cute, but it is of course the name of Dave Wilson's new dog. Happily, the reason behind the name change is rather more logical. Whereas the *WATT/Puppy* combos always kept the mid-to-treble crossover network within the *Tiny Tot* head unit, allowing it to be separated and used as a mini-monitor if so desired, *Sasha W/P* is effectively a complete three-way speaker system, operationally (though not physically) indivisible. This is because the crossover for the entire system is now mounted within the bass enclosure, with two pairs of spade terminated cables protruding through its top surface to connect up to the mid/treble head unit.

Interestingly, this change from the *WATT/Puppy* sub/sat arrangement actually extends the historical

precedents way back to the late 1970s. The original KEF *Reference 105* and Bowers & Wilkins *801* were both three-way designs which positioned relatively small mid/treble 'head' enclosures on top of larger bass 'commodes', with the prime purpose of increasing the dispersion of the mid and treble drivers, and both those companies continue to make models with similar configurations to this day.

If KEF and B&W set the original precedents, Wilson Audio's *Sasha W/P* takes their implementation to a logical conclusion, especially in the very substantial yet subtle enclosure engineering, in the extreme care taken to achieve accurate driver-to-listener time alignment, and of course in the price.

While *Sasha's* UK price of £27,450 is undoubtedly very high, it's not far out of line with earlier *WATT/Puppy* generations when inflation is taken into account. Moreover, it's hard to assess the value for money of high end products, particularly when one considers the variations from one country to another. For example, the *Sasha W/P* costs roughly the same in US\$ in the US as it does in UK£ in the UK, despite a current (as I write!) exchange rate of \$1.63 to £1, or a price loading of roughly two-thirds. Going the other way, B&W's *800D* (a comparable if somewhat larger and heavier competitor) costs £13,000/pair in the UK, but this rises to \$20,000/pair in the US. However you look at it, *Sasha W/P* is an expensive proposition here in Britain, but it's clearly more competitive on its home turf.

One crucial element that goes some way towards justifying Wilson Audio's premium price is the considerable care that the company takes to ensure that the speakers deliver optimum performance in the purchaser's listening room. To this end an elaborate package of accessories is supplied to assist in precise alignment, but more important is the services of an experienced and factory-approved installer who will spend some hours ensuring that the very best performance is achieved. To this writer's knowledge, this unquestionably valuable service is not practised by any other hi-fi manufacturer.

Experience over a number of years and many different has shown that the twin 8in bass drivers used here is likely to prove a fine match for my 14x8.5x18ft listening room. *Sasha W/P's* Dynaudio-sourced bass drivers might resemble those used by *System 8*, but in fact the motor behind the diaphragm has been substantially modified and now has twice the 'shove'. The midrange has a paper/composite cone 7-incher of Scandinavian origin, the tweeter a Focal-sourced inverted 1in metal dome,

PAUL MESSENGER

and both are the same as those used in *MAXX 3*. All three drivers are substantially different from those used in *System 8*, primarily in order to improve the speaker's subjective 'speed'. Wilson Audio doesn't manufacture drive units itself, preferring to use a number specialist suppliers, but it does have considerable design input on the specific examples it uses, and in this case each driver type is sourced from a different manufacturer.

Perhaps Wilson Audio's greatest strength lies in the carefully chosen proprietary composites used for its enclosures. The formulations, which usually consist of a combination of wood-based particles within an epoxy resin matrix, are under constant revision and are carefully chosen to suit specific applications within the loudspeaker. The latest material, used for the front baffle of *Sasha's* mid/treble sub-enclosure, is described as: "a combination of natural fibers in a phenolic resin laminate", which doesn't give a great deal away, but which is clearly very effective.

An obvious clue to the US heritage is that the input terminals are expressly designed for use with spade type cable terminations. Just a single pair are fitted low down on the bass module's enclosure, so bi-/tri-wiring or bi-/tri-amping are not options here (probably wisely in this reviewer's opinion). Two further pairs of terminals are fitted to the 'head' module, to accept the spade-terminated cables that emerge from the top of the bass module. The terminals themselves have substantial and long brass nuts (somewhat pretentiously inscribed with the maker's name), and a tool is supplied to ensure all are done up nice and tight. An inspection hatch at the top of the bass module allows some crossover network fine tuning via resistor substitution, though this feature wasn't discussed or explored during my installation.

The installation process is thoroughly worthwhile, but necessarily elaborate and time consuming. The bass modules arrived fitted with large piano castors, allowing the speakers to be moved easily to find the best acoustic locations before spikes are fitted. Starting from my 'usual' speaker locations, the installer moved the speakers about three inches – a little further apart and rather less further away – until he was happy with the image coherence. He marked the position of a corner of each speaker on the floor with gaffer tape, and started fitting the spikes.

The spikes themselves are substantial affairs and have a clever screw-together stacking system that allows hefty spacers to be added to raise the base several inches off the deck. At the installer's suggestion, high spikes were used on my wooden



floor, and brass discs were also supplied to avoid damage. The massive head unit sits on three spikes – two at the front and one at the rear. Several different length examples of the latter are supplied, and a (hidden) look-up table on the top surface of the bass module identifies the correct spike to use for accurate time alignment according to listening distance and seated ear height.

For convenience and simplicity, first impressions were obtained by connecting the *Sasha W/P* onto the end of my regular Naim *NAC552/NAP500* amplification and Vertex *AQ Moncayo* speaker cable. Results were immediately impressive, the *Sasha* delivering fine overall neutrality, a wide dynamic range and splendidly airy yet precise imaging.

In-room far-field averaged measurement amply confirmed the neutrality and the generally good room match. Although an averaged excess of about 5dB was recorded below 60Hz (the alternative Euro bass alignment might have helped here, had it been offered), the trace elsewhere held within a

remarkable ± 3 dB right across the rest of the audio band – indeed, exactly as specified. The only minor departure from an almost flat tonal balance was a slight loss of midband energy 300-500Hz.

Not only is the in-room frequency response remarkably flat, the sensitivity is a very generous 91-92dB too. Sadly, however, the otherwise outstanding performance is seriously compromised by an impedance that drops to an exceptionally low 1.8ohms around 80Hz, and indeed remains unusually low through most of the bass region. Such a current-hungry load will place a very heavy demand on the amplifier, especially if the full loudness capability of the speaker system is explored. More seriously, the output impedance of the amplifier plus the resistance of the speaker cable will not be insignificant compared to the very low speaker bass impedance. It will vary somewhat according to the specific amplifier and type and length of cable, and interact accordingly, and therefore somewhat unpredictably.

Although I got very satisfactory results when simply driving the *Sashas* with my usual core system – an approach I always favour because it avoids introducing extra variables – I also had the opportunity to try a number of alternatives. Wilson Audio's UK distributor Absolute Sounds had also supplied a DarTZeel *NHB-18NS/NHB-108* pre/power combo, complete with special long BNC-based 'darT' interconnects and 2m Transparent *Reference* speaker cables. I'm a big fan of DarTZeel amps (which is probably why they were chosen as partners), but the *NHB-108*'s rated power is pretty similar to the Naim *NAP500*, and therefore might struggle to drive high levels into the *Sasha*'s wicked load. A number of other amplifiers, both valve and solid state, were also available, and tried for varying lengths of time.

One thing quickly became clear: the *Sasha* is very effective at discriminating between all the components used further up the hi-fi system chain. It was ridiculously easy to hear the differences between alternative amplifiers, speaker cables, even mains cables, and even when deliberately keeping the system volume very low to avoid stressing the power amplifier.

This is because the *Sasha* is exceptionally strong in three distinct areas: stereo imaging, neutrality and dynamic range. The dynamic range is much more to do with the speaker's exceptionally low noise floor than any expression or grip at the top of the dynamic range, presumably due to the very refined



enclosure construction and crossover network. I was listening very quietly late one night to an interview with Microsoft CEO Steve Ballmer, and was surprised to hear clearly audible noise pumping from the interviewer's audio recording device. I admit that doesn't prove anything, as there wasn't

time to do any comparisons, but I certainly can't recall having previously noticed low level noise pumping on a BBC radio broadcast.

By day two I'd got the DarTZeel/Transparent combination hooked up. This caused some initial puzzlement, because although the soundstage was airy and spacious, the sound as a whole seemed to lack drama and immediacy, somewhat at odds with my recollection of this amplifier from three years earlier. Changing back to my regular Vertex AQ speaker cable restored my expectations: the sound did seem a bit sibilant, but had much better bite and immediacy, while delivering the sweetness, transparency and speed expected of this remarkable amplifier. While I'm not condemning the Transparent cable, this complex network design needs to be carefully matched to a system, which may not have been the case with these samples.

Over the next couple of weeks I used the DarTZeels and the Naims as well as a very costly Swedish valve amplifier called *theLars*, and the *Sashas* clearly revealed the characters of each. It was quite a



surprise that it worked so well with *theLars*, which is only rated at 20W/4ohms, and it's true (and hardly unexpected) that the bass end sounded a bit 'fat' and lacking in poise. But it's equally true that *theLars* is a very fine amplifier with exceptional top end sweetness and voice band integrity, both of which were ably demonstrated *via* the *Sashas*.

Imaging is quite exceptional. The precise soundstage focus validated the considerable care taken during the initial set-up procedures, while the tapering and backwards-tilted top section helps bring enough room-reflected sound into the mix to add some worthwhile spaciousness and airiness.

Combine this image precision with the low noise floor and the results can be quite spectacular. Radio 3's Choral Evensong from Exeter cathedral, feeding the speakers from the DarTZeel amps and Magnum Dynalab MD106T tuner, sounded quite wonderful, making it easy to comprehend both the size of the choir and the scale and acoustic of the cathedral.

Similar strengths were again clearly evident when replaying Laurie Anderson's *Strange Angels*, which sounded sensational from vinyl via a Soundsmith Strain Gauge cartridge. The superior dynamic range clearly delineated the artifice – the vocal echo and multi-tracking – in this excellent production, yet in no way distracted from the music. Voices were clear with fine separation, depth perspectives were spectacular, and box coloration negligible. Indeed so accurate is the imaging that with movie soundtracks the two speakers proved quite capable of generating

apparent 'phantom' images way outside the zone between the speakers.

Across the whole spectrum of music the *Sashas* proved thoroughly informative and engaging, with significantly better timing than I recall from my earlier *WATT/Puppy* experience. Even 'difficult' material like early Velvet Underground was handled very well, while a well recorded voice, such as Lambchop's Kurt Wagner on *Is a Woman*, was both delicate and delicious. Furthermore, it sounds significantly tauter, faster and more dynamic than my admittedly distant memory of its ancestor.

Sonic criticisms are minor. A little more body and warmth might have been beneficial, and there wasn't the taut dynamic tension and grip that I find with very high sensitivity designs (and which is normally only found alongside limited bandwidth and obvious colorations).

Beyond those sound quality considerations, however, the issue of amplifier compatibility with that very low bass impedance remains. It will probably introduce a degree of unpredictability to the system scenario, especially for those that like to play their music at high levels.

Provided that is not considered a serious issue, the *Sasha* must be regarded as an exceptionally impressive loudspeaker. The bottom line is that the high price is its only real weakness. It does everything with a consummate capability that marks it out as an ultimate allrounder, particularly well suited to medium and large British rooms.

"Radio 3's Choral Evensong from Exeter cathedral, feeding the speakers from the DarTZeel amps and Magnum Dynalab MD106T tuner, sounded quite wonderful, making it easy to comprehend both the size of the choir and the scale and acoustic of the cathedral"

Wilson Audio Sasha W/P

SECOND OPINION AND LAB REPORT

MARTIN COLLOMS

This loudspeaker's *WATT/Puppy System 8* predecessor was covered in *HIFICRITIC*'s first year (*Vol 1 No 3*), and we found much to like. The *W/P* series have often required some extra care in tuning their positioning in rooms, to achieve a good balance of smoothly coupled and voiced upper and lower bass, some rooms proving less well suited with a mild but characteristic imbalance that favoured upper over lower bass output. Since that review I have covered Wilson Audio's *Duette*, *Sophia 2* and *MAXX 3* in *HIFICRITIC*, and have found a new consistency of lower frequency behaviour throughout, with deeper and more even bass, and better room positioning tolerance. We look forward to something similar from this *Sasha W/P*.

While the physically separated bass system is ostensibly very similar to that used in *System 8*, including a pair of those original 8in frame long-throw Dynaudio drivers, it also has a number of changes. The magnet dimensions and flux have been increased, as has the enclosure volume, enabling a revised bass alignment with recalculated port dimensions. Alterations to the bass crossover have also materially affected the resulting frequency response at low frequencies. The effort to get this region right has resulted in some compromise to the load impedance, which (in a pre-emptive strike) Wilson Audio declared reached a 1.8ohms minimum at 92 Hz. Although I'm certainly not in favour of such low impedances, which in reality have an even more severe effect on amplifiers when the adjacent reactive content is taken into account, this admission does contrast with some competitors who blithely assert 8ohm loads despite very low impedance minima.

Amongst valve amplifiers, only the most powerful, set to 4 ohm matching, will start to exploit this speaker's loudness capabilities. While momentary current clipping in the bass region may be tolerated aurally, for best performance one should seek at least 100W/4ohm with a minimum of 10A peak current. An Audio Research *Reference 210* monoblock would do job, if only because it may be transformer matched to this lower load and because this speaker has a genuinely high 91dB sensitivity. If the sensitivity was only 85dB alongside 1.8 ohms, double the current would be needed for a given sound level.

A quick back of envelope calculation shows that 115dB maximum sound level at 1m (on axis peak program – pretty well the aural limit for a domestic listening room, and equivalent to 110dB for a stereo pair at the listening location) will need 200W/ch (40 volts RMS), and I do not see the need for any more. This requires a potential momentary peak

current draw of 32A. Rarely can even the largest valve amplifiers deliver more than 15A peak so here is a lesson. For best bass at higher volume levels with *Sasha*, as potentially offered by this class of loudspeaker, choose a low impedance amplifier and cable, ideally less than 0.3ohm in total with a 25A peak rating for 100W and a 35A peak rating for 200W nominal (8ohm) rating.

My Conrad Johnson *Premier 350SA* power amp's 40A peak capacity should be enough up to 250W, but the last 150W to full peak power might occasionally be current limited should full level 92Hz bass tones arise in program material. The music peak power spectrum suggests there will usually be a couple of dB in hand, so the matter is unlikely to be troublesome. But we shall see.

The 25mm inverted titanium foil dome tweeter might look like that used in *System 8*, but it's actually the *MAXX 3* version. It's a very sensitive and powerful tweeter with extended lower frequency performance and very low distortion, improving crossover design possibilities. More like a small cone driver, it remains piston-like to a little above 20kHz, and is driven by a 17mm voice coil at the effective nodal circle which helps control the first bending resonance amplitude. It's able to deliver tolerably good sound right down into the low midrange, albeit at an understandably moderate level, and Wilson notes the benefit of improved decay resonance. Despite efforts made to roll it off with the crossover, the low frequency resonance of a tweeter can and often does intrude into the midrange decay characteristic, since it is a mechanical system partly coupled to and energised by the midrange driver's soundfield. With extended rear loading and critical acoustic damping/termination, the tweeter's low frequency response no longer significantly obstructs low level detail or colours the mid response.

Some time back Wilson Audio's *Alexandria* had a new 6.5inch midrange unit with a low mass bonded cellulose (paper-based) cone developed for superior subjective dynamics and clarity, plus a more extended frequency range that assists crossover alignment. The same basic driver then appeared in the latest *MAXX 3*, and now *Sasha* has it too. It has a very low distortion motor and is effectively required to operate over some six octaves.

While the upper *WATT* system was previously a full range speaker in its own right, with substantial internal crossovers, the *Sasha* head unit now just houses the drivers, improving the back wave termination with enlarged volume. This speaker lives or dies on its midrange excellence, and much additional work has gone into enclosure panel resonance control.

"Amongst valve amplifiers, only the most powerful, set to 4 ohm matching, will start to exploit this speaker's loudness capabilities"

For any speaker the optimum listening axis is important. Here the front baffle's backward slope delay-compensates the mid and treble sources to allow a phase-coherent acoustic blend for the listening axis and distance. To which end the tilt of the head unit is adjustable on its three-point aluminium and steel metal spike system. The baffle 'blankets' of compacted wool felt operate in conjunction with the near constant directivity pyramidal shape to help control acoustic edge diffractions.

To reduce spurious relative vibration between the two enclosures, a new higher damping composite material is used for the upper module driver baffle, alongside further reinforced proprietary plywood panels for the side walls. The bass enclosure also has a revised panel material and bracing to minimise energy decay levels.

Low level detail will only be well resolved if the self-noise and the energy decay noise are low, the former through low distortion and accurate crossover control, the latter through low energy storage and dissipating systems well matched to the driver chassis through the structure, materials and panels of the enclosures. With this low noise floor should come deep focus and image depth, plus accurate delivery of the stopping of notes as well as their starts.

Sound Quality

In support of PM's assessment I thought it would be useful to report how the *Sasha* sounded in a different room and with different equipment. I was also curious to hear the development and performance progression from *Sophia 2* via *W/P System 8* to *MAXX 3* and *Sasha W/P* for myself.

Confirming just how cleanly and loudly *Sasha* can play, a pair was used in a small ballroom at the National Audio Show, Whittlebury Hall last September driven by massive Krell amplification. A vast choir was reproduced in full flood with no hardness or other compressive limiting and no audible congestion, the voices remaining substantially separate and natural. In the face of this complex and arduous assault the speaker still maintained a deep, spacious and highly focused soundstage.

Back home such high sound levels were understandably inappropriate due to the usual pressure mode build up in a domestic listening room. Nevertheless the sound remained singularly free of strain and fatigue.

The various *W/P* models have worked well in most rooms, but historically have always required extra care in location fine tuning to address some upper bass excess, by exploiting the room's low



frequency modal behaviour and precisely setting side wall spacing for best focus and lowest midband coloration. *Sasha* has a better balanced low frequency response, like the other new generation *Sophia 2*, and consequently is easier to place for good low frequency coupling, allowing still finer tuning relative to side walls for superior mid/treble timbre.

On arrival *Sasha* was initially positioned at the locations that had been used for *Sophia 2*, and which has been effective with a number of other speakers, but excess bass tended to create boom and a leaden balance. Moving them out up to 5ins from the wall behind helped, but measurement analysis confirmed an extended but too weighty bass. For experiment the ports were blocked, and this provided a fast dry bass, measuring almost flat to 30Hz but the lower mid was now out of balance. The new alignment has generally reduced the need for 'tuning' the bass, but the review speakers had arrived in standard 'US bass' mode, with 13.5ohm crossover damping resistors. The optional 'EU bass' alignment requires up to 25% less, and we settled on -22% installing a 10.5ohm resistor *via* the crossover access panel in the bass enclosure.

Now the bass sounded sufficiently quick and even. The speakers could be moved back to their sweet spots and further small adjustments of little more than an inch sorted out final integration, tonal



balance and central focus. If this doesn't sound like much, in the hands of experienced system designer and installer Pedro Jorge-Luis this final stage tuning added more than 30% to the sound quality, confirming the added value of Wilson Audio's included specialist installation. In my experience you can only go so far on this with many lesser designs before diminishing returns set in, but that's not so with Wilson Audio designs.

I initially had a strange and as yet unresolved experience. Playing vinyl, the Conrad Johnson 350SA power amp became violently unstable, not through acoustic feedback but some kind of electrical feedback. It was as if the 350SA was not well disposed towards the *Sasha's* known low bass impedance. Heavy low frequency transients set it off, sending an electrical ripple back to that sensitive moving-coil preamplifier.

The Conrad Johnson was changed for a Krell *EVO 402*. This at least is specifically designed to tolerate tough loads, and also has regulated supplies so there will be less stray coupling back into the system. Sure enough, now there was no complaint with LP, and the system could be played as loud as one wished; all rather mysterious. This 2009 *402* sounded rather better than I remembered from my 2005/6 *Hi-Fi News* review, and partnered the

Sashas really well. I tried several other amplifiers, and all showed differences in bass quality, evenness, punch, depth and tune playing, reflecting the effects of the difficult loading. The following comments are generally based on the Krell *EVO 402*, which matched well.

Quite simply, *Sasha* has better bass than the outgoing *System 8*. It's faster, punchier, better focused with significantly deeper soundstaging. It sounds freer and more subtle, with finer shadings of bass tune playing and instrumental timbre. Certain difficulties with systems and room acoustics may be partly tamed by the subtle level adjustments available for mid and treble sections. These are set *via* certain crossover resistors associated with fusible elements which also intentionally go open circuit for driver protection; these may be readily serviced and avoid the major expense of driver replacement. Experiment showed that such adjustment could be useful, for example in a bright, Spanish style tiled floor environment with highly reflective walls. I toyed with 1-2dB less treble from the *Sasha* rather than considering the addition of some absorptive panels on the side walls.

I had greatly enjoyed the mid-to-treble performance of the outgoing *System 8*, commenting on the remarkable blending and the subtle deep spatiality that resulted. *Sasha* is still more transparent and better resolved, adding further depth and low level detail while significantly increasing the proportion of dynamic drive and definition, sounding faster and crisper yet without hardness or exaggeration. Transient micro detail is much in evidence, together with smooth integration and very fine image depth, and *Sasha* gets more than half way towards the revelatory *MAXX 3*. I did miss a little of the latter's richer, more expansive timbres, finding some combinations of source and program slightly lightened and brightened, while the bass is understandably not quite as deep and effortless.

Almost by definition, large three way speakers do not excel in rhythm and timing, and to some degree this is the price paid for genuinely powerful dynamic and extended bass. This is true for the *Sasha*, but it does considerably improve on the preceding *W/P System 8's* timing, albeit at the expense of tough amplifier loading. Although the bass remained a bit (but not excessively) 'heavy' towards its extreme, getting the best of *Sasha's* bass and timing does require an amplifier that's up to the job.

Perhaps the lasting impression is not just its conspicuous attainment on general sound quality parameters, but the feeling of live sound being conveyed: crisp, lively percussion, uninhibited bass and pedal drum playing, characterful, expressive, and

revealing of the performance. Compared with the *W/P System 8*, itself absolutely no failure, both the music and the soundstage it inhabits seem to jump right out of the box.

Lab Report

With impedance lows of 2.2 and 1.8ohms in the bass (hardly affected by the EU shunt resistor), and local higher values accompanied by significantly reactive phase content, we are looking at an effective, nominal IEC load rating of just 2.2ohms, and a 'Keith Howard' rating (associated with the reactive demands made on the output stage of an amplifier) as low as 1.5ohms. Another low of 4.2 ohms is recorded in the mid-treble.

I am not saying that this loudspeaker cannot be driven, but such a load must logically compromise the relatively high 91.5dB voltage sensitivity, and it can fairly be said that this sensitivity has been bought at the expense of additional current burdens on the amplifier. The listening tests showed that at high levels the substantial Conrad Johnson *SA350* was borderline; while smaller amplifiers may well drive the *Sasha* to more modest levels, there's always the possibility of current clipping. And even though amplifiers may sustain high output currents, even the massive Krells do approximately double in distortion with each halving of load impedance.

Frequency responses were very good, with exceptionally good off-axis output ensuring a fine, coloration-free power response. Estimated frequency response based on room drive and the merged semi-anechoic measurements suggests 24Hz to 22kHz +/- 4dB, slightly wider amplitude limits than usual in this class. The port is tuned to approximately 27Hz.

Our composite frequency graph shows the spliced listening axis response together with the observed outputs for +, -15 deg vertical, and 30, 45 and 60 degrees lateral. Much like the similarly shaped *Sophia 2*, they show similarly well matched curves, *ie* without significant peaks or dips to colour the sound, on- or off-axis, for example *via* side wall reflections. Microanalysis of the tweeter response showed a series of suppressed, secondary resonances from 22kHz to at least 45kHz, fortunately averaging 15dB below the mean high frequency level. These are not considered audible artefacts.

The tweeter is still working, albeit with some attenuation, down to a low 1.5kHz, while on the optimum axis the midrange driver continues to about 4kHz and gently dies away to about 10kHz. At the low end of its range, the midrange is still working quite hard at 125Hz. The nearfield bass (a necessarily slightly warped view of frequency response) shows a 25Hz to 120Hz passband with -6dB at a low 20Hz, at

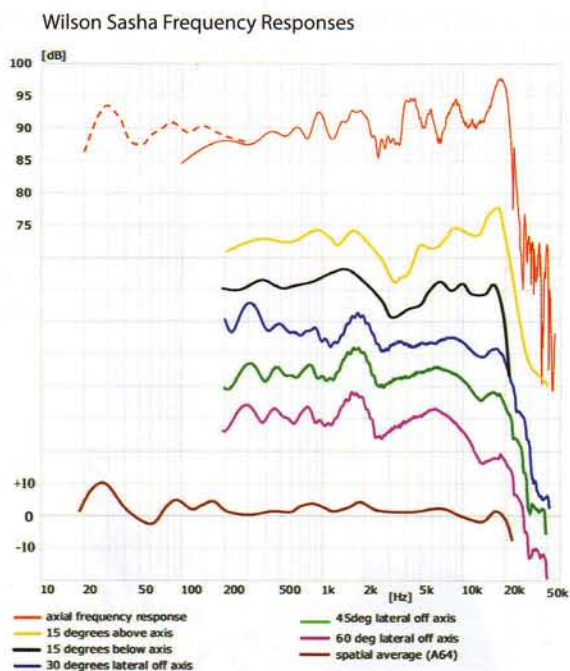
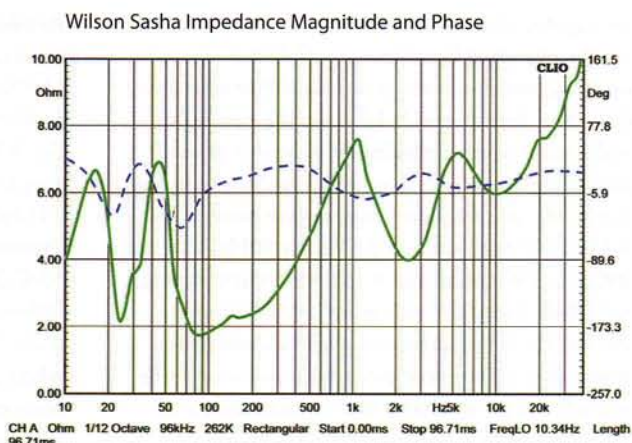
the expense of 3-4dB of bass lift.

The improved bass drivers, with better acoustic loading, provided more power capability with lower distortion than *System 8*. Likewise the new mid and revised tweeter handled considerable power and showed very low distortion at realistic listening levels. My spot frequency figures gave better than 0.3% THD with third at 0.15% for 30Hz, 1W; and still only 1% second and 0.1% third when pushed to 100dB. Even 28V sine wave (100W) at 40Hz did not result in mechanical overload, and driver power sharing was very good. An innocuous 0.4% second, and no resolvable higher harmonics at all, was measured for 120Hz, 10W. Third harmonic remained respectably low 50-100Hz, and second averaged a mild 1% at medium power. In the midband, about 0.1% second and third harmonic were found at 800Hz. For 91dB and 101dB spl, second was still only 0.4% with third well below 0.05%. At 5kHz and 91dB spl we got 0.07% second



Resident audio system

Speakers: Quad *ESL63*, BBC *LS3/5a* (15ohm), Avalon *Eidolon Diamond*, and recently the Wilson Audio *MAXX 3*. Amplifiers: Krell *EVO402* and *EVO600*, Conrad Johnson *Premier 350SA* power amps, Krell *202* and Audio Research *Reference 5* pre-amplifiers (*CAST* and balanced working where appropriate). Sources: Naim *CDS3*, Marantz *CD-7*, Audio Research *CD8*. Linn *Sondek LP12 (Keel, Radikal)*, Naim *Aro*, Koetsu *Sky Blue Urushi*, Naim *Superline* phono amp. Cables: Van den Hul *First Ultimate II*, *Transparent XL-MM2*, interconnect and speaker cable, Cardas *Golden Reference SE* interconnect. Finite Elemente *Pagode* equipment stands



and 0.15% third, then 0.3% and 0.4% respectively at a stonkingly loud 101dB. Second harmonic was -50dB, 0.33% for 10kHz at 100dB spl. Overall these are very good results, and third harmonic (the component which may alter timbre under dynamic conditions if uncontrolled) was particularly low.

The grilles showed little direct attenuation, for example -0.3dB 15-30kHz, but did affect the treble smoothness from 15-20kHz, with perturbations of close on +/-3dB and a 4dB dip at 4kHz. Grille frame diffraction did smooth the 6-15kHz band, albeit at the expense of poorer image focus. From the listening tests the additional seismic mass of the grille frame somewhat dulled the clarity of transients, which was noticeable on drum strikes and forceful piano passages.

The waterfall representation of energy decay with frequency for the upper mid and treble ranges could not be made anechoically, as one would like, but still gives an idea of temporal and frequency interaction. The back of the graph has the set of parallel lines representing the steady state response; as the time base progresses the test stimulus stops and you begin to see the 'echo' from the speaker. Here the initial 'clearing' is quite uniform and coherent, but decays into some less well correlated clutter after about 2 milliseconds in the 5-10kHz range, probably due to the midrange unit roll-off.

Conclusions

There is much to like in this new Wilson design, packing into a relatively compact footprint much of the exemplary *MAXX 3*'s significant technology and sound quality at just half the price. It has its own character and must be properly auditioned before purchase, but is easy to recommend on outright musical performance, though not without certain provisos. It now offers genuinely deep bass, to 25Hz and can handle any kind of music. Sensitivity is high, if significantly tempered by the severe amplifier loading.

While I am sure that it will perform well in a number of system contexts, my experience suggests that to wring out the very best, and there is a lot to get, the power amp choice is likely to be crucial. A very powerful amplifier such as the very fine Krell *EVO600* monoblocks may well coax still more than I achieved.

Driven well, it performs beyond its size and price class, and includes fine tuning provision for different acoustics, and benefits significantly from the included factory approved installation. It will drive large and medium spaces with ease, while I'm sure that the very low distortion contributes to the fine timbre, clarity, transparency and low fatigue.

HIFICRITIC Loudspeaker Results

Make	Wilson Audio: Provo, Utah, USA
Model	SASHA W/P
Price (5 year guarantee)	£27,000 including factory grade installation
Finishes	Custom lacquer shades in WilsonGloss
Size (h,w,d cm)	124 (spiked) x 36 x 53
Weight	197 lb, 89.36 kg each
Type	Four driver, three-way, bass reflex loaded
Sensitivity for 2.83V	91dB
Amplifier loading	poor: 3ohms typical, 1.8ohm min
Frequency response, axial	23Hz to 21kHz +, - 3.5dB, (listener axis): very good
Frequency Response, off axis	Excellent power response
Bass extension	20Hz for -6dB
Max Loudness, in room	109dBA for a stereo pair
Power rating, (Max, min)	50 to 300W (check amp peak current suitability)
Placement	Floor standing, near free space location, plus LF tune

Krell S-300i Integrated Amplifier

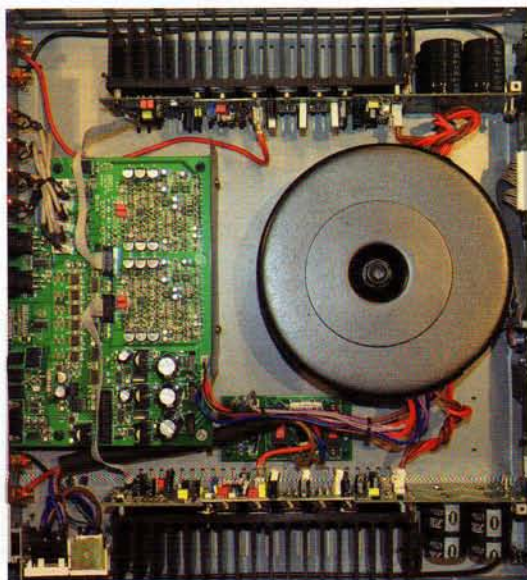
A POCKET BATTLESHIP OF AN INTEGRATED AMPLIFIER BY MARTIN COLLOMS



The very first thing that impressed me about this 'first from China' Krell (origin unambiguously printed on the rear panel), was the sheer mass of the packed unit: 23kg/51lb bodes well for build quality and for the large power rating of the mains transformer. The Editor is wont to comment how often mass, or more specifically density, provides a useful guesstimate of possible loudspeaker performance, particularly when comparing like models in a group test. I have found that this can also be true for audio electronics, except where examples are deliberately built of special lightweight materials.

The central volume rotary encoder has a secondary function as a control and data input for selecting various operating modes, many of which allow the user to customise the inputs, their sensitivity and channel balance offset if required, plus display dim and auto off functions.

Krell's *KID iPod* dock featured an analogue, balanced audio interface to an *iPod's* multi-pin connection. Costing little more than the *KID* dock, the *S-300i* now includes a balanced 'audio pod' connection, via a sufficiently long included cable, rather than a physical dock. Like the *KID*, it allows



iPod album and track selection, play, pause etcetera via a dedicated keypad section on the main Krell remote control. It's helpful to be able to see the *iPod* screen while using these controls.

Krell has provided some revealing data about the £2,400 *S-300i* which hints at the potential available. Good eco-friendliness is promised by the claimed low 20W standby power, despite the toroidal mains transformer's large 750VA rating. However my VI meter contradicts this claim, measuring 42W/68VA on standby and 68W/104VA when 'on' at moderate volume (*ie* that of an average tungsten light bulb), and rather different from the spec. Nevertheless it is still quite low by audiophile product standards.

On the basis that the mains transformer is larger than found in many good sized free-standing power amplifiers, the 2x150W 8ohms, 2x300W 4ohms power output rating looks conservative, and I'd suspect that more like 200W and 400W/ch respectively will actually be available into real loudspeaker loads, making this a very powerful integrated amplifier indeed.

This model's US built predecessor, the *KAV 300i* sold for about £3,000 in 1996, so the cost saving for the new build location has dealt a death blow to nearly 15 years of inflation. While the power output ratings for the old and the new are roughly comparable, the earlier design had four 8,200uF Nichicon reservoir capacitors, a smaller 450VA transformer, and idled at 50W. The new has four 4,700uF reservoirs per channel and of course that much larger toroid. There are double mono secondary supplies and reservoirs with four pairs of high current output transistors per channel. This is not a bridged design.

The surface mount technology gives very short signal paths on the central circuit board. Control of DC offset for signal handling, in particular the fully balanced input, is allocated to a number of high precision Burr Brown *OP177* op-amps. Also embedded is the 151-step analogue volume control, an FET-switched miniaturised surface-mount precision resistor ladder controlled via a microprocessor and a front panel rotary encoder volume knob. While miniaturised, Krell's traditional discrete transistor symmetric array amplifier are present. These symmetric DC coupled very wide band stages are essentially immune from slewing with audio bandwidth signals.

Build and finish is very good, like a standard Krell *EVO* pre-amp. The power switch is on the rear panel next to the IEC mains connection, and the speaker terminal layout is sensible, with easy access 'WBT

MARTIN COLLOMS

style' heavy duty binding posts, for wire, spade and 4mm plug connections. Some evenings a mild mechanical hum came from the casework: this may be the transformer's magnetic field exciting the heavy duty steel panel casework, which is securely locked together by plenty of stainless steel socket-head bolts.

Sound quality

In recent years I hadn't found the outgoing '300i very special musically, with barely above average rhythm and timing and an identifiable solid state quality, a leanness of timbre, some upper mid obscuration, and a sort of 'blankness' to the presentation. Right away I knew that the *S-300i* was a different and better amplifier. From the off there was an open and expressive vitality, a confident reach for dynamic expression, crisply focused definition and confident, assertive control of transient sounds right across the frequency range.

Clearly not laid back, neither did it tip the other way to forwardness and brightness. The stereo depth plane was stable, just a little forward of the speakers, but with fine projection and depth. Focus was particularly good for the class, rivalling some more costly pre-/power combinations including some Krells. Image width was decent, if not 'super wide', but groups of musicians appeared well located and remained locked in position.

While it could not be confused with a valve amplifier, its timbre was substantially neutral, generally well balanced and focused, and natural and tidy in the treble. The bass sounded solid, powerful and deep, but just a hint of nasality was heard through the upper mid, the sound on strings showing a touch more 'rosin' than our assumed perfection.

It could kick hard and play really loud into loads above 3ohms. The big three-way *Eidolons* presented no difficulties whatsoever, and this amplifier's dynamic performance and headroom characteristics were more like those of a significantly more costly and substantial amplifier, punching well beyond its weight. Added to this is an inherently lively and upbeat nature that rates better than much of the competition on rhythm and timing, moving significantly towards the involvement we take for granted from a number of Naim designs. Percussion has a realistic 'snap and crack', where other amps in this class can sound a bit muted and lacking drive. Setting the display to 'auto mute' added another few marks, and this amplifier certainly merits care taken with cable selection, routing and dressing. With its overall precision, clout and clarity, the *S-300i* gains a very creditable 45 marks for overall sound quality.

Out of curiosity I also tried the *iPod* interface,

and the Krell handset successfully operated the *iPod* controls. Sound quality was fairly good (and even better with the main CD player disconnected – some interaction perhaps). Although I fancied that I still preferred even a cheap Panasonic battery CD player to those carefully recorded full res WAV files replayed via my Apple *Classic*, it was certainly useable for mood music and for less critical situations.

Some critics have commented on a slight background hiss from this amplifier. I found that it was at a low level, and did not vary much with the volume setting, and was not significantly audible with my 87dB/W *Eidolon Diamond* speakers at my normal 3.5m listening distance. However, some might hear it faintly if closer in, and also with higher sensitivity speakers say 90dB/W or more. I would leave out sensitive horn designs for this reason but check this out with your dealer.

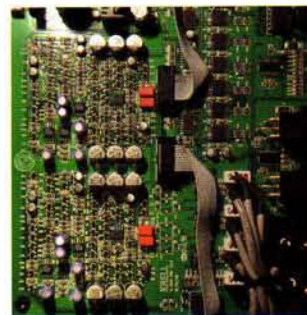
Lab report

The output is generous, and on test still more than claimed, eg 2x190W 8ohms both channels driven and 324W into 4ohms. The very decent 16.5A peak current can drive 3ohm minimum speaker loads to full (4ohm) rated power. Feeding 2ohms, the protection folds back the output to 248W. Maximum per channel short term music duty cycle outputs were 225W 8ohm, 425W 4ohm, and 260W 2ohm. Overdrive of even 6dB remained clean without latching or other misbehaviours, even up to 300W 8ohms at 20kHz. Transformer mechanical hum was low, though there was a trace of hum in the electrical noise floor.

For a typical 10W swept distortion graph, most of the frequency range measured at the inherent noise level of 0.04% or -75dB, while for what it's worth the intrinsic distortion is substantially less (see graphs). For example the two tone CCIF 19/20kHz intermodulation scored -83dB at 1W power and -88dB at 150W. The intrinsic frequency response is wide, barely -0.2dB at 10Hz and 20kHz, while the half power high frequency -3dB point is up at 110kHz. Output impedance averaged a low 0.1 ohms, a little less in the midband, while DC offset was also low.

At volume setting '98' rel 1W, the signal-to-noise ratios were certainly poorer than average with 53dBA, 44dB CCIR (1kHz) and 48 dB unweighted, though supply hum levels were low. I cranked up the input level and with a more normal setting of 49 got 70dBA, 70dB unweighted, and 60dB CCIR which is satisfactory.

Input overload occurs at 5V, +20dB IHF, so do not apply those few high output sources (some CD players, for example). Input impedance is a very



"From the off there was an open and expressive vitality, a confident reach for dynamic expression, crisply focused definition and confident, assertive control of transient sounds right across the frequency range"



source friendly 110kohm, with 130pF of shunt capacitance. Channel balance at higher settings was accurate within 0.047dB at 20kHz, and generally about 0.08dB overall. The volume control has occasional missing codes where a 'click' does not result in a volume change, and where the resolution varies with level. At high settings you get 0.5dB steps; in the '30s' the steps are 0.8dB, with larger steps at very low volumes. This is not untypical of these ladder type controls.

Channel separation was an average and more than satisfactory 67dB at 1kHz and 47dB at 20kHz. Output impedance was a very low and consistent 0.13ohms over the frequency range. Output DC offset was also low, with about 10mV of c1Hz low frequency servo or related noise.

One minor defect concerned the screws holding the rear power switch bracket which were loosening on this well used example. Lock washers might be helpful on this fitting.

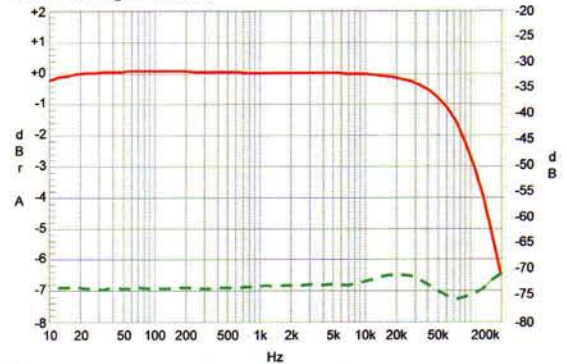
Conclusions

Quality has not been compromised here by Chinese build, and the cost advantage has largely been passed

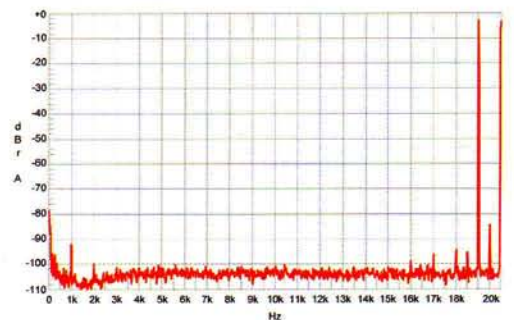
on to the customer, providing greater value for money. Taking everything into account: huge power, good load drive, technical accuracy, an intelligent iPod control interface, confidence inspiring build and finish, the channel balance and source volume offset facility, plus the precision volume control, it is well on the way to recommendation. I consider it can operate comfortably as part of complete hi-fi systems costing up to £15,000.

Add in class leading sound quality (for power and price), with a focused, muscular delivery, good clarity and image depth plus tonal neutrality, good dynamics, above average rhythm and timing, plus a stunning dynamic range, and this is a thoroughly recommendable, all purpose design. Even the handset is top quality.

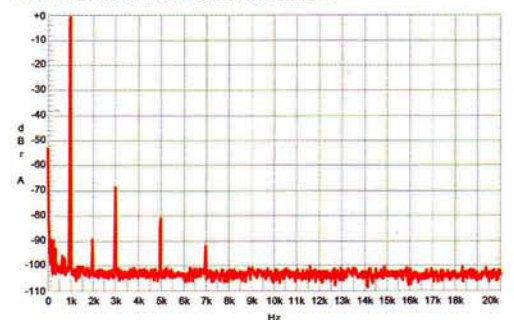
Krell S300i Frequency Response; 10W 8ohm, and distortion (green) RHS



Krell S300i 10W CCIF distortion spectrum 8ohm load, an excellent result



Krell S300i 1W 1kHz distortion spectrum 8ohm load, low order 'odd' harmonics dominant



INTEGRATED AMPLIFIER TEST RESULTS				
Make	Krell			
Model	S-300i			
Date	22/10/09			
Ser. No.	231080800079			
POWER OUTPUT	20Hz	1kHz	20kHz	
Continuous 8 ohm 2 channel	190 W	190 W	188 W	
Continuous 4 ohm 1 channel	320 W	324 W	318 W	
Pulsed 2 ohm 1 channel	248 W			
Output impedance (ohms)	0.15 ohms	0.13 ohms	0.14 ohms	
Peak Current	16.5 A			
Distortion, THD inc. noise (1W)	> -88 dB	-92 dB	-82p dB	
Distortion, THD inc. noise (rated power)	-76 dB			
Channel separation	70 dB	67 dB	47 dB	
Intermodulation Distortion 19.5kHz/20.5kHz 1:1 rated power, 8 ohms	-88 dB			
Intermodulation Distortion 19.5kHz/20.5kHz 1:1 1W, 8 ohms	-83 dB			
Signal to noise ratio (ref. 1W output)	CCIR Weighted	Unweighted	A-weighted	
IHF. 0.5V Aux	65 dB	70 dB	74 dB	
Disc mm	n/a			
Disc mc	n/a			
Channel Balance over volume range				
Rch is reference at 0db			0.08 dB	
at -20db			N/A dB	
at -40dB			0.05 dB	
at -60dB			0.03 dB	
Frequency Response: +0,- 0.2dB 10Hz to 20kHz, -3dB at 110kHz				
Absolute Phase	correct			
Input Data	Socket	Sensitivity	Loading	
Aux input balanced	-	- mV	- ohms	- nF
Aux input single ended (full power)				
Phono or DIN	820 mV	110k ohms	130 pF	
Disc mm Phono or DIN	- mV	- ohms	nF	
Disc mc Phono	- uV	ohms	nF	
DC offset	Left 10 mV	Right 10 mV (VLF servo noise) (1-2.Hz)		
Size W x H x D (weight 19.5kg)	438 mm	102 mm	445 mm	
Price	£2,400			
Contact	Absolute Sounds Tel: 0208 971 3909 www.absolutesounds.com www.krellonline.com			