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REVIEWED THIS ISSUE:

CONTINUUM CRITERION + COPPERHEAD
VOIGT DOMESTIC CORNER HORN
SPENDOR A9
JBL EVEREST DD66000
LINN UPHORIK
KRELL 402/402e
RAYSONIC SP-88
NAIM CDX2
CABASSE MINORCA

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How do you use your hi-fi system? I guess we're all different in the way we fit our hi-fis into our lifestyles, and all our lifestyles are full of individuality and evolve out of our habits and our homes.

That thought was sparked by the arrival of the latest version of MSB's excellent M202 finned and cylindrical monoblock power amps. These were the ones, we were promised, that would be a little more user-friendly in having two accessible top-mounted switches, for on/standby/off and to select between low/high power consumption modes.

Although the sound quality remains truly exceptional – sweet, clean, neutral, powerful and transparent – but that 'low consumption' mode has proved something of a disappointment. While the power consumption is still a considerable 350W each in 'high bias' mode, 'normal bias' only drops this to around 260W, so the stereo pair is still chucking out more than half a kilowatt of waste heat. And although they do have a genuine low consumption 'standby' mode, much the same is true of the various Krell power amplifiers when they're actually primed and ready for action.

Carbon footprints aside, those high consumption figures may not matter for people who only use their hi-fi amplifiers for an hour or two a day, or indeed whose room temperatures are stabilised by air conditioning.

However, neither of those situations apply to yours-working-from-home-truly. My own hi-fi system is used for both work and leisure, and may well operate for as many as 15 hours a day. Heavy amplifier waste heat output therefore tends to pose a problem, particularly during the summer months, the more so since replacing an old direct view TV with a plasma a year ago had already added an extra 200W or so.

Much as I enjoy listening to the MSB power amps, the simple fact that my regular Naim *NAP500* uses just 40W or so when idling makes it a much more practical proposition for my particular lifestyle. I simply leave it on more or less permanently, unless I'm actually going away.

Indeed, I'm even tempted to leave on my recently acquired PX-4 SET valve monoblocks, which only require 60W each, but am reluctant to risk the lifespan of those ancient NOS (new old stock) triodes.

Hi-fi and music are both very broad churches, and everybody has his or her way of enjoying both. Indeed, I daresay every reviewer has an individual *modus operandum* in the way he (or she) approaches a new product, and the different priorities and techniques may well explain the diversity of opinions and conclusions.

My own approach, for what it's worth, is basically to introduce a given component into a known and essentially stable system, and let it stay there for as long as practical, while using a broad selection of sources. Although first impressions are important, I'm really more interested in the effects a component has when I'm not consciously concentrating on listening, and find this technique quite effective in tuning into my subconscious reactions, which seem more important over the long haul. The down side is that they're very difficult to put into words!

Paul Messenger
Editor

Krell Evolution Series 402/402e Stereo Power Amplifier

MARTIN BEGAN WITH A CURRENT SERIES 402 AND WAS UPGRADED TO THE LATEST ECO VERSION 402e

MARTIN COLLOMS

For some years Krell's now discontinued *FPB700cx* was my long term reference amplifier: more than good enough to deliver solid listening pleasure, yet capable of driving any loudspeaker load with hardly any change in sound quality. It had a kind input impedance with single-ended, Krell *CAST* and balanced inputs, was DC stable, and could drive the more challenging electrostatic speaker loads. It could provide nearly 900W/ch into 8ohms, 2.4kW into 2ohms, and could supply a generous 50-60A of linear peak current.

That was the last of the 'super power' stereo chassis, a sequence which effectively began with the *KSA 200*, followed by the *FPB 600*, the '*700* and finally the *700cx*. Competition was provided by the Conrad Johnson *350SA*, which is somewhat smaller in both power and current delivery but still generously rated, with a little more clarity and liveliness, a sense of greater emotional involvement, a more upbeat nature, and slightly better timing. The '*700cx* remained a great power amp, with more power, better versatility and consistency with load variation, but the Conrad Johnson was just that bit more musical and has therefore served as my personal reference more recently.

A few years back, EU regulations changed the rules for amplifier design, specifically the amount of distortion current that's allowed to be imposed onto the mains supply; the manufacturing methods and other mains related design issues relevant to large amplifiers were also revised. Lead alloy based solder and related lead content electronic components were to be phased out in Europe, Japan, and some early adopting US states such as California. Power supplies now required significant revision to meet requirements for imposing much less distortion and noise onto the mains, and since power supplies can be a crucial influence in amplifier sound quality, meeting the new regulations potentially had an adverse impact on the audio performance. Furthermore, many designers believe that lead-free solder connections are inferior to those containing lead, and put forward interesting arguments that question whether applying this legislation to hi-fi electronics will have any perceptible environmental gain. Indeed some say that it may actually result in a net loss due to poorer reliability, and hence earlier scrapping of lead-free electronic products. Despite

this view, many audio manufacturers have complied with these new rules despite the difficulties.

A number of companies were disadvantaged by these changes, since initially, and certainly at the prototype stage, regulation-compliant versions often sounded disappointingly inferior to their predecessors. Indeed, several designers were convinced that they would never regain their former sound quality. Aware of this new performance obstacle, Krell explored previously peripheral design aspects which now proved vital in restoring the required audio performance.

In 2006, soon after the introduction of its new compliant range, I evaluated four Krell products: the *EVO ONE* and *EVO TWO* pre- and power flagships (which were very good if also exceptionally costly), and subsequently the *EVO 202* two-box pre-amp and the £13,450 *EVO 402* stereo power amp (*Hi-Fi News Jan 2007*). At that time I felt that there was a characteristic 'new' Krell sound; it was not very obvious but was nonetheless heard as a degree of masking 'whiteness' and lightness of timbre, albeit rather less than 'chromium plate' in character, plus some loss of exuberance. Pricewise the *EVO 402* was effectively a replacement for the outgoing *FPB 700cx*, and while the overall sound quality of 70 points was very worthy, it fell short of the earlier model's record breaking 100. (With hindsight, the *EVO 402* might have been seen as a replacement for the outgoing *FPB 400cx*, which historically also

scored 70 anyway.) The unavoidable fact was that all these newer products were now more difficult to make, and were therefore bound to cost more.

Four years on, events led me to consider revisiting the *EVO 402*, which had now established itself as a 'natural' model for the UK. Lent *EVO 600* monoblocks for the Wilson Audio *MAXX3* review, it was clear that these amplifiers had class leading sound quality, well beyond expectations based on the *402*. Another factor was the supply of a current production *402* to use alongside my Conrad Johnson *SA350* when reviewing the Wilson Audio *Sasha* loudspeaker (*HIFICRITIC Vol4 No4*). This speaker came with a 'difficult load' health warning of a severe 1.8ohm minimum in the upper bass, and larger Krells are designed to tolerate such very low impedance loads. At first this late series 402 seemed somewhat underwhelming, but after a few days it obviously ran in to the extent that stereo image depth and low level detail gained about 40%. It also sounded very neutral, rather better than I remembered from the earlier sample, so fresh appraisal seemed worthwhile. However, after work had begun, Krell announced a new 'eco' *402e* version, so activity was suspended awaiting developments.

A £17,999 402e arrived here in early May, from the Munich High End Show. While some publicised fine tuning is said to have enhanced the sound quality, most of the promotion has concerned an 'enhanced standby' mode with a low 2W consumption (now indicated by green power button illumination), establishing its eco credentials, at least when not replaying music. The two previous states of 'standby preheat' (250W) and full operation (410W) remain user selectable.

Our sample was finished in anodised satin silver alloy, and it's also available in black. The new amplifier sells for around £18,000 (depending on exchange rates, and a significant increase over its predecessor), is rated at a nominal 2x400W/8ohm, and weighs a hefty 61kg. The fascia is dominated by a large power switch, illuminated red for idle and blue when operational. Idle is 'pre-heat mode' and comes back up to 'good' sound quality within a few minutes; a rear panel switch can turn it off completely if required. Eco mode may also be set, and when pressed turns blue for full operation, in essence bypassing the pre-heat idle mode.

Power is fed via a detachable 16A IEC connector cable with a captive UK 13A plug. Speaker connection is via high power, high pressure gold-plated wing nut insulated binding posts, suitable for spades and dressed bare wire only. The three input types include Krell's CAST, balanced XLR, and single-ended RCA phono, the latter at a high impedance that provides easy loading for valve, passive or transistor sources. Those sharp-edged external heat-sinks of old have been replaced by a clean finished if unprepossessing alloy box, where internal chimneys funnel cooling air through heat dissipating fins. 12V trigger systems are present for link system operation, home cinema and suchlike applications.

The *402e* uses cascode circuitry developed for the *EVO ONE*, founded on discrete circuitry gain blocks with ultra wide bandwidth and highly linear operating points. Local current feedback is used for very short transit times and consequently low phase shift. Balanced differential noise rejecting topology has been voiced for improved clarity especially at higher frequencies. Fully regulated power supplies help distinguish Krell from much of its competition, so regardless of mains supply variations or demands of varying programme and the power sucked out by the load, the core electronics amplify with precision and low noise.

While negative feedback can be a useful element of amplifier design, helping to stabilise gain, broaden the frequency response, lower distortion and minimise output impedance, it may be responsible for an unnatural, even forced character if used to excess. The *402e* output stage has some mild local feedback, while overall feedback is a very low 14dB, which should help maintain an 'open' and expressive character alongside a sweet and natural mid and treble quality.

This amplifier has cross-coupled circuitry for good common mode and power supply noise rejection, maintaining compatibility with single-ended and balanced sources. A large number of powerful output transistors are used in parallel, which gives large peak current reserves and maintains temperature stability and linearity under high transient load demand. Upgrades for the *e* series comprise more closely balanced current sharing among the seven sets of active cascode quartets that make up the output stage. The benefit is a claimed improvement in sound quality, and reduced dependence on load current. Modifications to the feedback circuitry reduce the dependence of feedback on signal level, which is claimed to enhance inner detail and micro-dynamics and provide smoother high frequencies. A separate transformer is now provided for the control and monitoring sections, facilitating the greatly reduced standby power consumption, and providing isolation between the control and amplification power supplies. Both the high current and high voltage analogue supplies now have filters to minimise high frequency switching noise from the rectifiers, while the high current supplies have increased reservoir

capacitance. Finally, the power supply circuit board has been redesigned for improved isolation between incoming AC power and the output DC supplies.

The build is modular and easily serviced. Some measure of input power conditioning is present, compensation for second harmonic distortion, the DC component that's sometimes present, together with heavy duty RFI filtering. While the FPB series was fully balanced from input to output and used microprocessors to monitor and control output power and required plateau bias current levels in a pseudo Class A scheme, the Evo series manages to deliver the required power from a single ended configuration. A moderate power pre bias is used plus fast dynamic tracking of the anticipated demand. The amplifier is also is DC coupled, and small offsets are corrected by a servo with a very long time constant, ensuring clean deep bass. It is fully protected against short circuit, overload, thermal overrun, and ultimately by a circuit breaker/power switch at the back.

Krell has announced that shipping of the *Evolutions 402e*, *403e*, *600e*, and *900e* has begun; *Evolutions 302e* and *400e* will ship in July.

Sound Quality

Beginning with the earlier, pre 'e' *402*, once properly installed, mentally focusing onto its sound quality was not easy. Somehow it seems to shake itself free from attempts to corral it mentally. For sure its imperfections are real enough, yet they remain so unobtrusive that one is more than happy to let it get on with the job. Some might describe it as lacking character and musically uneventful, even frustrating, since it makes discussing the finer subtleties of the music, imaging, or dynamics rather redundant.

Its lack of character could be described as boring, but that would be a mistake. Rather it reproduces a music signal with a notable lack of alteration, regardless of the volume level, or the severity of the speaker load. I had greatly valued the consistency and imperturbability of my old '*700cx*, and found much the same with the *EVO 402*, which really does approach that fabled 'straight wire with gain'.

Where lesser amps showed changes in quality with level and load, the *402* remained resolutely neutral at almost any realistic volume level. At first one might mistakenly think the amplifier is a little withdrawn, a touch reticent dynamically, and a little slow on its feet. Then one recognises that is almost free of false tonal colour, exaggeration or emphasis. Remember that after start-up from cold it needs a few minutes use to come on song, so to avoid leaving it permanently on standby (especially in the summer), power it up 10 minutes before serious listening and all will be fine, though still slowly improving thereafter.

It has an almost ethereal, grainless clarity and spaciousness, together with deep and informative lower frequencies. Take your pick according to your preferred control source and connection. The electrical and mechanical noise floors are so low that the *402* is completely silent at the listening position, even with relatively sensitive speakers.

Referenced to the *402*, the *402e* initially showed moderate improvements in bass definition and attack, in mid dynamic expression and in treble definition and clarity. Improved transparency and micro detail then helped you begin to hear far depth and detail that you did not know was in your music.

While Krell, like many electronics manufacturers, would rather not know about accessory and cable interactions, and state their thesis that the special filters and supply correction installed obviates the need for anything more than the supply cord in the box, the fact remains that supply quality does affect the sound to a degree, and steps taken to improve the mains supply, including the cables, are audible. Using a 60A spur connection, I was able to compare Transparent *MM2* mains cable with several alternatives, and found that the *402e* showed significantly firmer, crisper bass, better image focus and depth, and sounded more 'open' with a sweeter high frequency range when using *MM2*.

The *EVO 402e* sounds very neutral, and the shadings of colour ascribed previously to some Krell products now seem to have been cleared away in my view, leaving improved clarity and resolution. While this amplifier does not quite have the full measure of crisp rhythmic agility that's possible from smaller, simpler specialist designs, it does deliver enough to create an involving, powerful and upbeat musical experience. The overall quality is so well balanced and so even over the frequency range, it's easy to underestimate how good this amplifier is, and one only finds out what might be missing when substituting other references. These may sound relatively boomy, lacking in deep bass, uneven in frequency response, pinched and coloured in the mid and upper mid, lacking in transparency and dull or grainy in the treble. Their sound may also be more dependent on loudness level and loading. You can play *402e* right to full volume and not be aware of it working hard until it actually clips (at about 420W/ch with program material and a typical load). I found the degree of progress Krell has made with this model over the past few years fascinating, and enough to change my view of both late *402* production and the current *402e*.

"At first one might mistakenly think the amplifier is a little withdrawn, a touch reticent dynamically, and a little slow on its feet. Then one recognises that is almost free of false tonal colour, exaggeration or emphasis."

"the 402e remains a very powerful and load capable power amplifier, one of the best of its type. It has low distortion, predominantly and desirably of low harmonic order, very low noise, and will drive anything to a high standard with accuracy and linear frequency responses"

Well founded, well supplied, and well warmed up, my *402* sound quality score was an impressive 120, for both balanced and single-ended modes (the latter with the XLR shorting links, and in my case also with a discrete ground link between the channels conveniently picked off the supplied shorting links). The amp works perfectly well with single-ended sources without this XLR link, but in my view drops about 12 marks, losing some rhythm, focus and bass dynamics. My score fell about 5% to 112 via the CAST connection, which is still very, very good.

Once the *402e* had settled in for a few days after its Munich holiday, I awarded an excellent score of 150 for overall sound quality. Just 10 marks short of an interim 160 for those impressive *EVO 600* monoblocks, so this is quite an achievement for the new model.

As it bedded in, the *402e* began to surge ahead of the *402*, delivering clearly better bass definition and tune playing, slightly more upbeat tempi, and significantly greater detail and transparency. Delightfully enhanced speed and dynamic contrasts were achieved with a sweeter, more open and more exciting upper midrange, intriguingly with no false timbre or brightness. Depth and transparency were clearly better at all volume levels, so claims that dynamic modulation effects had been improved would seem to be vindicated.

Lab Report *(402e)*

Played loud the average power input can rise to about 600W, but this peak draw is intermittent. (On the test bench at full power with both channels driven, it consumes some 4kW!) It reaches full power from 3.15V input into a very kind 100kohm impedance (200kohm balanced), and an input of 158mV raised the standard 1W output. This is a very easy input load and compatible with both transformer type, passive, solid state and valve control sources, both single-ended and balanced. The low impedance (70ohm) Krell CAST input is designed to sink the current fed to it across a very wide bandwidth, and is largely cable length and type independent. Signal-to-noise ratios were excellent: 117dB A weighted, 115dB (CCIR 1kHz) for full power, and 92dBA for 1W. Despite the huge power transformer, unweighted noise still reached a very good 106.5dB ref 400W.

Krell amplifiers are well known for their load independence, and there was no problem confirming this behaviour. I measured 2x438W into 8ohms at the edge of clipping, 840W for one channel into 4 ohms and 1,656W for one channel short term (1s) into 2ohms. Because a capable 5kW transformer is fitted, the single and dual channel drive results were very similar, save perhaps for a slightly limiting effect of my mains supply.

Peak current achieved a very good 63A, even higher than specified (though the latter could be an RMS value). While it might not be quite as big as the *FPB 700*, this is still massive power delivery that will clearly drive any conceivable loudspeaker load.

Despite the willingness of more powerful amplifiers to take on difficult speaker loads, I have long argued that there is always going to be a penalty, so I explored this Krell's variation of distortion with reducing load. At a moderate listening level (1W, 2.83V), the 'no load' distortion was -100dB (0.001%), while 8/4ohms loading gave -78dB/-77.8dB, some 22dB poorer but better than the earlier *402*.

If a cruel speaker load can increase the distortion in an amplifier of this quality, I cannot imagine that there will not be some consequence for sound quality. Why should so many speaker designers impose such difficult loadings on the amplifier and cable industry? Is it really just to win on pure subjective loudness in a crude A/B comparison at the dealers?

Distortion was generally very good, better than 0.01% at moderate powers (8ohm, 20Hz-20kHz). At 400W I measured -82dB (0.008%) at 20Hz and 1kHz, and 0.1% at 20kHz. Two-tone high frequency (19.5/20.5kHz) intermodulation was also very good: 0.0015% at full power, and a super -103dB at 1W, both significantly better than the *402* results. The distortion spectrum was predominantly low order, a desirable balance of second and third harmonic products, and channel balance was an excellent 0.005dB.

A very wide frequency response spanned better than 1Hz-150kHz at -3dB, and registered +0/-0.2dB 10Hz-20kHz. DC offset was negligible and servo noise very low. The squarewave response indicated first rate stability with fine behaviour on 0.1uF and 2uF of capacitance, providing further evidence of fine load independence and drive consistency. The output impedance is very low at just under 0.05ohm, despite the low feedback, so there will be no perceptible frequency response variation with loading. Channel separation was fine, even 98 dB at 20kHz.

I wanted to find out why I subjectively preferred a shorting pin in the negative section of the otherwise open XLR connector when listening via the single-ended (phono) connection, and also why I liked the channel grounds linked by a local short wire in this mode. (Incidentally, without these 'tweaks' it would be easy to assume that a 'balanced' connection actually sounds better than the 'single-ended' one, which wasn't the case.)

I was gratified to find that the noise floor for single-ended inputs was 10dB better with that XLR plug with pins 1-2 shorted in place, and this now matched the very good balanced input result. (This measured noise is inaudible of itself but probably has other consequences.) Theory predicts this lower noise result, but it's gratifying to see that theory, sound quality and measurement all agree.

The aforementioned inter-channel signal ground link relates to the *FPB*-series topology. Both audio inputs float off the chassis ground and from each other. In my experience linking the input grounds of such designs in single-ended connection mode delivers more focused stereo and better timing, as it did in this case. I even add this link with adjacently located monoblock amplifiers, which provides slightly better focused stereo and rhythm.

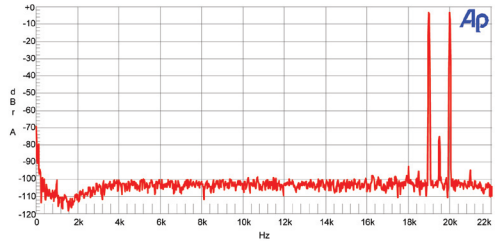
Conclusions

Krell power amplifiers used to deliver outrageously generous power outputs, well exceeding their ratings. The need to meet 'eco' legislation and the use of internal heat-sinks have put paid to such excesses, yet the *402e* remains a very powerful and load capable power amplifier, one of the best of its type. It has low distortion, predominantly and desirably of low harmonic order, very low noise, and will drive anything to a high standard with accuracy and linear frequency responses. Wilson Audio's *Sasha* is particularly demanding, yet the *402* sailed through, delivering a very fine sound. Other speakers simply sounded like themselves, showing very little amplifier signature with both this and the newer *402e* version.

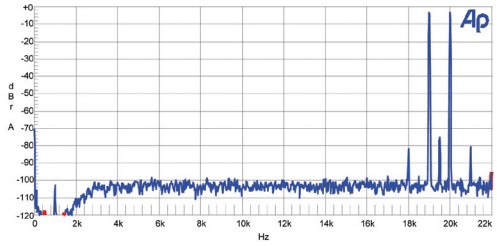
With use one's respect for the *402e* increases, and its near-state-of-art sound quality score puts in the highest class. Positive factors include innate neutrality and consistency, versatile input matching, a degree of immunity to mains quality variations, very low electrical and mechanical noise, and not least superb build and finish.

The sound quality of the *402* has improved significantly in later production, while the *402e* gives a truly substantial increase in sound quality, with power and current reserves within a couple of dB of the old *'700* warrior, alongside full compliance with the subsequently introduced legislation, unmistakeably shows that a true successor to the *FPB 700cx* has arrived. UK pricing for US imports is unavoidably high, but Krell has a fine track record in making amplifiers of this quality and power, so a very strong recommendation for this delightful power amplifier is indicated.

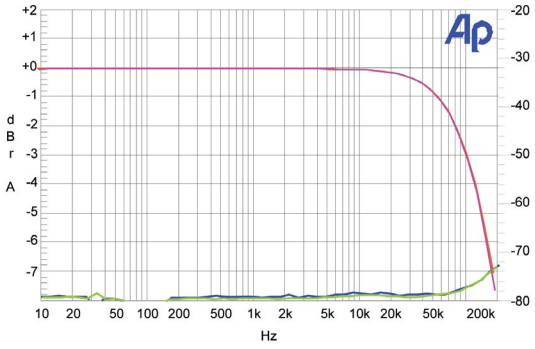
Krell Evolution 402e I/M 1W 19/20kHz



Krell Evolution 402e I/M Full Power 19/20kHz 8 Ohms



Krell Evolution 402e Frequency Response 1W 8ohm red (R,L) and distortion yellow (R) and green (L)



Review System Ancillaries

Control: XTC *Pre-1*, Audio Research *Reference 5*, *Reference 3*, Krell *202*.
Power: Krell *EVO 600*, Conrad Johnson *Premier 350SA*, Audio Research *Reference D210*.
Sources: Marantz *CD-7*, Naim *CDS3*, Audio Research *CD-8*, Linn *LP12/Keel/Radikal*/Naim *Aro*, Continuum *Criterion/ Copperhead*, Koetsu *Urushi Vermillion*, *Urushi Sky Blue*, Naim *Superline/Supercap*. Audio Research *Reference 2 Phono*, Linn *Uphorik*.
Loudspeakers: Wilson Audio *Sasha*, Avalon *Eidolon Diamond*, Quad *ESL63*.
Cables: Transparent *XL MM2*, and Van den Hul *The First Ultimate*, Cardas *Golden Reference*.

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INTEGRATED AMPLFIER TEST RESULTS

Make Krell	Date: 22/05/10		
Model Evo 402e (2010 build)	Mains For test: 242.5V		
Power Output	20Hz	1kHz	20kHz
Continuous 8 ohm 2 channel	440W	438 W	433 W
Continuous 4 ohm 1 channel	840W	840 W	820 W
Pulsed 2 ohm 1 channel		- 1650 W	
Output impedance (ohms)	0.049 ohms	0.048 ohms	0.050 ohms
Peak Current (1ohm)		55 A	
Distortion, THD inc. noise (1W)	>-78 dB	-78 dB	-78 dB
Distortion, THD inc. noise (rated power)	- 82 dB	-82 dB	-60 dB
Channel separation	>100 dB	>100 dB	98 dB
Intermodulation Distortion 19.5kHz/20.5kHz 1:1 rated power, 8 ohms			-98 dB
Intermodulation Distortion 19.5kHz/20.5kHz 1:1 1W, 8 ohms			-103 dB
Signal to noise ratio (ref. 1W output)	CCIR Weighted	Unweighted	A-weighted
Aux (Bal)	84 dB	81 dB	92 dB
Full Power	110 dB	106.5 dB	117 dB
Channel Balance		0.005dB	
Frequency Response :	+0,- 0.2dB 2Hz to 20kHz,	-3dB at 150kHz	-6dB @ 200kHz
Absolute Phase	correct		
Input Data	Socket	Sensitivity (400W), 1W Loading	
Input balanced (3.15V), 158	XLR mV	200k ohms	- 100pf
Input single ended Phono/RCA	156 mV	100k ohms	- 100pF
DC offset	Left	2.8 mV	
	Right	1.8 mV (VLF servo noise) (0.5-1 Hz)	
Size (Width x Height x Depth)	438mm	248mm	560mm
Weight	61kg	135lb	
Finish	silver or black anodised alloy		
Price	£ 18,000 (typical)		

Subjective Sounds

PAUL MESSENGER

Of several possible topics for this column, the most surprising, and therefore the most interesting, concerns a very costly Swedish speaker first spotted at the Munich High End show in May.

I'm pretty cynical about speakers with silly pricetags, and also any that appear to place extreme styling as a major design priority, so my first reaction to seeing SWSpeakers' *Magic Flute* (www.swspeakers.com) was doubly prejudicial, so I was far from enthusiastic when asked (very politely) if I would listen to a pair.

Happily, my cynicism was entirely misplaced, and I certainly didn't waste my time. SWSpeakers is a brand new operation, and the Magic Flute does show some naivety (especially some of the words on the website). However, do look at the pictures if you can, because the strikingly unconventional appearance seems the most likely key to this speaker's rather special performance. That said, the all carbon fibre composite (CFC) build also plays a significant part, in both the performance and the very high cost (estimated at around £70,000/pair!).

This four-way design has four drive units, each in its own 'turbine-shaped' enclosure ('nacelle' is the more accurate term). Each of these is then mounted onto a central CFC spine, and the shape and c6cm separation of these enclosures, doubtless assisted by the CFC construction, seems to be the main reason for this speaker's quite remarkably wide dynamic range and freedom from boxiness. Indeed, the *Magic Flute* has the widest dynamic range and the best low level resolution of any passive speaker I've ever heard (though not the most exciting dynamic expression, which is something rather different).

Top quality components include carefully selected SEAS anodised metal cone drive units and a high class fabric dome tweeter, Jantzen crossover components, and Jorma Design cables, all of which probably make significant contributions to the whole. But I'm fully persuaded that mounting each driver in its own tapering 'nacelle' plays a major role in minimising the unwelcome effects of the enclosures.

To what extent that's down to the use of CFC, or the nacelle shape is impossible to say. Certainly curved CFC's very high stiffness makes a fine enclosure material, but the very heavy tooling costs needed for the *Magic Flute*'s several different size CFC enclosures plays a major role in determining the speaker's extravagant pricetag. However, according to designer Sinan Knauseder, the shape is crucial, and its inspiration came from flying around Europe and noticing the ultra smooth way a jet engine can pass through light cloud, leaving barely a ripple. The nacelle shape of the *Magic Flute*'s enclosures has therefore been designed with the idea that mimicking a jet engine shape will propagate the sound waves generated by the drivers into the room smoothly and free from reflection discontinuities. Whether the theory is acoustically sound I'm not at all sure, but it does seem to work in practice, and, apart from the circular cross-section, the shape is pretty useful at dealing with internal reflections too, while the construction lends itself to some time-alignment.

I mentioned naivety, and there are indeed a few wrinkles that could well be ironed out. And while this isn't a formal review, it's worth mentioning that the tonal balance is decent enough, and the sensitivity is around 89dB, alongside a true 8ohm load.

The bottom lines are that the *Magic Flute* itself proved quite remarkably effective at revealing the differences between the components and accessories further ahead in the system. And there are firm plans to create smaller and much less costly variations on a similar theme, in wood as well as carbon fibre.