

hi-fi news

& Record Review

Exclusive

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Ayre Codex

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headphone amp/DAC

Rogue Audio

The 'mixed tech' amp

Massive monos

PS Audio BHK 300 Signature

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T+A G 2000 R all-in-one turntable



Pioneer SE-Master 1
Top-flight 'hi-res' headphones

NEW SERIES

Meet the Producers
Rick Rubin rewrites the rules, p86

- **PLUS** 18 pages of music • **VINYL RE-RELEASE** Neil Young's *Everybody...* on 180g
- **OPINION** 12 pages of comment • **VINTAGE** Sony's diminutive D-88 CD portable
- **SHOW BLOG** Munich's High End • **READERS' CLASSIFIEDS** Hi-Fi bargains galore

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THE hi-fi SHOW Live
29-30th October
See p17

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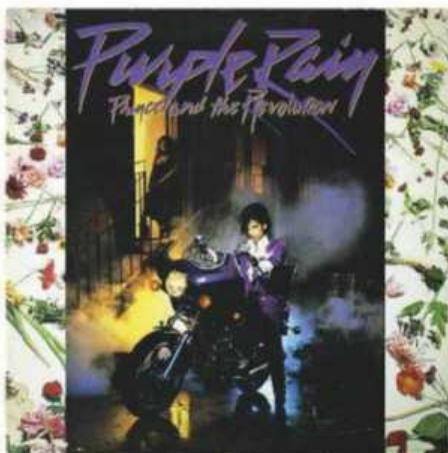
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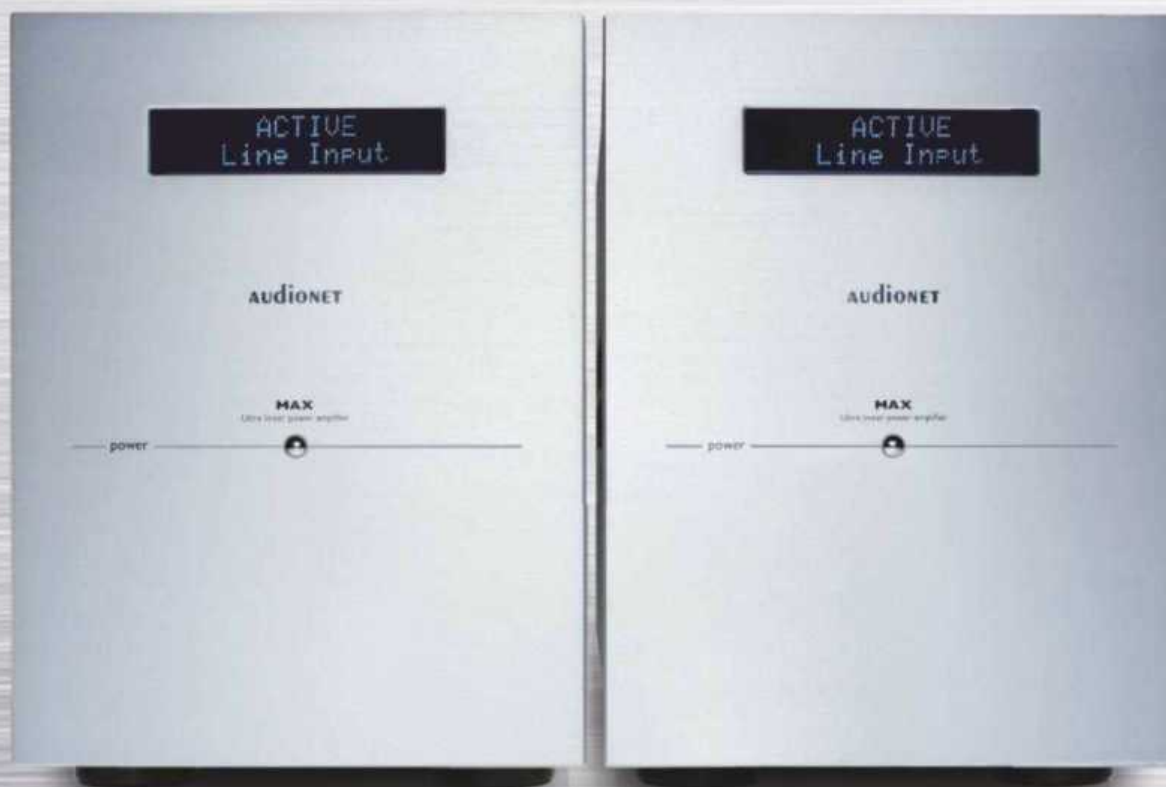


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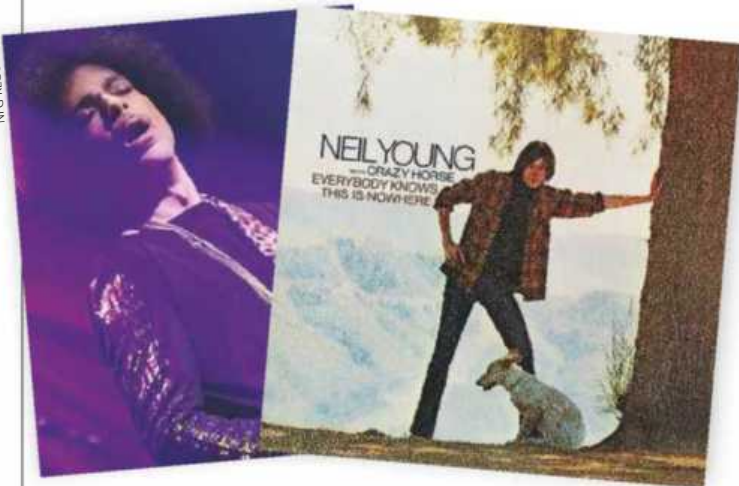
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RIGHT: A half century of Pioneer's headphone history culminates in the SE-Master1. Our exclusive in-depth review begins on p66



ABOVE: A minimalist exterior conceals the novel tube/Class D hybrid heart of Rogue Audio's Sphinx v2 integrated amplifier. See p54



VINYL: Our tribute to the late Prince, *Purple Rain* is our Vinyl Icon (p80) while Steve Sutherland reappraises Neil Young's key solo LP *Everybody Knows This Is Nowhere*, now re-released (p78)

RIGHT: *Hi-Fi News & RR* is the UK's representative of EISA's Hi-Fi Expert Group. Editor Paul Miller is EISA's President-elect & Hi-Fi Group Manager



Vinyl is no longer part of a revival – it's back, square and centre in hi-fi's mainstream. Judging by the number of new turntables and established vinyl-playing front-ends in evidence at Munich's recent High End show, and the format's overwhelming presence at CES in January, the conclusion is clear. In the space of some 30 years, the LP has declined, its spark all but snuffed out before rising again, phoenix-like to regain its place at the audiophile top table.

Singles and albums stamped on the black stuff even have their own Official Charts, these listings tracking the sales of vinyl across the UK. The vinyl charts themselves are a little over a year old – they never existed as a discrete listing back in the LP's heyday because vinyl was the

pre-eminent format. The top 10 in the 1970s, for example, was the 'vinyl' charts!

It's clear from looking at the top 10 biggest selling vinyl albums of 2016 so far that there's both a new and returning audience, and not a little nostalgia, driving the market. Boosted by events surrounding the recent Record Store Day, the late David Bowie's 25th and final album, *Blackstar*, is 2016's overall top-seller to date with the late Amy Winehouse's *Back*



To Black a close second. And guess who has recently nudged both these icons down a notch to assume the No 1 spot on the Official Vinyl Album Chart? None other than Prince and The Revolution with *Purple Rain*.

As hi-fi enthusiasts and music lovers across the world mourn the loss of another musical innovator, *Hi-Fi News* extends its own tribute to arguably the

'Vinyl is no longer a mere revival. It's back on hi-fi's centre stage'

'80's greatest creative superstar with our own behind-the-scenes review of this LP [p80].

Interestingly, a proportion of Prince's back catalogue has now appeared on highresaudio.com's website for download as 96kHz (and in some cases 192kHz) FLAC files. Their provenance is unclear – they are not 'remasters' – so pop back next month for our review in *HFN*'s exclusive Hi-Res Download section [p94].

PAUL MILLER EDITOR

HI-FI NEWS' EXPERT LINE UP: THE FINEST MINDS IN AUDIO JOURNALISM BRING THEIR EXPERIENCE TO BEAR ON ALL AREAS OF HI-FI & MUSIC



BARRY FOX
Investigative journalist supreme, Barry is the first with news of the latest developments in hi-fi and music technologies



JOHN BAMFORD
JB brings huge industry experience, a penchant for massive speakers and a love of hi-res audio in all its diverse guises



KEN KESSLER
is a long-serving contributor, luxury goods writer and champion for the renaissance in valves and 'vintage hi-fi'



KEITH HOWARD
has written about hi-fi for 30 years, and edited *Hi-Fi Answers* for nine. KH performs our speaker and headphone lab tests



STEVE HARRIS
Former Editor of this very title from 1986 through to 2005. A lifetime in audio and a love of jazz makes Steve a goldmine



ANDREW EVERARD
has reviewed hi-fi for over 30 years and is still effortlessly enthusiastic about new technology, kit and discovering new music



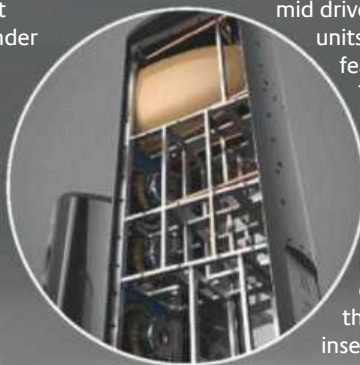
STEVE SUTHERLAND
worked on *Melody Maker* and then edited *NME* from 1992-2000, the Britpop years. Steve brings a unique slant to our Vinyl Release pages

Magico M3

FRUITS OF THE LIMITED-EDITION M-PROJECT REALISED IN NEW FLOORSTANDER

Inspired by Magico's anniversary M-Project loudspeaker, the new M3 is described as its 'most sophisticated' floorstander to date. Weighing in at 145kg, the M3's internal matrix of reinforcing beams brings strength and rigidity to a massive, sealed box enclosure comprising alloy baffle and rear panels with new, polished carbon fibre side cheeks.

Moreover, the M3 also features the 28mm diamond-coated tweeter debuted in the M-Project alongside new graphene-impregnated,



woven carbon fibre-coned bass and mid units. Magico claims that the 6in mid driver and three 7in bass units employed in the M3 all feature 'Graphene Nano-Tec' cones that are 20% lighter and 300% stiffer than those used in its earlier generations of speakers. Furthermore, the midrange works into a polymer sub-enclosure, isolated inside the top of the cabinet [see inset picture]. Launch date is autumn 2016 and price ~£70k.

Magico LLC, 0208 971 3909;
www.magico.net;
www.absolutesounds.com



ONE for all...

REBIRTH OF THE CLASSIC COMPACT AMP

Over 30 years after Cyrus defined what was to become the 'footprint' for compact integrated amplifiers with its Cyrus 1, the company has reimagined and reinvigorated its concept with an entirely new model called... the Cyrus ONE! The styling of this new £699 integrated is rather dominated by two huge rotaries, catering for input selection and volume, while, under the bonnet, the engine room is fired by a third-generation version of the company's hybrid Class D amp module.

Aimed at what Cyrus describes as an 'enlightened consumer group', the 100W ONE includes support for Bluetooth aptX streaming and vinyl, the latter courtesy of a MM phono input, plus headphone listening via a discrete Class A/B line amplifier. Any subsequent firmware updates will be achieved via a micro USB port on the rear of the amplifier.

Cyrus Audio Ltd, 01480 435 577;
www.cyrusaudio.com



HI-FI NEWS' NUGGETS

MQA AND WMG

Meridian's revolutionary MQA (Master Quality Authenticated) packing technology – designed to deliver high sample rate, high-resolution audio over limited-bandwidth streaming services [see *HFN* Apr '15] – has received a massive boost with the announcement of a long-term licensing deal with Warner Music Group (WMG). In practice, and with a growing list of MQA-ready hardware now available, this agreement paves the way for recordings from WMG's diverse roster of acclaimed artists and its world-renowned catalogue to be accessible in studio master quality through MQA distributors.

www.mqa.co.uk

A NEW TWIST

Black Rhodium's 'vibration stabiliser technology' has been trickled-down to its Twist VS-4 loudspeaker cable. Based on the proven Samba VS-1 geometry, VS-4 employs a pair of 0.75mm² tin-plated copper conductors with silicone-rubber insulation. A 3m terminated set costs £195. **www.blackrhodium.co.uk**

Pro-Ject's Classic

25TH ANNIVERSARY VINYL SPINNER



Launched in celebration of Pro-Ject's 25th birthday, its sub-€1000 'The Classic' turntable also pays homage to the iconic suspended subchassis turntables from the 1950s-'70s. In this instance, the rigid sandwich-construction 'subchassis' is not suspended by springs but sits on six balls of TPE (thermoplastic elastomer) located inside the wooden-framed plinth. The motor also sits within the plinth, driving the machined, and TPE-damped, alloy platter via a belt and sub-platter. The deck also features a new carbon/alloy composite tonearm and special Ortofon 2M silver MM pick-up.

Pro-Ject Audio Systems, Austria,
01235 511166;
www.project-audio.com

Prism Sound Callia

NEW DAC/PREAMPLIFIER FROM PRO AUDIO BRAND



Galvanised by the success of its professional Lyra, Titan and Atlas recording interfaces, Prism Media has leveraged its DAC technology, ARM Cortex processor and USB platform into a consumer-focused product – the £1794 Callia. This flexible DSD-capable DAC, preamplifier and headphone amp offers both fixed and variable analogue outs on both balanced XLRs and unbalanced

RCA. Digital inputs include S/PDIF on Toslink optical and coax with USB supporting LPCM up to 384kHz/32-bit and DSD to 5.6MHz (DSD128). The headphone output boasts a separate low-impedance preamp, with its own volume control, designed to drive a very wide variety of cans. **Prism Media Products Ltd, 01353 648 888; www.prismsound.com**

Essence of a fine MC

CLEARAUDIO REFINES ITS ENTRY-LEVEL CONCEPT MC

Clearaudio's entry-level moving-coil pick-up, the 'Concept', has seen sterling service for many years [*HFN* Apr '11] and now forms the 'donor chassis' for an uprated version called the Essence. This £795 pick-up is built into the same 8g alloy body but is distinguished by its neutral-coloured hard anodising (the Concept MC is black).

Inside, too, the 11ohm OF-copper coils, the boron cantilever and microline stylus are common to both pick-ups as is the 0.4mV (re. 1kHz/5cm/sec) output specification, the 2g recommended tracking force and 9cu compliance. The difference lies in the *tolerance* of the generator assembly – those offering a tighter channel balance and wider

stereo separation being selected for inclusion in the superior Essence model. **Clearaudio Electronic GmbH, 0118 981 4238; www.soundfoundations.co.uk**



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If you can't always find a copy of this magazine, help is at hand! Complete this form, hand it in at your local store and they'll arrange for a copy of each issue to be reserved for you. Some stores may even be able to arrange for it to be delivered to your home. Just ask!

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Viva Le Reva

NEW WHARFEDALE SPEAKERS

We reported on Wharfedale's revamped Diamond speaker range over a year ago [*HFN* Mar '15], during which time another range – benefiting from slightly relaxed cost constraints – has been developed by way of upgrade. This five-strong Reva series builds on the Diamond 200s by employing advanced multi-layer cabinets that are curved into a pleasing aesthetic and slot-loaded at the base. Glass fibre cones feature in the mid and bass units along with a soft-dome tweeter up top. Prices range from £450 for the two-way Reva-1 standmount to £1300 for the 2.5-way Reva-4 floorstander. **Wharfedale, 01480 447700; www.wharfedale.co.uk**



Upcoming Events

IMPORTANT DATES FOR YOUR HI-FI DIARY

03-05 JUN	T.H.E. Show, The Hotel Irvine, Newport Beach, CA, USA
02-07 SEP	IFA Berlin, The International Funkausstellung, Germany http://b2c.ifa-berlin.de
15-16 OCT	High End Swiss 2016, Hotel Moevenpick Zuerich Regensdorf, Switzerland; www.highendsociety.de/
29-30 OCT	The Hi-Fi Show Live 2016, Beaumont Estate, Windsor; www.hifinews.co.uk/show
30-02 OCT	Tokyo Audio Show, International Forum, Japan



HA-2

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“...a crushingly competent piece of equipment for the asking price.”

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THE hi-fi SHOW

Live 2016

Now in its fourth year, and with more new exhibits, the UK's only high-end audio show gathers pace as the 'who's who' of world-class hi-fi plan their debuts

The silence surrounding Dan D'Agostino's statement Progression monoblock power amps will be broken at the Hi-Fi Show Live in October. Hear these awesome 800W amps as part of Absolute Sounds' exclusive presentations!

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Visitors to last year's show were blown away by GamuT's flagship RS9 floorstanders, but the Danish brand aims to go one better in 2016 with these new limited edition, cost-no-object, 'Zodiac' flagships!

Launched to huge acclaim at last year's Hi-Fi Show Live, the revamped version of KEF's iconic Muon loudspeaker will partner with Chord Electronics' flagship DAVE DAC and Reference Monoblock amplifiers as the centrepiece of our new White House exhibition space. Prepare to be amazed!

Proving just how adept it has become at trickling-down its bespoke digital technologies, PS Audio will be showing off the DirectStream Junior USB DAC, which now includes its 'Bridge II' network connection as standard [see *HFN* Jun '16].

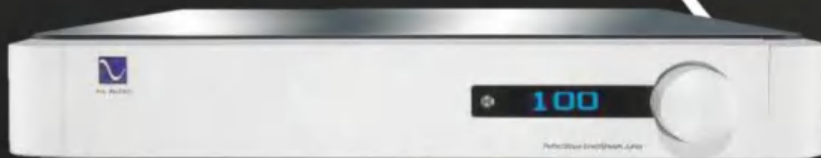
29th-30th October

Advance tickets are on sale for the UK's premier high-end audio event – The Hi-Fi Show Live at the Beaumont Estate conference centre, Old Windsor on Saturday 29th and Sunday 30th October 2016.

Tickets cost £20 (£30 for a weekend pass) via www.eventbrite.co.uk or via the link on our website.

We will also be offering a concessionary £15 day pass for subscribers of *Hi-Fi News* and *Hi-Fi Choice*, details of which will be announced in July. Please return regularly to www.hifinews.co.uk/show for more details.

Focal returns to the Hi-Fi Show Live with a new and considerably beefier version of the EISA Award-winning Sopra N°2 floorstander [*HFN* Sep '15]. The 70kg Sopra N°3 features a larger cabinet and a pair of 8in woofers to develop a deeper, grander sound. Look out for the exclusive review in *Hi-Fi News*!



Munich High End 2016

Words & pictures: Ken Kessler



Handily the world's largest and best audio show, Munich High End 2016 was astonishing for both the attendance and the newsworthiness of trends and products. Who would have thought that the vinyl revival is now so entrenched that it can be taken for granted? Or that it would be followed by a revival in open-reel – both the hardware and pre-recorded tapes?

Retro rules: IMF, Hafler and Dynaco are back. ELAC revived the Miracord turntable. Revox is to make a new open-reel, and there are whispers of another open-reel maker coming back, while an all-new manufacturer is soon to emerge. Not enough? How about audiophile pre-recorded cassettes?



Making some of the best-looking, best-finished and – appropriately – best-sounding kit in the UK today, but rarely shouting about it, is Trilogy. New for 2016 are the £4995 993 Stereo Hybrid Power Amplifier with tube input stage and choke-regulated power supply for the output stage [top] and matching 903 Valve Line Preamplifier at £4995, with phono option an extra £1450. www.trilogyaudio.com



One to delight those who own the portable Astell & Kern AK380 digital player, the AK Recorder is an add-on that turns it into a, er, recorder. Two channels, low-cut filters, limiters, phantom power, mini XLR and 3.5mm line and mic inputs, sampling rates up to 384kHz and bit depths of 16/24/32-bit, plus DSD64 and DSD128. The sound of an LP dubbed into it was staggeringly good. www.astellnkern.com

Tragic, this: the last-ever design from Franco Serblin, founder of Sonus faber. Called Ligneas, it blew me away, a svelte floorstander delivering bass that it simply should not be able to reproduce from a 110mm woofer, below a 27mm tweeter. As you'd expect, it's so pretty that it will make you cry, and price is circa €4000-€5000. Ciao, Franco. www.franco-serblin.it



For me, the most pleasant surprise of the show: the return of Dynaco! This is the all-tube ST1, actually a new-look PAS preamp, while the classic Stereo 70 power amplifier is back, too, as the ST-70x. Classic circuits have been retained and modernised; prices are said to be low and the vibe is positive. The new owner is Radial Engineering, from the pro sector, so this should be a goer. www.radialeng.com

Clearly hoping to out-horn the Germans, Poland's Auto-Tech showed the outrageous three-way Uniwersum. Yup, a Teutonic 'w' instead of 'v'. Size is room-challenging; the dimensions supplied (1130x1630x725mm) are for the box, the woofer tower being a 140-litre composite enclosure. Bi-amping is required, the drivers including a 15in woofer, 2in beryllium mid and 1in tweeter – the latter each with its own composite horn – and sensitivity is a claimed 100dB for 1W. This 8ohm design covers 30-30kHz. Seen here in matt black; gloss white is also offered. www.autotech.pl



How cool is this? Available in a host of colours, the Miracord is back in production from ELAC, though now it's a manual, single-LP player rather than the automatic fondly remembered from the 1960s. The Miracord 90 Anniversary, supplied with arm and A-T cartridge, celebrates ELAC's 90th and boasts a 5.5kg MDF chassis on specially developed silicone rubber feet. Its aluminium platter weighs 6.5kg. www.elac.com



Now my Quad PA-One headphone amp won't be so lonely as the company has succumbed to logic and built a remote-controlled, integrated amp into the same chassis. Valve complement of one ECC83, two ECC82s and four EL34s delivers 15W/ch on paper, while inputs include one each of RCA, digital optical, coax, USB and Bluetooth. Would love to see them do just a power amp in this chassis! www.quad-hifi.co.uk

Having made its (unnamed) debut at the Bristol Sound & Vision show, the new miniature floorstander from Neat Acoustics now has a name and a price [writes Andrew Everard]. The Iota Alpha is now in production, and set to sell for £1385/pr. Just 45cm tall, it combines the drivers of the original Iota, now in an upward-angled sealed cabinet, with a downward-firing 13.5cm bass unit. Standard finishes are Natural or Black Oak, American Walnut and Satin White, with special finishes available to order. www.neat.co.uk



SHOWBLOG Sights and sounds from around the globe

Marantz Brand Ambassador Ken Ishiwata always 'gives good dem', and this year was no exception [writes AE]. He was using the forthcoming upsampling-to-DSD SA-10 SACD/CD player/DAC and PM-10 amp to drive the 'proof of concept' WM-3 speakers by Fink Team. Based on the reaction to the speakers, Karl-Heinz Fink says he's now planning to make and sell them. www.marantz.co.uk; www.fink-audio.com



Aside from a truly embarrassing name, Supranus' Loudspeaker Art Laboratory from Italy adds rock 'n' roll aesthetic touches to the Tatú models by integrating sculptured representations of electric guitars into the baffles. No idea what they sound like, but the look is terrific if you're tired of black grilles. Frontal area of the speaker is 310x190mm, and they clearly encourage stacking. www.supranus.com

Celebrating its 30th Anniversary, Air Tight has launched this beauty, a special edition of the ATM-300 stereo power amp, equipped with Japanese-made Takatsuki 300Bs and Mullard input tubes. Controls include separate left/right level attenuators (so you can feed a line-level source directly into it) and bias adjust in conjunction with a bias/current meter. www.global.airtight-am.net



It's not unknown for brands exhibiting at Munich to stick to a successful formula, and this year's Technics room played it safe by being exactly the same as last year's – with the significant addition of the SL-1200GAE turntable, reviewed in *HFN* Jun '16 [writes Andrew Everard]. It was sounding great through the SU-C700 amplifier and excellent SB-C700 speakers, and it was good to catch up again with Marty Kashiwai, formerly at Onkyo and now in charge of product planning for Technics. www.technics.com

Another from Italy, EAM Lab's Element 501 is a hefty monoblock amplifier rated at 650W/8ohm or 1100W/4ohm. Power supply includes a 1500VA transformer while the amp employs a compact input stage module and no fewer than 16 pairs of output transistors. The construction looks bomb-proof. www.eamlab.com

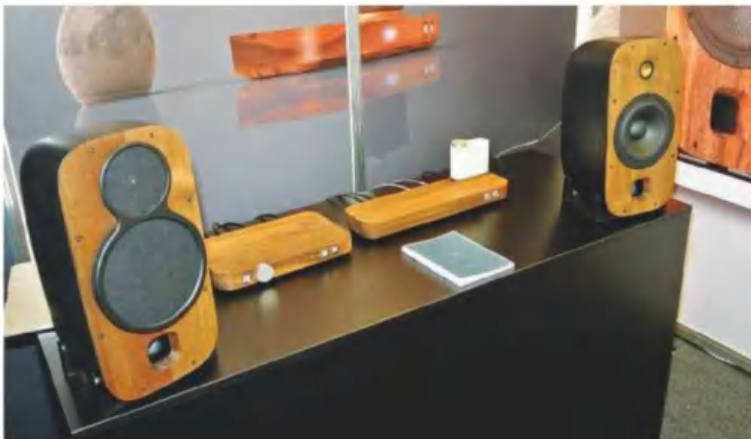




And about time, too: at last, a high-end brand has realised that to sell expensive equipment, you need someone who understands the luxury sector. Following the sad passing of Dieter Burmester, Burmester Audiosysteme GmbH has hired Andreas Henke, who is currently marketing director at Porsche Deutschland. After 18 years with the car maker, Henke will become the CEO of Burmester on the 1st of January 2017.



As if TechDAS' Air Force One wasn't amazing enough, the new, dearer 'Premium' version features upgrades to the pneumatic bearing support with a new mechanism and pressure sensors, improvements to the LP vacuum hold-down, the option of three upper platter types, improved motor-control circuits, a faster start-up, a larger power supply and much more. www.techdas.jp



Sound Art-Works marries the retro of reclaimed teak with the modernity of wireless Bluetooth connectivity in this handsome amp/DAC/speaker system. The amplifier is rated at 2x50W and conventional inputs include one RCA phono and one XLR. Two-way ported speaker measures 418x213x244mm (hwd). www.designindulgence.com

Don't get too excited, but Jerry Bloomfield of UK company Falcon Acoustics said, yes, this is a trial return for IMF, and yes, this is a true transmission line speaker. After the company's success in reviving the LS3/5A, the project certainly seems sensible, and I would love to see IMF back from the dead. Fingers crossed! www.falconacoustics.co.uk



A lovely throwback to all-in-one music centres, the ON made by Gpinto in Naples is stylish and – lest you think it's just fashion – has a valve preamp. The deck is belt-drive, features a Corian platter and comes with a carbon fibre tonearm, it accepts MM and MC cartridges, has Bluetooth aptX, four digital and two line inputs, with Class D amplification from 100W. www.gpinto.it

Under its funky, folded metal cage, Octave's flexible V80SE is hiding four output valves, which allow this integrated amplifier to deliver a claimed 130W/ch. It can accept KT88 or 6550s with the rear panel selector's 'low' position, and KT120s or KT150s in the 'high' position. Front-panel bias adjust is aided by three LEDs. www.octave.de



SHOWBLOG Sights and sounds from around the globe



Audio Research has rationalised its range into three families, with Reference at the top, the G Series (sort of) in the middle and the new Foundation models as the main line. The first three products will include the LS28 line stage preamp, PH9 phono stage and DAC9 D/A converter, with a new power amplifier to follow. All models will be offered in both black and natural finishes. www.audioresearch.com



Called, simply, the Classic INT, Nagra's latest integrated is the natural follow-up to the Classic AMP introduced last year. This adds one XLR balanced and three RCA line inputs, volume, balance and remote control to the 100W/ch power amp. Modulometer shows output; LCD display indicates selected input. www.nagraaudio.com



Anniversaries everywhere: this gilded beauty is the EMT JPA66 Mk IIG 'Limited Diamond Jubilee Edition' of the Variacurve Tube Stereo Control Centre. It's loaded for vinyl users, with four phono inputs and utterly comprehensive adjustability, including variable curves and turnover points. More to celebrate: EMT won a Grammy Award this year for technical achievement. www.emt-international.ch

No, you are not imagining this: alongside the revived IMF [see p21], Falcon Acoustics – which now makes the drivers for LS3/5As – has also come up with a B139 driver replacement. Hooray! All those KEF 104 and IMF users can rejoice, and you can take this as an indicator that IMF may well be back with bigger models. www.falconacoustics.co.uk



Sister to the revived Dynaco is the reborn Hafler. So far, the products have been compact headphone amps and phono stages aimed at studios, like this, the HA75D headphone amp with USB, a rotary to adjust impedance between 20 and 400ohm and two outputs. Expect more targeting of the audio community! www.hafler.com

Nice British feel to the Harbeth showing, with the excellent, so-BBCish-that-it-hurts Monitor 40.2 waving the flag. The speakers flanked Martina Schöner's magnificent, English-by-birth L'Art du Son Garrard Transcription Reference, recently acclaimed by a German magazine to be 'as good as it gets.' www.harbeth.co.uk; m.schoener@garrard.de



SHOWBLOG Sights and sounds from around the globe



An oddity, this: Spaltart camouflages the entire loudspeaker with this complete, naturalistic real-wood construct with the merest of slits allowing the sound to escape. Design is by Klaus Wangen; no technical information at all is available, only that they are offered as integrated in-wall types, or as the K1, K2 or K3 passive loudspeakers for use with any hi-fi system. www.spaltart.de



Completing the triumvirate of legendary German turntables from the 1960s, with Dual and Miracord, was Perpetuum Ebner, back for a couple of years and now with a full range. The two-speed PE4040 is the top model, with belt-drive, a split chassis, 3.5kg platter and Papst motor. www.weaudiosystems.com

One trend is hefty tonearms, some reminiscent of the Dynavectors, others pivoting like the Garrard Zero 100. Sibatech's made-in-Japan Abis uses miniature radial bearings for the vertical and the horizontal, the arm 'wand' is machined from solid aluminium and wiring is isolated through separate arm tubes, which is said to give better stereo. www.sibatech.co.jp



For the total tube obsessive, who owns hi-fi-related clocks such as the McIntosh or – especially – the Telefunken with Nixies, this is Russia's answer to the latter. VacuumGlow is 'a developer and producer of Nixie tube clocks', with a range of three models in different sizes and glowing in different colours, from \$1199. This has to be the ultimate, final touch for your listening room! www.vacuumglow.com

To sit with your Russian dolls and samovar, speakers from Volya Audio Systems painted in the Ukrainian 'Petrikovsky' style. New to capitalism, it managed to produce a six-fold brochure with no contact information, so it looks like the West is safe for a bit longer. www.volya.audio



Tsakiridis' Theseus – who better than a Greek brand to use the gods' names? – can use any tube from EL84 to KT150. Triode and pentode operation is offered as is adjustable feedback, a headphone output, an ALPS volume pot, three line inputs, MM phono with tube RIAA and a USB DAC. www.tsakiridis-devices.com



Next month

Hi-Fi News uncovers gems from the UK's Audio Jumble



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To the ends of the earth

Keith Howard revisits the question of headphone headband resonance

BELOW RIGHT: Figure 1 shows a circuit diagram of an unbalanced headphone with a three-wire lead, connected so that the right capsule is electrically isolated from the amplifier. This prevents crosstalk due to the common earth impedance

BELOW: With models like the Focal Spirit Pro, the effects of headband vibration can be heard when the headphone is worn during impedance testing

Shortly after my first Investigation into headphone headband resonance was published [see *HFN* Jun '14], Owen Jones – he who designed THX's Achromatic Audio Amplifier circuit – pointed out to me that I could have done a better job of it.

I'd deployed the artificial head I use for headphone measurement in a seemingly odd way: to measure the output not of the headphone's active capsule but its inactive one.

By comparing the frequency response obtained in this way to the one obtained from the active capsule, it was possible to see – in the case of headphones with headband resonance issues – obvious peaks in the inactive capsule response which were caused by the headphone structure going 'boing' at certain frequencies.

RARELY MENTIONED

Exactly how significant such resonances are when using headphones normally to play music has not, so far as I know, ever been established. In fact headband resonance has been an elephant in the room for headphone design.

Manufacturers often talk about using low-resonance materials in their headphones' capsules, but the headband is rarely mentioned in this context: it merely exists to link the two capsules together, and is conveniently assumed to be vibrationally inert. But often it isn't, and only with a headphone like the AudioQuest NightHawk [*HFN* Sep '15] – which compliantly isolates the capsules from the headband – is it reasonable to make that assumption.

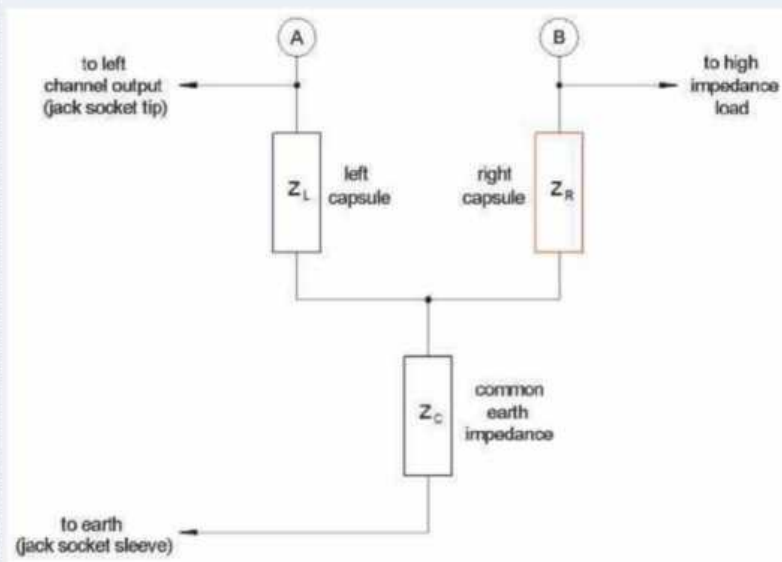
My measurement method probed the issue of headband resonance and showed it to be quantifiable in



an acoustically relevant way (ie, not by sticking an accelerometer somewhere on the headband and then speculating about the acoustic effect of the resonances thus revealed...). It was neat, it was simple, it gave interesting and pertinent results.

But what I hadn't done, Owen pointed out, was eliminate electrical crosstalk between the two capsules caused by the common earth wiring often employed in unbalanced

headphones. Here the ground terminals of the left-channel and right-channel capsules are linked within the headphone, so that a three-wire connecting lead can be used instead of a four-wire one: left signal, right signal and common earth. The common earth impedance means that signal current flowing through one capsule results in a crosstalk voltage appearing across the other capsule – and vice-versa.





Because the left and right signal earths are connected within the headphone, they cannot be separated without invasive surgery – not something that can be undertaken with review samples.

But you can easily open-circuit the signal connection to the inactive capsule, to leave the circuit depicted diagrammatically in Figure 1.

Not only does removal of the signal connection prevent electrical crosstalk current from flowing through the inactive capsule, it also allows the electrical crosstalk to be measured by comparing voltages at points A and B in the circuit.

THE ADAPTER

Not a finger need be laid on the headphone to achieve this: it can be implemented using an adapter inserted between the output of the (stereo) headphone amplifier and the headphone itself.

A picture of the one I built can be seen to the right: the jack plug connects to the headphone amplifier, the headphone under test plugs into the adapter's jack socket, and the two phono sockets connect to points A and B in the circuit. In my adapter the left headphone capsule is

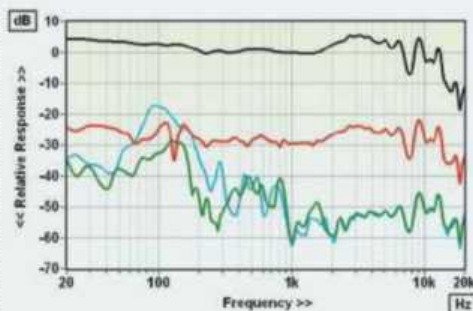


FIGURE 2. Focal Spirit Pro (black: active left capsule; red: right capsule; green: right capsule with adapter; blue: headband raised)

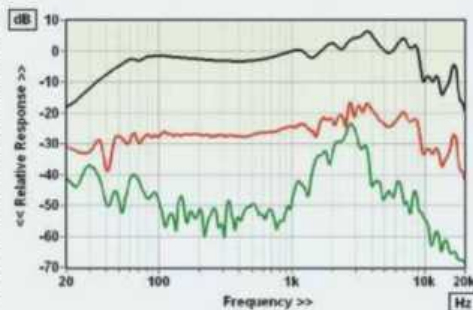


FIGURE 4. Sony MDR-MA900 (black: active left capsule; red: right capsule; green: right capsule with electrical isolation via adapter)

ABOVE LEFT: NAD Viso HP50 has an obvious headband resonance issue, audible in our impedance test [see Fig 3 & 5]

BELOW: Adapter built by the author for the tests

connected normally and the right capsule isolated, but it could as well be the other way round.

THE RESULTS

What results do we get using the adapter to remove electrical crosstalk in headphones with common earth impedance? Figure 2 shows an example, the headphone in this case being the Focal Spirit Professional that I reviewed recently [see *HFN* Dec '15].

Subjectively this headphone has an obvious headband resonance issue, by which I mean that in the impedance test I conduct for the lab report – which involves the headphone being worn while a pink-spectrum periodic noise test signal is played over the left capsule only – coloration of the noise and migration of the sound from the left towards the inactive right capsule could clearly be heard.

Both are indicators that the headband is not the acoustically

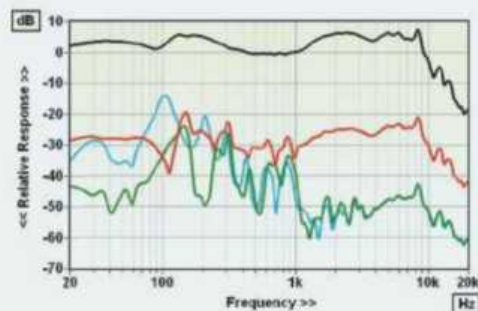


FIGURE 3. NAD Viso HP50 (black: active left capsule; red: right capsule; green: right capsule with adapter; blue: headband raised)

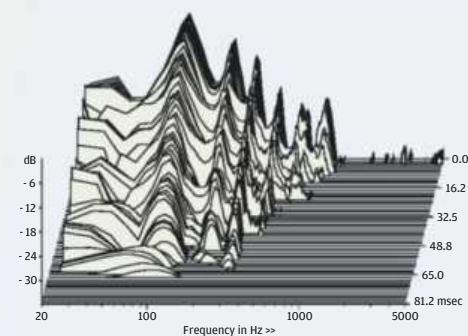


FIGURE 5. CSD waterfall derived from the NAD Viso HP50's right capsule output with the headband raised and the adapter in circuit

inert structure we would hope it to be. Three of the four superimposed traces in Figure 2 show: 1) the uncorrected frequency response of the left capsule of the Focal Spirit Pro review sample (black trace); 2) the response measured at the right capsule – as before, on the artificial ear – when the left capsule is driven without the right capsule being open-circuit (red trace); and 3) the response measured at the right capsule when the left capsule is driven but now with the right capsule open-circuit to prevent electrical crosstalk from the common earth wiring (green trace).

All three of these responses were measured with the headband resting on the artificial head; the fourth trace (blue) shows the effect, with the isolator in circuit, of lifting the headband out of contact.

It's clear from the blue trace in particular that the Spirit Pro has a headband resonance issue, and that

'The difference between the NAD and Sony is remarkable'



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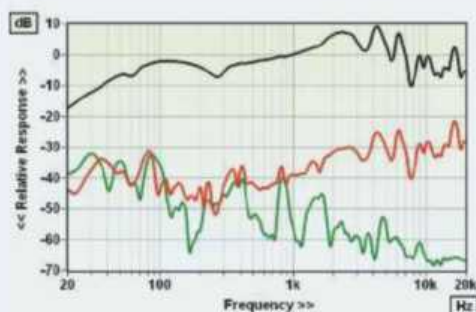


FIGURE 6. Audeze LCD-2 (black: active left capsule; red: right capsule without electrical isolation; green: right capsule with electrical isolation via the adapter)

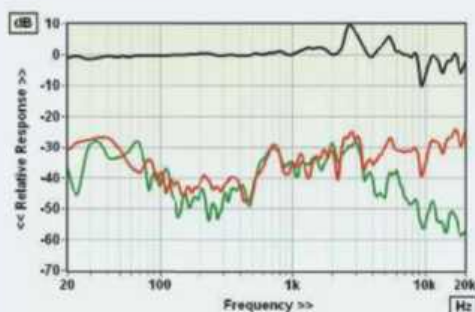


FIGURE 7. A-T W1000Z (black: active left capsule; red: right capsule without electrical isolation; green: right capsule with electrical isolation via the adapter)

the use of the isolator makes this much clearer.

Two headphones measured in the earlier article were the NAD Viso HP50 [see *HFN* Jan '14] – which subjectively has a severe headband resonance issue – and the now discontinued Sony MDR-MA900 [*HFN* Oct '12], which subjectively (in the impedance test) seems to be resonance-free.

Figures 3 and 4 show the results of retesting these models with and without the isolator in circuit, the trace colours being the same as for Figure 2. (There is no blue trace in the case of the Sony because its head clamping force is insufficient for the headband to be raised off the artificial head – the capsules slip.)

MARKED PEAK

The difference in behaviour between the NAD and Sony is remarkable. Whereas the NAD with isolator in circuit (green and blue traces) shows obvious peaks between 100Hz and 1kHz, beyond which the level shelves down, in the Sony the 100Hz-1kHz band is very well controlled, with little sign of resonance, whereas above it there

RIGHT: The Audeze LCD-2 performs well subjectively in the impedance test but the revised measurement procedure shows that headband resonances are indeed present

BELOW: The Audio-Technica W1000Z Maestro uses compliant mounting of the driver within each capsule to reduce the vibration reaching the resonant headband but it's not completely successful

is a marked peak evident at 2.7kHz.

Given that this is close to where the ear is most sensitive, you might suppose the effect of this would be clearly audible in the impedance test but it isn't.

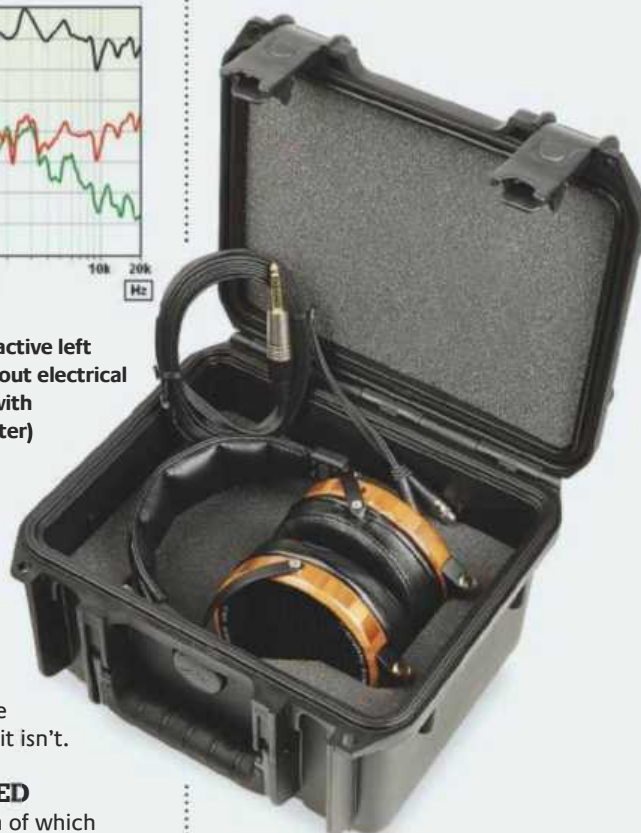
DOUBT BANISHED

To get a clearer idea of which response features are audibly significant it may be necessary to investigate them in the time domain, for instance by using cumulative spectral decay waterfalls as more normally seen in *HFN*'s loudspeaker tests.

A CSD waterfall derived from the NAD right capsule output with the headband raised and adapter fitted is shown in Figure 5 and banishes any doubt that the peaks in the frequency response are due to a series of resonances.

It's obvious in all three of these examples that Owen Jones was right: removing electrical crosstalk due to common earth wiring makes the vibrational behaviour of the headband very much clearer. This improvement should, of course, only be available with headphones in which the earth wiring for the left and right capsules is shared through the connecting cable.

While this is often the case with headphones in which the



connecting lead attaches to one capsule only, it's by no means universal. In some models the left and right channels nevertheless have independent earth wiring. With headphones having a Y-lead, connecting separately to each capsule, independent earth wiring is the norm. The isolator ought to have no effect with such headphones, but that proved to be not quite the

'The behaviour of the headband was now very much clearer'

case when I retested the Audeze LCD-2 [see *HFN* Mar '13] (Figure 6) and then tried the recently reviewed Audio-Technica ATH-W1000Z Maestro (Figure 7) [*HFN* Jan '16].

MORE TO INVESTIGATE

In both cases the 'with isolator' and 'without isolator' curves depart significantly as frequency rises, in the case of the Audeze from 3.5kHz and with the Audio-Technica from much lower in frequency, around 400Hz. The cause of these unexpected departures is being investigated.

Should there be any suspicion that a Y-cable is not four-wire all the





Emit.

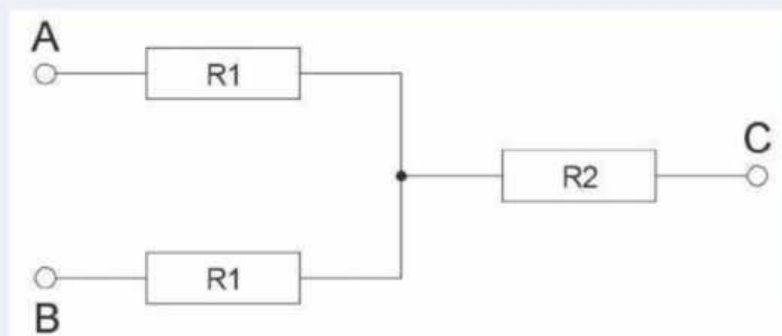
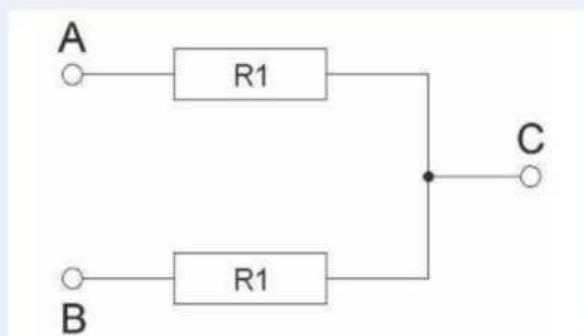
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way from capsules to connector, this can easily be detected if the cable is detachable using accurate resistance measurement as shown in Figures 8a and 8b.

In Figure 8a we see the case of a proper Y-cable with separate earth wiring (of resistance R_1 for each channel) from each capsule to the connector. In this case, resistance AB should equal that of resistance AC plus resistance BC, whereas this isn't the case if the earths are joined part way along the cable, as is illustrated in Figure 8b, alongside.

HOT TERMINALS

If the cable is captive then the determination can still be made, at least in theory, but the measurement now has to be performed from the left and right 'hot' terminals at the connecting plug and involves determining small differences in wiring resistance in the presence of the much larger resistances of the drive unit



voice coils. You can also get a good idea of whether there is common earth impedance for the two channels by inspecting the impulse response of the inactive capsule.

If the initial impulse peak has opposite polarity to that of the active capsule, it follows that shared earth impedance should be suspected. (The reason for this is obvious from Figure 1.)

CONCLUSIONS

Use of Owen Jones' isolator idea throws into even sharper relief the issue of headphone headband resonance and the wide disparity in headband vibrational effects between different headphones.

Personally I'm convinced that headband resonance is a subjectively significant issue in the worst offenders, although it's worth pointing out that I have *never* ascribed any aspect of a headphone's sound quality, in normal use, to this effect. We don't yet have hard evidence on which to make such a claim.

The effects of headband resonance can certainly be heard when pink noise is replayed over one capsule only. But the effect on stereo music replay will be influenced by masking and by the fact that we can expect the headband vibrational behaviour to be different for the M (sum) and S (difference) components of a stereo signal.

Still, were I to be tasked with designing a headphone I'd adopt the precautionary principle: assume that headband resonance does have audible effects and take appropriate measures to suppress it.

I can't believe that AudioQuest will be alone when it comes to adopting whole-capsule compliant isolation as a solution. 🙏

ABOVE LEFT:

Figure 8a – circuit diagram of the earth wiring of a true Y-cable where each capsule earth remains separate back to the connector (C)

ABOVE:

Figure 8b – circuit diagram of the earth wiring of a Y-cable in which the earths are joined part way along the cable. This can be revealed using resistance measurement

BELOW LEFT:

One solution to headband resonance – in the AudioQuest NightHawk the capsules are compliantly isolated from the headband to prevent vibration passing across

RIGHT:

The artificial 'head' used comprises sheets of MDF with a GRAS 43AG ear and cheek simulator mounted into one side. For these tests the head had to be compliantly isolated using coil springs

MAKING MEASUREMENTS

While the main text gives a brief description of how the measurements were made, some important practical details are missing.

With the isolator in circuit some of the sound pressure levels being measured are sufficiently low that the frequency responses obtained are susceptible to external interference. This was minimised in two ways.

First, the artificial head was compliantly isolated from the floor, using four coil springs, to reduce the influence of structure-borne low frequency interference from, for instance, passing cars and gusts of wind.

Second, while the reference capsule response (black trace) was averaged from ten measurements, an average of 100 measurements was used for the remaining responses in order to reduce variation at LF in particular.

Even so, some response variability remained between successive runs, mostly below 200Hz. To reduce this further the measurements would need to be performed in a structurally and acoustically isolated test chamber.



MartinLogan Neolith

With its 30th Anniversary to celebrate, MartinLogan has pulled out all the stops to create a new flagship – the Neolith
 Review: **Ken Kessler** Lab: **Keith Howard**

Forty-five years or so after the first \$500 cartridge – a ton of money in the early 1970s – a speaker like the MartinLogan Neolith, selling for £79,500, will barely raise an eyebrow. If *anything* surprises about the Neolith, it's that the price is so low for such an imposing and musically impressive product.

The Neolith's performance will further ensure that the company's new flagship – a massive electrostatic hybrid with built-in passive woofers – seems, I dare to suggest, something of a bargain. By excluding amplifiers for its woofers and thanks to a single structure rather than separate ESL panels and woofer towers, like the outgoing Statement, the price has been lowered, despite the promise of featuring the gamut of MartinLogan's latest technologies.

As one who has used 'Logans for over a decade in my 5.1 reference system, I'm pleased to note that the evolution continues on an upward trajectory but still with respect for tradition. Even the name pays homage to the speaker that launched the brand, the 'Monolith'. The new speaker employs one of the company's largest-ever radiating systems, with its signature curvilinear, 'see-through' topology. According to the company, it is a staggering 35% larger than the radiating surface of the Statement E2. This is augmented by a 15in rear-firing ported woofer and 12in front-firing sealed mid-bass woofer. It is an impressive package, but the real delight is in the details.

The Neolith's CLS XStat electrostatic panel measures 1220x560mm. (To put that into context, a Quad ESL63's dimensions are 925x660mm.) This panel, operable down to 400Hz, is perched on top of the woofer enclosure, so its overall height is a daunting 1899mm, and the footprint is 769x870mm.

RIGHT: ML's XStat panel offers an effective radiating area of over 1000in². Below 400Hz it is augmented by a front-facing 12in carbon fibre sandwich-coned bass driver and a 15in sub, in its own enclosure, to the rear [see p37]

It would be daunting if it wasn't so gorgeous, thanks to the classic MartinLogan 'see-through' effect.

ANY COLOUR YOU FANCY

And if that's not enough, the colour palette for the non-resonant Phenolic Resin Polymer frame includes gloss red and six metallic hues, all premium automotive coatings. If your pockets are deep enough, any bespoke colour is possible. A nice visual element is the soft leather upholstery of the woofer cabinet.

Inside the lower enclosure, the front-firing 12inch mid-bass woofer operates from 60Hz to 250-400Hz, depending on jumper settings. Its construction includes a non-woven carbon fibre cone, set in a cast aluminium alloy frame, and a 3in voice coil that uses a flat, copper-clad aluminium wire. Augmenting this, firing out the back and flanked by ports, is the extended throw 15in woofer to cover the spectrum below 60Hz. This employs a rigid, extra-thick anodised aluminium cone in a cast basket.

As is now the norm for high-end speakers, every single component is finished to the highest standards,

'It's so gorgeous, thanks to the classic ML "see-through" effect'



'STATICS AND SUBS

ESLs augmented by cone woofers are nothing new. Back in 1955, when Arthur Janszen released the JansZen Model 65 electrostatic speaker, its natural partner was Acoustic Research's AR1 with its 12in woofer, the compact '65 perched on top. When the Quad ESL (aka the '57) arrived, it was a full-range design, but its maximum level was restricted, as was bass output. Myriad subwoofers were attached to it, most famously the Mark Levinson HQD system with two Quads, Decca tweeters and Hartley woofers. Gradient would offer models dedicated to both that speaker, the SW-57 (which also acted as a plinth), and the SW-63 for the later ESL-63. Because they were tailored to the Quads, they worked satisfactorily out of the box. Other aftermarket subs, however well-designed, were more hit-or-miss. That said, I've heard Quads used with RELs and others which offer a useful amount of adjustability.

no rough edges, no unsightly surfaces. See one in a shop, and I suggest you look at the back to check out the single-wire or bi-amp connections made with WBT's five-way NextGen binding posts with shock protection and palladium-plated metal caps, clock the adjustable feet and scratch your head at the array of adjustment jumpers.

This last array of hardware, seen under glass in a niche on the top of the woofer cabinet, relates to 'Precision Vojtko System Blending', via the proprietary 'Vojtko Filter' crossover section. It was developed 'to handle massive amounts of power with the utmost precision.' Note that while bi-amping is possible, the crossover cannot be by-passed, so a fully active system is off the table.

The Neolith's set-up regime takes into consideration both position, *ie*, distance from walls and listener to speaker, as well as bass output. Like all ESLs it's mains powered – it can detect an audio signal, and a light shows that it is operating normally, indicating standby, power off, 'safe' and play modes. Most useful

for tailoring such large systems to one's room are the 'Low Bass' and 'Listening Distance' crossover adjustments using dual, gold-plated metal links. The former reduces bass output when adjusting for room gain, with settings of -8dB, -4dB and 0dB. The latter adjusts the front woofer output to optimise the woofer/panel integration at various listening distances, which you measure with a tape from the front of the electrostatic panel, with settings of 3m 'or less', 4m or 5m 'or greater'.

DESIGN GOALS

While the Neoliths are too ungainly to install on one's own, and set-up is intimidating (surely, the dealer should be on hand to do this), the owner's manual is comprehensive, with superb diagrams. Indeed, ML's move to a single enclosure for its new flagship, abandoning the various Statements' separate bass towers, addressed the former's extremely complex set-up and installation.

Says Devin Zell, MartinLogan Product Manager, 'MartinLogan's vision for the Neolith was a product with performance approaching the Statement E2, but with a simple set-up. Designing a system with integrated bass drivers allowed greater control over the crossover network because we were not required to make concessions for dealing with variable distances of subwoofer towers in relation to the mid- and high-frequency drivers – a challenge when attempting to blend various drivers into a seamless sonic presentation.' Chief Audio Technologist Joe Vojtko adds: 'By creating a fully passive design, we left the choice of amplification completely up to the listener. This is a very personal decision for customers dedicated to pushing the envelope of performance with products of the Neolith's calibre.'

With no specific recommendations for partnering amps, beyond suggesting





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LEFT: The frame supporting the curved electrostatic panel and housing the two moving-coil bass units is fashioned from a dense phenolic resin. Exquisitely polished, the Neolith is available in a choice of seven colours

'50-1300W at 4ohm', the review system consisted of Constellation Centaur Monos and Virgo III preamp, fed by the Metronome Kalista Ultimate [HFN Dec '13], wired throughout with Transparent's finest.

SPATIAL MAJESTY

It was obvious that, electrostatic-ness aside, this speaker was going to be about bass, about impact, about everything one *doesn't* expect of ESLs. Having lived with speakers such as MartinLogan's Summits for so long, I wasn't even remotely concerned about the chance of incongruities between 'statics and cone woofers. The company mastered this long ago.

'For What It's Worth' from Keb' Mo's *Peace... Back By Popular Demand* [Okeh/Epic EK92687] and the Willy DeVille CD single 'Assassin Of Love' [Polydor 887 312-2] provided ample test material for impact, bass extension and scale. And I have to admit that I wasn't prepared for the delivery of a speaker that must have, what? six times the radiating surface area of the slim floorstanding Summits?

Those among you who have lived with both dynamic and planar speakers are in for a treat: if you came upon these blindfolded, you'd be hard pressed to guess the nature of their driver technology. This speaker is a perfect example of a hybrid system that simply works. True, the bass is clearly *not* available from any ESL I can name, short of a wall full of Acoustats, so names like 'Magico' and 'ATC' and 'Wilson' might pop into your head. But then the sheer openness, airiness and sense of

freedom tells you that you are not listening to a box, however rigid and well-designed. With 'Assassin Of Love' [Polydor 887 312-2], the images floated so far outside and above the Neoliths that I was reminded in spades of the argument presented by those who insist that two perfectly resolved channels are enough even for material offered in surround. There was so much depth to the Neolith's soundstage that one could clearly discern layers in the song's instrumentation. I have no idea if that's how it's supposed to be; the track is, after all, a studio creation. But heard at this level of resolution such spatial majesty merely seems 'right'.

As it's all too easy to be both impressed and distracted by a soundstage of such precise image placement and acreage, I had to revert to mono in order to focus more on the tonal balance, neutrality and other qualities unrelated to spatial concerns. Tennessee Ernie Ford's 'Sixteen Tons' may be mono, but it was recorded on Capitol in the

1950s, which means that the sound is so realistic as to defy the 61 years since it was released... and its single channel status.

Oh, mama! Within a bar or two, any thoughts of 'missing stereo' simply vanished. It was big and room-filling and, thanks to the vocals, resonant, rich and unfettered by artifice. Here we have a recording that tested the Neolith's neutrality, the inimitable clarinet and Ford's relentless finger-snapping enjoyed in-the-room palpability recalling Apogee's Scintilla [HFN Sep '85], while the forcefulness and

'It's a perfect example of a hybrid system that works'

JOE VOJTKO

Joe Vojtko, Chief Audio Technologist, and Devin Zell, MartinLogan Product Manager, explained the Neolith's role in the evolution of MartinLogan's high-end models, and its likely trickle-down benefits.

'The Neolith is the flagship for our next generation of electrostatic speakers, called the Masterpiece Series. Elements and philosophies from the Neolith that will be seen in future models include crossover and mounting technologies, bass and mid-bass level controls and the resulting ability to tweak voicing. Better understanding the speakers' relationship to the room allows us to adjust for the unique characteristics of different listening environments and seating positions.'

They also cite as benefits, regarding both the electrostatic component and the totally revised approach to the woofer section, 'massively improved bass dynamics, output and blending. Not to mention a return to extremely large planar transducers and their unique ability to create richly detailed and expansive soundstages.'

Ultimately, such research is costly, but, they add, 'Regardless of whether or not specific technologies trickle down to other models in the line, the Neolith's performance philosophy establishes a sonic performance benchmark. The Neolith is a *tour-de-force* of the sonic qualities we sought to bring to our new Masterpiece Series. Without pushing the envelope of performance, there's was no way to know how far we could take everything that will follow.'





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Technical Information

- Dual-mono stereo integrated amplifier
- Single-ended parallel Class A design
- 6 x 6550 valves (three per-channel)
- 2 x ECC82 valves (one per-channel)
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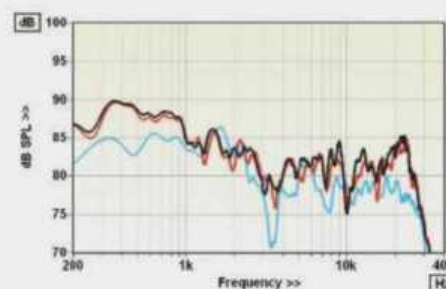
LAB REPORT

MARTINLOGAN NEOLITH

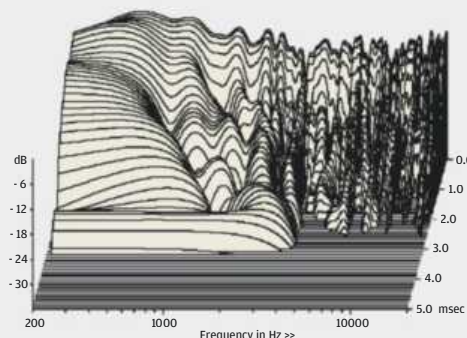
MartinLogan claims 90dB sensitivity for the Neolith but our measurements showed this to be approached only below 1kHz, the pink noise and 'music' figures suggesting that 84/85dB is more realistic. MartinLogan also rates the Neolith at 4ohm nominal but says the impedance drops to a scary 0.43ohm at 20kHz. We measured a minimum of 1.8ohm at 11.7kHz but the combination of low modulus and high phase angle in the upper treble drops the minimum EPDR (equivalent peak dissipation resistance) to 0.6ohm at 10.3kHz, although the dips to 1.1ohm at 113Hz and 1.3ohm at 50Hz are arguably more significant.

As usual, on-axis response measurements – taken on the central axis of the panel and with the 'distance control' set to 3m – were made at 1m distance [black/red traces, Graph 1] but another was made at 2m with the second speaker [blue trace], to see how the response changes out towards more realistic listening distances. With the 'bass setting' at 0dB, all three traces indicate that treble output is significantly shelved down, resulting in high response errors of ± 7.4 dB and ± 7.0 dB respectively (1m, 200Hz–20kHz). The pair matching error of ± 2.9 dB is also high, although the severest disparities occur over narrow frequency bands.

Nearfield measurement of bass response was stymied by not being able to place the microphone sufficiently close to the front-firing bass driver due to its fixed grille. But the measured port tuning frequency of 25Hz suggests the specified 23Hz for ± 3 dB response limits is realistic. Nearfield measurement of THD at 1kHz and 10kHz from the Neolith's large electrostatic panel also gave unrepresentative results. KH



ABOVE: Forward response is notably shelved-down below 1kHz, even at 2m distance [blue trace]



ABOVE: Highly complex panel modes are indicated in this cumulative decay and the response plots [above]

HI-FI NEWS SPECIFICATIONS

Sensitivity (SPL/1m/2.83Vrms – Mean/IEC/Music)	82.0dB/85.1dB/84.0dB
Impedance modulus min/max (20Hz–20kHz)	1.8ohm @ 11.7kHz 16.7ohm @ 2.1kHz
Impedance phase min/max (20Hz–20kHz)	–76° @ 6.7kHz 44° @ 1.5kHz
Pair matching/Response Error (200Hz–20kHz)	± 2.9 dB / ± 7.4 dB/ ± 7.0 dB
LF/HF extension (–6dB re. 200Hz/10kHz)	see text/30.7kHz/31.1kHz
THD 100Hz/1kHz/10kHz (for 90dB SPL/1m)	0.2% / see text
Dimensions (HWD)	1899x769x870mm

LEFT: A 15in aluminium-coned, reflex-loaded subwoofer operates below 60Hz with a '0dB, –4dB and –8dB bass control'. The five-way bi-wire terminals are silver/palladium types from WBT

offer, intimate and subtle and perfect for the massed-but-delicate backing vocals. At the same time, however, it established a 'wall of sound' of such grandeur that I could only think of an analogy by citing its opposite: watching an epic film on an iPad.

Having come to grips with this blessed contradiction, vocal tracks followed in quick succession.

Howard Tate's 'How Blue Can You Get' and 'Everyday I Have The Blues' stretched the Neoliths

because of both his range and the funk factor of his arrangements. A classic

1960s-sounding stereo effort [Verve], it was a case of an open window into a recording that excels for the performance rather than the sonic merit. The Neolith forces the listener to ignore rather than fret about any failings.

By the time I reached Dean Martin's 'That's Amore' [Disky BM 871522], his delivery as relaxed as Tate's was intense, I realised that the Neolith isn't merely the best speaker yet to issue from MartinLogan: it's one of the most satisfying large systems I've heard since experiencing the Alexandria prototypes in Dave Wilson's listening room. ☺

HI-FI NEWS VERDICT

Allowing for my bias as a long-term 'Logan user, and lover of ESLs in general, the Neolith changes one paradigm completely: it is the first ESL – hybrid or otherwise – I have heard that gives away nothing in terms of dynamics and power to box-type systems. It does this while retaining all the glories of electrostatics including clarity, transparency, openness, speed and delicacy. Its stunning looks? A welcome bonus.

Sound Quality: 90%

0 - - - - - 100



solidity approached that of Wilson's XLF [HFN Oct '12].

I cannot imagine how many times I have heard Lou Rawls' 'At Last' [At Last; Blue Note CDP 7 91937 2], and yet here I was uncovering some low-level information that had previously eluded me – subtle harmonics, a vocal tic, the hint of a quiver from Ms Reeves' impressive pipes.

A WALL OF SOUND

Apart from the seamless matching between panel and woofers, this level of detail and surgical precision from so large a system seemed at odds with the need to be a room filler. It's not that the two are incompatible, but something Pavlovian suggests that one uses large systems for scale, impact and majesty, and small speakers like LS3/5As for forensic listening.

With Big Daddy's 'With A Little Help From My Friends' [Rhino OGL83001-2], for example, the system portrayed this Johnny Mathis pastiche with all the silkiness it can

Leema Acoustics Elements Pre-Amplifier/Monoblocks

With its entry-level Elements range, Welsh-based Leema Acoustics is challenging some well-established rivals. Has it got what it takes to stand out from the flock?

Review: **James Parker** Lab: **Paul Miller**

Without a doubt, British company Leema Acoustics hit the ground running. Having been established in 1998 as a speaker manufacturer, it launched its first electronics in 2006 in the form of the Tucana integrated amp [*HFN* Sep '06], and promptly picked up the *Hi-Fi News Award* for amplifier of the year. Since then the company has expanded its portfolio to include not only a revived version of its original Xen loudspeaker [see boxout, facing page], but also three complete electronics ranges, of which the Elements line-up represented here is, as the name suggests, the entry-level offering.

MATCHING THE TREND

The Elements Pre-Amplifier, complete with built-in digital-to-analogue conversion, is £1395, while the Elements Power Amplifiers, usable either in stereo or – as here – as bridged monoblocks, are also £1395 apiece. In their distinctive 22cm-wide casework, it's hard not to view the Elements models as Cyrus-chasers, but in fact they're indicative of a wider trend in hi-fi components these days. Given the ever-more-compact living forced on many by rising property prices, some companies are exploring just what can be done with hi-fi components which are not much bigger than those in mini-systems, able to be used without taking up an entire wall with a rack of 'full-size' separates.

Handbuilt in Leema's own factory, the Elements products immediately impress with the solidity and quality of their design and construction. The preamp and power amps here may look relatively simple, but they're beautifully put together. And though it's small, the Pre-Amplifier packs

in considerable flexibility, with five digital inputs – three optical, one coaxial and an asynchronous USB – and four analogue inputs. Three of these are on RCA pairs, and the fourth uses balanced XLR connectors. Outputs are on both RCAs and XLRs, and the preamp follows current fashion by also having a 3.5mm line input on the front panel, allowing convenient hook-up for portable devices, as well as a headphone output driven by its own amplification. Completing the connectivity is a pair of rear-panel sockets for the company's proprietary LIPS remote control system, allowing an entire Leema set-up to be governed from the remote handset which is supplied with the preamplifier.

The onboard DAC is slightly unusual at a time where so many manufacturers of digital equipment seem to be engaged in

an arms race of ever higher sampling rates and multiples of DSD operation: it's limited to 192kHz/24-bit across all its digital inputs – yes, even the asynchronous USB.

BRIDGEABLE TO MONO

That said, and present company excepted, not many will have files much beyond this, so for the majority of users the Element's digital capability will be more than adequate. Also a little unusual is the control interface on the preamp, with a single knob looking after both volume and input selection. Press it, and you go into input mode... press again and you're back to volume, though as we found when we began to use the system, even this isn't entirely conventional.

The Leema Elements Stereo/Monoblock Power Amplifier, to give it its full

'It combines plenty of dynamic ability with a cultured balance'

RIGHT: Separate linear PSUs feed the Element's digital and analogue circuits, the former based on a Thesycon USB solution with a digitally-governed volume control from Texas Instruments





LEFT: The preamp is kept simple by the use of a single control for both volume and input selection. White on blue displays are basic, but do the job, and it's possible to delegate volume control from the preamp to the power amps


somewhat smarter than your conventional bridgeable stereo power amp.

Firing up the Leema combination requires a little more 'check and recheck' than is usual with most pre/power duos of this kind, thanks to the sheer variety of settings available on the power amp. Having tried a variety of configurations, including a brief run with just one power amp, just to see what it could do in stereo, I ended up with the mono'd amps set to run in 'slave' mode, whereby the volume is – unusually – controlled within the power amps, driven by the preamp's control via the LIPS system.

DISTINCTIVE CHARACTER

What's immediately striking about the Leema trio is its defiance of the 'small box, small sound' stereotype, its presentation combining plenty of dynamic ability and a smooth, cultured balance, trading a little sheer impact for total ease of listening. It may lack the stump-pulling 'oomph' of the similarly-arranged, albeit rather heftier, PS Audio monoblocks [see p58] used in concert with the company's Direct Stream Junior DAC/digital preamp [HFN Jun '16] – but then the Leema package is a fraction of the price of its American rival.

What quickly became noticeable, even during initial experimentation with various sources, was that though the digital section in the Pre-Amplifier is respectable enough, it gives away some definition and punch to the analogue inputs. Connecting other sources to the analogue inputs, including my usual Mac mini fed though a Chord Mojo [HFN Jan '16], revealed better drive and space in the sound compared to the lushness of the Leema Pre connected straight to the computer via its USB input.

Used as an analogue preamp, then, the Leema Pre conspires with the compact but powerful power amps to deliver a sound that's still warm and full, but with a bit more pep and vigour. Use the preamp's internal DAC, however, and the overall warmth and treble softness here is compounded to the point where it all becomes a bit more 'llawn cymeriad' [characterful], as they no doubt say in Welshpool, where the amps are made. There is a distinctive character to the sound although some will find this rich smoothness highly appealing. 

designation, is at heart a stereo power amplifier bridgeable to mono working, delivering a quoted 55W per channel in stereo, and 210W/8ohm in mono, with Leema claiming maximum outputs of 160W/2ohm in stereo, or 365W/4ohm as a monoblock [see PM's Lab Report, p41].

However, the way it operates is somewhat unusual. Sure enough, there's a simple mono/stereo switch, sunk into the rear panel to avoid optional activation, and thus requiring the use of an straightened paperclip – or, as Leema rather cosily suggests, a cocktail stick – but using that

LIPS remote system also allows a variety of other operation modes.

Specifically, the power amplifier has variable gain built-in, and can thus be configured to do its own volume adjustment, and can also be designated as the left or right channel amplifier in a LIPS system. It has daisychain outputs for another power amplifier – on RCAs only, whereas the main inputs are on both RCAs and XLRs – and can even be set with a 6dB level reduction when in mono mode, to match the gain if paired with other Elements amps running in stereo. It's

LEEMA'S LINEAGE

Leema's Elements range, like all of the company's products, is made in the company's manufacturing facility in Wales. Founded by ex-BBC engineers Lee Taylor and Mallory Nicholls, with the intention of pushing the limits of the compact speakers so favoured by the corporation for monitoring, it joined forces some ten years ago with a manufacturer of agro-electronics, Davlec, at the time best known for equipment for dairies but diversified into automotive products. The two companies still share premises and production in Welshpool, Davlec having fully acquired Leema a couple of years back, freeing the founders to spend more time on R&D rather than the day-to-day operations. Under this new regime, Leema's designers have gone back to their roots, re-visiting their first product, the Xen speaker, to create a £1295 model with steel cabinetry, and claiming a modest 85dB/1W sensitivity from an enclosure of just five litres.

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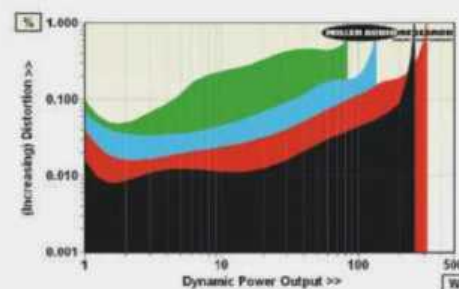
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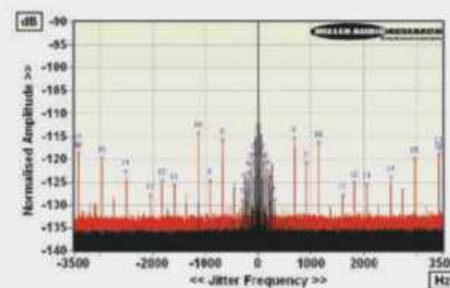
LEEMA ELEMENTS PRE/POWER

Based on NXP Semiconductors Class D (switching) amp modules [see *HFN* Oct '12], Leema's Elements Monoblock just delivers its rated 210W/8ohm in bridged mono mode. Into 4ohm it offers 285W while, under dynamic conditions, there's enough headroom to service peaks of 255W and 320W into 8 and 4ohm, falling to 140W and 80W (or 8.9A) into tougher 2 and 1ohm loads [see Graph 1, below]. There are some analogue Class D foibles here too: distortion rises quickly with frequency from <0.01% through bass and midrange to 0.12%/20kHz while the A-wtd S/N ratio is a little below average at 79dB (re. 0dBW). Also its frequency response is very speaker-dependent thanks to an output impedance which climbs from 0.1ohm through bass and mid to 4.5ohm/20kHz and 17ohm/60kHz. The response varies from -1dB/20kHz into 8ohm to -1.5dB/10kHz and -4dB/20kHz into 4ohm and -8.9dB/20kHz into 2ohm, so it'll lose sparkle into declining, sub-8ohm speaker loads.

The partnering Elements Pre-Amplifier is more impressively 'transparent' in its analogue guise, offering a full 94dB A-wtd S/N ratio, a wide 1Hz-100kHz response (-0.7dB) and very low 0.00008-0.00075% distortion (20Hz-20kHz, 0dBV). The S/N via USB and S/PDIF inputs is only marginally better at 96.6dB and 98.1dB – about 10dB shy of what's typical – while THD holds to around 0.003-0.004% from 20Hz-20kHz over the top 25dB of the DAC's dynamic range (volume set to '164' or 4.0V from the balanced XLR outs). Jitter is low at <200psec [see Graph 2] while the minimum phase digital filter boasts little pre-ringing, albeit with a limited 41dB stopband rejection, and an additional roll-off with 96/192kHz media of -3.0dB/45kHz and -17dB/90kHz, respectively. PM



ABOVE: Dynamic power output versus distortion into 8ohm (black trace), 4ohm (red), 2ohm (blue) and 1ohm (green). Maximum current is just 8.9A



ABOVE: High res. jitter spectra with 48kHz/24-bit data over S/PDIF (black) and USB (red, with markers)

HI-FI NEWS SPECIFICATIONS

Power output (<1% THD, 8/4ohm)	210W / 285W
Dynamic power (<1% THD, 8/4/2/1ohm)	255W / 320W / 140W / 80W
Output imp. (20Hz-20kHz, pre/power)	46-61ohm / 0.11-4.7ohm
Freq. resp. (20Hz-20kHz, pre/power)	+0.0 to -0.0dB/-0.10 to -0.9dB
A-wtd S/N ratio (pre/DAC/power)	94.3dB / 98.1dB / 78.8dB (0dBW)
Dist. (20Hz-20kHz, pre (DAC)/power)	0.003-0.004% / 0.0065-0.12%
Digital jitter (S/PDIF / USB)	170psec / 200psec
Power consumption (pre/power)	7W/255W (12W idle, each)
Dimensions (WHD) / Weight	220x88x340mm (each) / 7 & 11kg



LEFT: Balanced XLR outs on the pre (top) are matched by XLR ins on the power amp(s), the former also offering XLR and three RCA ins, USB and S/PDIF digital ins (three optical, one coax). BFA 'short-proof' speaker outlets and LIPS connections complete the package

As PM's lab report here makes clear, much of this noticeable sonic 'footprint' comes from the power amplifiers, their raised treble output impedance changing the system response depending on your choice of speakers, so caution must be exercised in this respect (I used my trusty pair of PMC OB1s). All that said, the Leema combination offers a presentation that's able to 'deliver' when it comes to ease of listening but rather lacking in all-out detail, especially when it comes to the spatial information that helps a system describe the recorded ambience of a performance.

CLOSE ATMOSPHERE

As a result, recordings made in a very obvious acoustic, such as the classic collaboration between Ry Cooder and VM Bhatt, *A Meeting By The River* [Water Lily Acoustics WLA-CS-29-CD] are pleasant enough, but lack the sheer instrumental bite and timbral depth available with other amplification. Listen via the Leema Elements, and you might just wonder what all the fuss was about. The instruments – Cooder's guitar and Bhatt's mohan vina – sound distinctive enough, but a little of the detail of finger and slide on string has gone AWOL, and the resonances of Bhatt's instrument are somewhat diminished, as is the sense of air around the two musicians.

Similarly with Circles Around The Sun's *Interludes For The Dead* [Rhino R2 55237], the tight interplay between the musicians is slightly diminished by the combination of low-end warmth and top-end softness. 'Gilbert's Groove' could do with a bit more punch and impact in the rhythm section than the Leema combo seemed able to deliver,

with Mark Levy's cymbals sounding particularly splashy and undefined.

The Leema Elements are on safer ground with classical recordings, though even here there's a lack of air in the sound at times, with church recordings in particular suffering from the overall warmth. Yes, orchestras sound rich and full, and there's a sweetness to the voices of the St Albans Cathedral choirs on, for example, the recent Naxos release of Rutter's *Psalmfest* [8.573394], but the sense of the cathedral space around the performers is somewhat suppressed by the lack of high-frequency openness the amps are able to muster.

There's nothing wrong with the way the performances sound, and the articulate presentations make what's being sung clear – at least until the orchestra comes in full-force – but it's possible for this recording, combining as it does highly-trained voices and Rutter's characteristically romantic orchestrations, to sound rather more joyously atmospheric. ☺

HI-FI NEWS VERDICT

In many ways, this Leema combo is the polar opposite of its most obvious rival, the Cyrus 'shoebox' range. A long, hard audition with the speakers you're intending to use is mandatory in order to discover whether the character of these amps, compounded by their speaker-sensitivity, is to your taste. Some will enjoy the Leemas' smooth, slightly soft sound; others will find the lack of treble sparkle a deal-breaker.

Sound Quality: 77%



Ayre Codex

Inspired by Ayre's development of Neil Young's PonoPlayer but with technology distilled directly from its QB-9 DSD DAC, does the Codex offer the best of both worlds?
 Review: **Steve Harris** Lab: **Paul Miller**

With the boom in headphone listening, headphone amplifiers have proliferated, and this once-simple product category has become a spectrum that runs from the most basic types through to complex units that are really complete 'digital' preamplifiers. Not aspiring to be the latter, but offering carefully-chosen features and claiming high sonic standards, is the £1495 Ayre Codex DAC/headphone amp/preamp reviewed here.

This is not a portable product, although it shares a DAC chip and some design DNA with the largely Ayre-designed PonoPlayer [see boxout, facing page]. It's a home-audio item that could find a role in many different kinds of system, and for headphone listening from computer sources, of course, it's all you need. As a DAC, the Codex offers an asynchronous-mode USB input to accept high-res sources up to 384kHz/32-bit, as well as DSD64 and DSD128, plus a Toslink optical input for S/PDIF sources.

BALANCED HEADPHONES

While it's the USB that's of primary interest to hi-fi enthusiasts, the optical connection makes the Codex readily usable with video systems and with Sonos multi-room systems, for example, as well as Toslink-equipped CD players. As Ayre points out, 'while Toslink is not super-low jitter, it provides absolutely perfect isolation from all the [electrical] noise on a video system'.

As a headphone amplifier, the Codex caters for one listener plugging in to a ¼in (6.35mm) jack or two listeners using 3.5mm jacks. Alternatively, the two 3.5mm jacks can be used for the left and right channels of balanced headphones, as per the Pono standard.

Externally, the compact, vertical-format Codex is plain and simple, though solidly built, with its shaped metal front fascia plate. Its front panel layout is minimalist,

because above the headphone jacks there is just a very basic display panel that shows three dot-matrix LED characters or numbers, and an unlabelled volume control. But this simplicity belies the product's versatility, because the volume knob doubles as a push switch to enable the set-up menu functions.

At the back are the USB and optical digital inputs, along with the balanced (XLR) and unbalanced (RCA phono) analogue output connections. These can be run as fixed-level outputs to feed a preamp, or as variable level outputs using the Codex's volume control, when connected direct to a power amplifier or to speakers with built-in amplification. The Codex doesn't provide an electrical (coaxial) digital input, nor does it provide analogue inputs.

Inside, the Codex boasts much of the technology that Ayre has developed in its bigger and more expensive product lines. Drawn, ultimately, from Ayre's long-established high-end QB-9 DAC [*HFN* Jan '15], the Codex also uses a minimum-phase digital filter with single-stage 16x

oversampling. In the analogue section, it uses the fully balanced and all-discrete 'Diamond' output circuit that's also a feature of the Ayre KX-R Twenty and KX-5 Twenty preamps. This is a 'zero-feedback' design, that description typically meaning that overall negative feedback is not used, as there must be feedback around individual stages. Either way, with all this packed into a small space, the Codex does run quite hot.

EASY SET-UP

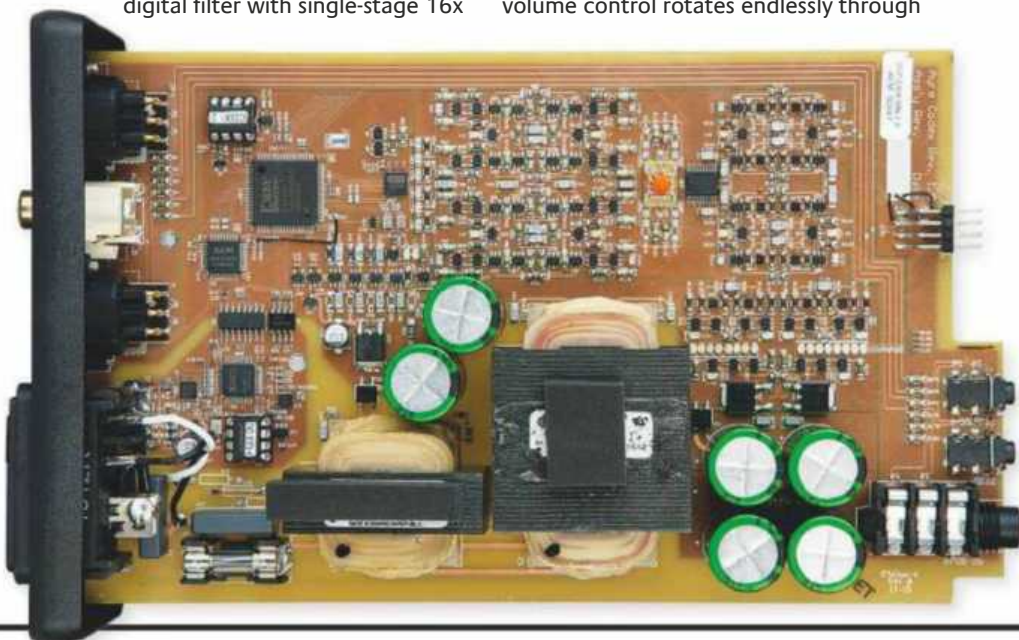
Setting-up and using the Codex proved extremely simple, and in fact it was happily playing music

before I'd even glanced at the owner's manual or understood the menu.

As usual with USB products, if using a Windows computer you will need to install a driver from the supplied CD-ROM or downloaded from the Ayre website. With a Mac once you've connected the Codex, you have only to go to System Preferences/Sound, and select the option 'Ayre USB Interface' which automatically shows there.

Operating in the digital domain, the volume control rotates endlessly through

'I was bowled over by the majestic sound of the orchestra'



RIGHT: X MOS-based USB input is separate from the Toslink optical though both use the ESS9018 DAC chip (as does the Pono). Note plentiful SMDs in balanced analogue output



LEFT: Push button/rotary encoder acts as volume control and selector for input and fixed (DAC)/variable output modes. Single-ended and balanced headphone outs are on 6.35mm and two 3.5mm sockets

control takes you into the set-up menu where the rotary then lets you scroll through the options. Press again to select the choice that's displayed and exit the menu.

The 'Input Selection' menu, obviously enough, gives you the choice of USB or Toslink (displayed as 'OPT') while 'Output Mode' options are 'Pre' if you want to use the volume control and 'DAC' for fixed-level output via the XLRs or RCAs. When in DAC mode, inserting any headphone plug will mute the analogue outputs and temporarily activate the volume control, starting with a moderate preset level of '66'. Remove the headphones and the DAC mode is restored. If in Pre mode, connecting headphones will not mute the rear-panel outputs, but the volume will automatically reduce to '66' if it was set higher before, thus avoiding a blast to the ears.

Whenever two 3.5mm headphone plugs are inserted, the Codex will ask you to select between two-user mode and single-user balanced mode. Another menu option offers the choice of three levels of 'Display

Brightness', or 'Off', where only a decimal point remains lit to show that the unit is on, but volume or sample rate changes will still be displayed for three seconds.

POIGNANT PERFORMER

Before putting on Oppo PM-1 headphones [HFN Jul '14], I listened at length to the Codex as a USB DAC, connected to amplifier and speakers via its analogue outputs through my Classé/Dali system. And although the Codex produced attractive, silky-smooth results with CD-quality material, it really came into its own with hi-res files.

With the gorgeous 'Lucia' by Marta Gomez from her album *Entre Cada Palabra* [96kHz/24-bit, Chesky JD301] the sound that floated out via the Codex was caressing and beguiling indeed. The singer's voice had an unforced naturalness while the band members seemed at one with her, the understated percussion remaining in the background yet contributing a vital gentle swing, and the accordion solo complementing her vocal sound more perfectly than ever, with a truly embracing quality.

Listening to a 192kHz recording of Rachmaninov's *Symphonic Dances* engineered by Tony Faulkner, I found myself bowled over by the majestic sound of the orchestra at the opening. Later, in the quieter middle section of the first dance, the interweaving of woodwind parts seemed almost unbearably poignant. Here was a sound full of life and detail, with a superb naturalness to the instrumental timbres and an unforced, organic depth and spread of stereo image.

On another Faulkner recording, Dvořák's 'New World' symphony at 176.4kHz, the orchestra again sounded very fine, from the dramatic impact of the timpani to the swirling strings and woodwinds. The full-bodied brass was particularly good too, powerful, precise but never sharp or harsh.

And with Tim Hugh's recording of the Kodály solo Cello Sonata [88kHz/24-bit, Naim Label naimcd118], I found myself gripped and drawn into the music in a way that I hadn't really experienced before with this recording. The sound of the cello was at once natural and satisfying, the euphonious Wigmore Hall presentation arguably a little larger than life in the context of my home listening room, but no worse for that.

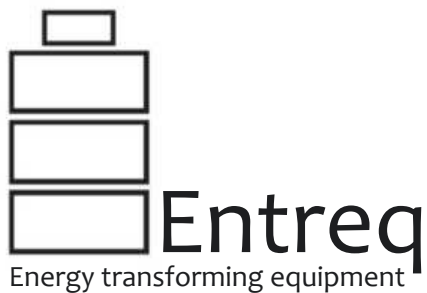
Used as a DAC for disc replay via Toslink, the Codex still had a distinctively pleasing way with the music. On the atmospheric CD *Antonio Forcione Live* [Naim Label; naimcd054] the sound via the Codex was

a range of 100dB in 1dB steps, and claims full resolution throughout this range. The display indicates the volume setting, 0-100, for three seconds after a change is made, before reverting back to the sample rate.

A brief press on the volume knob will mute the output, and this is confirmed by the display flashing. Another brief press un-mutes. However, a longer press on the

ONCE A PONO TIME...

You can't blame Ayre for trumpeting its involvement in such a high-profile project as Neil Young's PonoPlayer. As Charles Hansen told an interviewer, 'He was looking around for companies to work with and our name got tossed into the hat. We sent him one of our DACs to audition, and he said, "Yes, that's it. That's what the Pono sounds like. Get those guys to design the audio circuit".' Ayre was not given much time, and with the PonoPlayer's launch scheduled for the SXSW music and film festival in March 2014, working prototypes were delivered in just weeks. But as Hansen says, behind every overnight success there are years of hard work, including in this case figuring out who makes the best-sounding components. The ESS ES9018 DAC was an automatic choice, and was allied with Ayre's usual 'zero feedback' approach for the analogue stages. But in the process of working on 'a product with miniature scale and very tight pricing restrictions', Ayre learned a lot about optimising performance within those constraints, and some of that experience has clearly fed into the Codex.



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DAC/HEADPHONE PREAMP



ABOVE: S/PDIF optical input plays second-fiddle to the 384kHz/DSD128-compatible USB input. Fixed and variable analogue outputs offered on RCAs and balanced XLRs

full of rich sonorities in the lush and ringing tones that the guitarist brings forth with his effects pedals, and at the same time conveying the natural attack of the plucked strings. The applause was convincing too.

With a well-finished studio album like Eric Bibb's *Get Onboard* [Telarc CD-83675] the sound was still quite clean and full. On a big-production number like the opening 'Spirit I Am', there was a sense of clarity and separation between instruments, and in this case it was easy to hear past the upfront electric guitar, the lead vocal and the big firm bass, right into a background that's populated by various vocal and guitar interjections.

ON THE EDGE

Yet this was a sound with a slightly softened quality, majoring on coherence rather than fine detail. For example, 'First We Take Manhattan' from Jennifer Warnes' *Famous Blue Raincoat* [RTHCD 5052] had a nice relaxed feel, a wide stereo stage and a welcome sense of space in the recording, but some listeners would have wanted more drive and attack.

With the comfortable Oppo PM-1 headphones, it was easy to spend time listening to old favourites ripped from CD and played via my Mac. With Art Pepper's 'You'd Be So Nice To Come Home To' [Art Pepper Meets The Rhythm Section; Contemporary Records 0888072319929] it was great to hear the comprehensively round-the-kit explosions of Philly Joe's drums as he trades fours with Pepper. And with the Codex, it was somehow

particularly easy to hear how, while the drummer was totally in control, the saxophonist was on the edge, just making it every time.

Returning to high-res material, I could find plenty of detail to focus on. In 'The Wind Song' from Patricia Barber's album *Smash* [Concord Jazz 0888072336766], for example, there was that mysterious, faintly-heard cry in the background at the end of the first verse. Later came the subtleties of cymbal sounds and the guitar that creeps in quietly behind the hypnotic piano chords before the bass breaks out centre-stage.

Of course, if your preference is for a sharp, punchy and hyper-detailed sound, you would possibly not choose to put the gentle-sounding Oppos with a headphone amplifier that trends the same way. And yet, with the vast majority of material, the Codex/Oppo combination was consistently enjoyable, well-balanced and airy. ☺

HI-FI NEWS VERDICT

Compact yet heavier than you'd expect, the clever Codex puts sonic performance first, with balanced line and headphone outputs. On the other hand, it comes with a far from luxurious user interface, and with only USB and Toslink inputs it can't replace the preamp in a multi-source system. But for the money, Ayre has succeeded in offering a much more than adequate headphone amp and a truly excellent DAC.

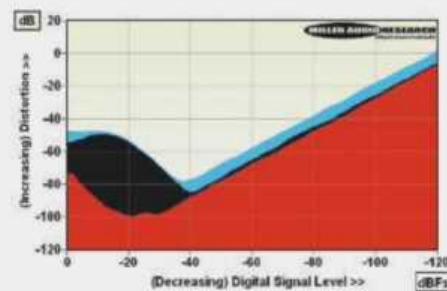
Sound Quality: 84%



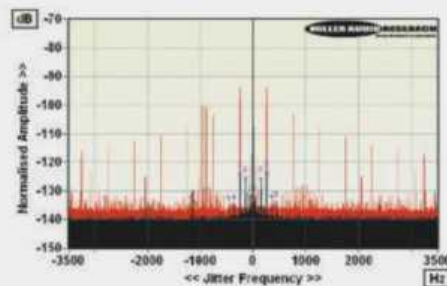
AYRE CODEX

This is a rare example of a DAC that performs better via USB than S/PDIF, as illustrated by the respective 50psec versus 1265psec jitter figures [see Graph 2, below]. Furthermore while both USB and optical inputs both pass through the same minimum phase digital filter (benefiting from almost no pre-ringing but offering limited stopband suppression), the response of the optical input is limited to -2.3dB/20kHz and -20dB/30kHz with 96kHz media. Via USB, compatible with 384kHz/24-bit and DSD128, the decoded frequency response stretches out to -2.1dB/20kHz (48kHz files), -4.4dB/45kHz (96kHz files) and -6.1dB/90kHz (192kHz files). With either digital input, the fixed (DAC mode) output reaches 4V from a 76ohm source impedance and offers a 108.5dB S/N ratio. Ayre employs limited compensation (feedback) in the Codex's analogue stage and so distortion is a moderate 0.01-0.03% at this maximum output, falling to a minimum of 0.003% over the top 20-30dB of its dynamic range [red trace, Graph 1 below].

Via the separate headphone output, the maximum 3.5V unbalanced output achieves a modest 431mW into 25ohm at 0.21% distortion and an A-wtd S/N of 111dB (100dB re. 0dBV). The ~4ohm source impedance represents a loss of ~1dB into our standard 25ohm headphone load with distortion increasing slightly to 0.35% at a reduced 60mW output [see black trace, Graph 1] but the frequency response holds true to that reported for USB, above. Readers are invited to view comprehensive QC Suite test reports for the analogue and digital performance of Ayre's Codex headphone preamp and DAC, when available, by navigating to www.hifinews.co.uk and clicking on the red 'download' button. PM



ABOVE: Distortion versus 48kHz/24-bit digital signal level over a 120dB dynamic range (DAC out 1kHz, red; headphone out 1kHz, black; 20kHz, blue)



ABOVE: High res. jitter spectra with 48kHz/24-bit data over S/PDIF (red) and USB (black, with markers)

HI-FI NEWS SPECIFICATIONS

Maximum output (re. 1% THD into 47kohm)	4.00V (DAC mode via XLRs)
Max. power output (re. 1% THD into 25ohm)	431mW
Output Imp. (20Hz-20kHz, DAC/headphone)	76ohm / 3.6-4.0ohm
A-wtd S/N ratio (re. 0dBV/ S/PDIF / USB)	100.1dB / 108.5dB/108.5dB
Frequency response (20Hz-20kHz/25ohm)	+0.06dB to -2.08dB
Distortion (20Hz-20kHz, re. 10mW)	0.32-0.40%
Digital jitter (S/PDIF / USB)	1265psec / 50psec
Power consumption	13W (1W standby)
Dimensions (WHD) / Weight	55x137x230mm / 1.4kg

T+A G 2000 R

T+A's new turntable may look simple on the outside, but has hidden depths. It comes as a package with two arm and cartridge choices, plus optional internal phono stage
 Review: **Adam Smith** Lab: **Paul Miller**

Turntables have arrived with many surprising features over the years, but the new G 2000 R from the German company T+A, introduces a new one, for on its rear panel are two RJ45 sockets, which are most commonly used for Ethernet connections! But I was rather pleased to discover the G 2000 R is not the latest intelligent addition to the burgeoning 'Internet of Things'. Rather, these sockets are for connection to a T+A amplifier's R2-LINK remote control system.

That is not to say that the G 2000 R is just another plain turntable – far from it. Indeed, this new addition to the company's R-Series line-up offers a surprising number of possible configurations. In its most basic form, the deck comes complete with a Rega RB251-based arm and retails for £3187. An Ortofon 2M Bronze MM cartridge can be added to this for a total of £3432 (representing a £30 saving over buying the cartridge separately).

INTEGRAL PHONO PREAMP

The 'high-end' variant under review here was supplied with a Clearaudio-sourced 'Carbon 2' tonearm for £3767. As before, a cartridge can be added and this is also a Clearaudio-based design, designated the MC-2, and bringing the total to £4719.

The deck may also be pre-fitted with either an integral MM or MC phono preamplifier, which adds a further £524 to the price. Both offer an impressive array of gain and loading adjustments [see boxout – facing page].

The turntable itself is built into a sturdy MDF base that's covered in a sleek black or silver aluminium skin bonded directly to the inner structure. The aluminium is also a 'sandwich' construction, which is claimed by T+A to greatly absorb and suppress vibration and resonances. In addition, the plinth sits on four special shock-absorbing feet but these are not adjustable and so

care needs to be taken that the supporting surface is stable and level.

The diecast aluminium platter, which is topped-off by a thick silicone rubber mat, weighs in at 3.8kg and this is belt-driven via a zinc inner platter. The motor is a quartz-controlled AC-synchronous type that's further improved by a DSP-based control circuit of T+A's own design. This fine-tunes the voltage delivered to the motor coils for as smooth a ride as possible – even during start-up, when the motor torque is carefully controlled as it builds up speed. As you might expect, speed change is electronic and set by front panel buttons.

While the company's claim that the resultant wow and flutter is 'no longer measurable' might seem a little optimistic, PM's Lab Report [p47] certainly suggests that the system works very well indeed. An additional bonus is that the deck is relatively immune to voltage and frequency fluctuations on the mains supply. Meanwhile, and as I've mentioned,

while this model's arm is sourced from Clearaudio a special variant is used for the G 2000 R – there's a definite resemblance to the Satisfy model but the arm-rest and cueing outrigger are different and more magnets are used on the anti-skating system. The arm still uses a woven carbon fibre tube, however, and the simple but effective angled cartridge mounting platform is retained.

The 'MC-2' pick-up itself bears more than a passing resemblance to Clearaudio's Essence MC. The two share a micro-line stylus, 8g overall mass and a 2g recommended tracking weight, although the MC-2's output of 0.75mV is substantially greater than the 0.4mV quoted for the Essence. Once again this proves that the differences amount to more than just a T+A logo on the front!

Naturally, a lid is provided to round off the package but this simple item locates over the turntable spindle and extends to cover the arm. There's a clever touch in



RIGHT: The G 2000 R is available in both black and silver finishes. Further options include a 700g record weight and a magnificently retro brass and horse-hair record cleaning brush!



the location spigot to the right of the arm, which means the lid is held still and cannot move even if you accidentally start the platter with it in place.

Finally, two optional extras are available at £210 each: the 700g AG-10 record clamp and a wonderful nod to vinyl's heyday in the form of a record-cleaning 'dust bug'. This item, called the PB-10, features a brass stand and horsehair brush to scoop-up dust from the record during play!

Phono output sockets and a grounding post are to be found on the rear panel, along with the IEC mains inlet and those RJ45 R2-LINK sockets. This allows the deck to be remote controlled from a T+A amplifier, or to wake the amplifier from standby when the platter is started. As we've come to expect from *HFN*'s experience of T+A's other separates, the deck is superbly finished and an absolute pleasure both to set up and use.

EASE AND AUTHORITY

Within minutes of spinning up the G 2000 R, I realised that we were going to get

along famously... The deck sounds even-handed, neutral and poised, but is also unafraid to boogie when required. So while this outer veneer of sophistication bears out a very well-engineered design, don't let me suggest this is a mere 'cerebral analysis machine' lacking any kind of *joie de vivre*.

It's certainly reasonable to expect more detail and depth from LPs with a costly deck, but a sense of musical fun is just as important. In this case the sound is very easy to tweak, of course, simply by switching the load and gain settings of the integral phono stage around those

recommended for the pick-up. Either way, it transpires that the G 2000 R has something of a Jekyll and Hyde-type character, but rather than Mr Hyde being evil he's more of a party monster.

Give the G 2000 R something refined to play and it rewards effortlessly. The drive system is stable, conferring solidity onto proceedings and ensuring that the sonic picture is vivid and detailed. Some turntables offer impressive soundstage depth, some offer a more 'wide-angle'


'With a "Mr Hyde" character, the deck proves a real party monster'

ABOVE: Three buttons on the front panel confer operation and speed change. Beneath the aluminium skin, the deck's inner structure is MDF and it sits on four shock-absorbing feet.

presentation, but the T+A seemed to favour neither extreme. Instead it offered a very fluid and insightful sound located securely between my two loudspeakers.

Vocalists benefited greatly from the G 2000 R's airy midband spaciousness. Singers like Diane Schuur were drawn from the groove with mellifluous ease but also with an underlying authority, so tracks like 'Love Dance' from the *Diane Schuur Collection* [GRP Records GR-9591] had a gloriously emotive and heartfelt central performance, underpinned by a fulsome backing track. Abraham Laboriel's bass line, in particular, provided a firm guiding hand.

SWEET TOP END

At the top end, treble was open, sweet and, again, superbly detailed. Cymbals came across with a firmly defined initial strike, a deliciously metallic ring and a smooth fade-off into the distance. The G 2000 R will also pull finer details from the back of the mix and ensure they're not buried under the main musical action. 

PACKAGE DEAL

Although T+A's amplifiers have the option of fine phono stages, the company is keen to encourage the fitment of its internal phono preamp to the G 2000 R. Integrating deck and phono stage keeps signal paths very short and minimises the opportunity for hum or other noise to creep in. Two phono stages are available; one for MM cartridges with five sensitivity ranges, from 1mV up to 10mV or greater. This version also has switchable capacitance with no fewer than 16 choices from 100-500pF. The MC stage is just as comprehensive with nine gain settings covering values from 100-2000µV (2mV) and a further nine input resistance settings from 15-650ohm. On both units, selection is made using small DIP switches that are accessible through cut-outs in the turntable's baseplate. This isn't my favourite way of doing things but seems acceptable in this context – after all, most users won't be swapping cartridges with reviewer-like regularity.



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sound foundations
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Contact
0118 9814238
info@soundfoundations.co.uk

TURNTABLE



ABOVE: At the rear of the unit are output phono sockets and a grounding post, plus an IEC AC mains connector. The two RJ45 sockets are for remote control link to a T+A amplifier, and not an Internet connection for you to upload your LPs to YouTube...

On more than one occasion, a softly played background instrument proved more evident than I was accustomed to, avoiding any sense of just a few main instruments playing with others forgotten behind. Rather, each piece of music was a beautifully cohesive whole.

A DISDAINFUL EASE

This spaciousness added a superb concert-hall feel to classical material in particular. 'Mars, The Bringer Of War', from Holst's *The Planets*, with the Boston Symphony Orchestra under William Steinberg [Deutsche Grammophon 419 475-1] rang out confidently as the G 2000 R followed the action around Symphony Hall with the tenacity of a bloodhound, swapping between the various orchestral sections with real verve. The dynamic abilities of the deck were also showcased by this piece as it moved effortlessly from whisper to climax with an almost disdainful ease.

Fed something funkier, however, and the G 2000 R's inner mischief-maker came out to play and had a whale of a time. The solid backing track underpinning Caro Emerald's 'Back It Up' from the 2010 album *Deleted Scenes From The Cutting Room Floor* [GrandMono STEMRA GM006] was punchy and timed to perfection. As a result, the track bounded along with gusto but at all times led by Miss Emerald's vocals, which were solid and clear. T+A's top-end deck tells you that, yes, it can have fun with the best of them, but it'll never lose the mastery of detail and soundstaging expected at this price level.

Arguably, T+A's well-engineered drive setup and intelligent motor control system made its presence most keenly felt at the low end of

the spectrum. In short, its exemplary bass performance ensured the lowest bass notes were handled with confidence and weight – kick drums had gloriously solid impact and precise timing.

Equally, however, the upper bass was clean and open, with no sense of the artificial bloom that can make for an initially pleasing warmth but one that soon starts to turn swampy.

Perhaps because of this compelling combination of abilities, the G 2000 R still holds its own when fed with a less-than-perfect pressing. Ironically, budget decks often fare well here because they can subtly mask the records' deficiencies while the cream of the high-end succeed by working through to the music within.

Once again T+A's G 2000 R showed its class by taking the 'high-end' route of dealing with imperfect pressings, and so the likes of Sausage Records' reissue of U S Warren and the Genghis Pea's 'Hard Headed Woman', first released in 1972 [SAUS 006], proved to be an absolute rocking delight. 🎧

HI-FI NEWS VERDICT

£5000+ is not exactly small change for a turntable, but spending it on T+A's G 2000 R buys you a superbly engineered and beautifully built motor unit with high quality arm and cartridge. Top this off with its very capable and versatile integrated phono preamp and the results are, as one might expect, exceptional. When it comes to plug-and-play vinyl front ends, it doesn't get much better than this.

Sound Quality: 86%

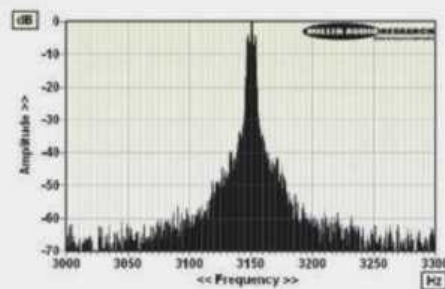


LAB REPORT

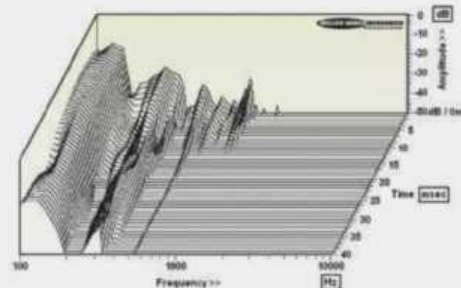
T+A G 2000 R

Tested in the lab without T+A's optional PH-G R MC phono stage, the G 2000 R deck put in a resolutely solid performance. The synchronous AC motor brings the 3.8kg diecast platter up to speed within five seconds – its accuracy good to within 1.5Hz at the 3150Hz test frequency (or an inaudible +0.04% absolute error). Cyclical speed variations amount to a peak-weighted total of 0.06% with some mild low-rate wow occurring ~3Hz [see Graph 1, below]. Rumble from the polished steel spindle/bronze bush bearing is very low indeed at -71.4dB (DIN-B weighted) and that from the LP groove itself only fractionally higher at -70.2dB – all figures that would be quite in keeping with many more exotic, 'high-end' turntable designs.

The partnering Carbon 2 tonearm, built to T+A's specification by Clearaudio, is evidently derived from the brand's earlier 9in Satisfy arm and equipped with a woven carbon fibre tube with fully adjustable alloy headshell. The 9g effective mass makes it very compatible with the optional Ortofon 2M Bronze and Clearaudio MC2 pick-ups while its resonant behaviour is impressively benign [see Graph 2, below]. The principal tube resonance occurs at 130Hz and there is a cluster of harmonics/torsional modes at 236Hz, 285Hz, 315Hz and 355Hz. All these are of mercifully low-Q while any mid/high frequency breaks of the sort seen with less well-damped carbon tubes are, in this instance, rapidly dispelled. All-in-all, this is a very cleanly-engineered combination. Readers may view full QC Suite reports for T+A's G 2000 R turntable and Carbon 2 tonearm, when available, by navigating to www.hifinews.co.uk and clicking on the red 'download' button. PM



ABOVE: Wow and flutter re. 3150Hz tone at 5cm/sec (plotted ± 150 Hz, 5Hz per minor division). Absolute speed is excellent and flutter is impressively low



ABOVE: Cumulative tonearm resonant decay spectrum, illustrating various bearing, pillar and 'tube' vibration modes spanning 100Hz-10kHz over 40msec

HI-FI NEWS SPECIFICATIONS

Turntable speed error at 33.33rpm	33.35rpm (+0.04%)
Time to audible stabilisation	5sec
Peak Wow/Flutter	0.04% / 0.02%
Rumble (silent groove, DIN B wtd)	-70.2dB
Rumble (through bearing, DIN B wtd)	-71.4dB
Hum & Noise (unwtd, rel. to 5cm/sec)	-61.0dB
Power Consumption	8-11W (3W standby)
Dimensions (WHD)	460x160x380mm / 14kg

Denon DCD-2500NE

If SACD is facing its last hurrah, then Denon's massively constructed but affordable, purist DCD-2500NE disc player may still make you fall in love with the format

Review: **Ken Kessler** Lab: **Paul Miller**

Never making a secret of my love for SACD – as woefully-overlooked a format as has ever been offered – I have always delighted in how Denon, Esoteric and a handful of others have shown loyal support for it. Rumours abound that the drives are drying up, but this year has seen enough new players to suggest that reports of its demise are premature. If there is any justice, Denon's DCD-2500NE, at £1499, will win converts even at this late date.

A minimalist follow-up to 2010's DCD-1510AE, this unit smacks of hair-shirtism in relative terms, but the absence of the earlier machine's S/PDIF and DSD-ready USB inputs will be not be mourned by those who just want a no-nonsense player. I do concur, however, with Editor PM's disappointment in the lack of balanced XLR outputs – inexcusable in this day and age in any component at over a grand.

DENON'S LUXURY FEEL

While it's likely that Denon's thinking regarding the USB inputs may have been a by-product of this player enjoying the release of a matching integrated amp, the PMA-2500NE with its own USB inputs (to be reviewed next month), the company didn't hamstring it in any other way. If, that is, 5in discs excite you more than USB sticks or streaming, for this machine will play any file you've burned to disc, including WMA, MP3, WAV, AAC, FLAC, ALAC and AIFF files up to 192kHz, as well as DSD128 (5.6MHz) files burned onto DVD-R/RW. I tried five of the formats and both writeable CDs and DVDs, with only one curious occurrence: the machine doesn't like cheapo CD-R/RWs or DVD-R/RWs, and mistracked on a few that worked fine in the Mac on which they were burned.

But that is to exploit its secondary purpose if commercially-available SACDs are the primary reason why you would

consider this player. Dispensing with other file formats here, as my main concern was how the unit handled SACDs and 'Red Book' CDs, was to note that it did extract the best sound I've heard from a number of FLAC, WAV, MP3 and AIFF tracks.

Absent USB input aside, this player, then, does address the current state of digital playback with a gracefulness and authority that certainly belies its price. If you have a hard-drive full of downloads – especially the bonus material that complements sets from Led Zeppelin, Paul McCartney and others – burning them to disc(s) is a fine (and nostalgic) way to access them instead of via your computer.

Leaving aside whether or not £1500 is big money to you, the DCD-2500NE still looks like something with double the price tag. The construction is superb, it has heft to please the tyre-kickers at 13.7kg, the finish is elegant and everything, including the remote, has a luxury feel about it. Even the way the tray slides in and out is redolent of far costlier hardware.

Again, though, we're ignoring the Pavlovian: audiophiles still expect high-end kit to ooze facilities, four decades after the self-appointed audio gods deemed tone and balance controls evil. This manages to suggest high cost despite its lack of gadgetry. The back is all but naked: IEC mains in, in/out for remote system control, a pair of RCAs for line output, and a brace of S/PDIF digital outputs: coaxial and Toslink. At the front, there's not much to confuse the user, either.

AUDIOPHILE FEATURES

Its fascia bears a centrally-sited slot for the disc tray, above an information-laden display that can be dimmed, or shut off completely. To the right are the four transport buttons plus eject, but to the left are two buttons and two LEDs that need a bit of explaining. The power-on button is situated to the far left, and its behaviour can be overridden with the use of an auto-shut-off mode, with the remote control turning it back on.



RIGHT: Separate power supplies feed the DVD transport mechanism, digital processing and analogue stages. Burr-Brown's proven 192kHz/32-bit DAC handles LPCM and DSD data



The other, less-obvious buttons choose between an SACD's disc layers and 'Pure Direct', while the LEDs indicate if you are listening to an SACD, and whether or not its 'Advanced AL32 Processing Plus' is in play. Choosing between layers allows the user to select the two-channel, multichannel or CD layers on a hybrid disc.

I should note here another omission that probably won't bother too many of you, if surround sound isn't your thing. When playing a multichannel SACD, this mixes it down to stereo and its status is shown on the display. It's not the player for a 5.1 rig!

'Pure Direct' is going to be the preferred mode for the hard-core listener, as it switches off the display and deactivates the digital outputs, all in the cause of better sound. I think it makes a difference, especially as low-level information enjoys greater clarity.

'Advanced AL32 Processing Plus' is what, in all probability, makes this unit a stunningly good CD player. This is Denon's proprietary data processing regime, evolved from the original 'Alpha' and 'AL24' algorithms featured in its digital products for over 25 years. The version implemented here upscales CD's native 16-bit/44.1kHz data to 32-bit/705.6kHz 'to achieve smoother recreation of sound

waves'. Also part of the process is adaptive 'interpolating across a large number of data points to provide audio as close as possible to the original sound'. [See PM's Lab Report, p53.] It certainly closes the gap between CDs and SACDs, its tell-tale LED glowing when a CD or data disc is inserted, or when the user chooses the CD layer of an SACD, but not the SACD layer.



WORKING ITS MAGIC

With a half-dozen SACD and universal disc players already in my possession, including models from Sony, Cambridge, Marantz and, indeed, an earlier Denon player, the new DCD-2500NE was connected with Crystal interconnects to an Audio Research REF

6 preamp [*HFN* May '16], driving an Audio Research REF 75SE power amp into Wilson Alexia floorstanders [*HFN* Mar '13], the latter via Transparent cable. My battery of favoured SACDs included Carly Simon's *Anticipation* [Mobile Fidelity UDSACD 2166], Love's *Da Capo* [Mobile Fidelity UDSACD 2130] and Harry Belafonte's magnificent *Belafonte At Carnegie Hall* [Analogue Productions CAPF 6006 SA].

ABOVE: Heavyweight build and an immaculate finish distinguishes this elegant and very minimalist SACD disc spinner. Pure Direct function mutes the display and digital outputs

For comparison's sake, rather than depend solely on the SACD's CD layer, I also used The Detroit Emeralds' *Greatest Hits* [Westbound CDSEWD 119 CD] and The Hues Corporation's *The Very Best Of The Hues Corporation* [Camden 74321 603422 CD]. And, yes, I compared the Love album

on normal CD vs the CD layer, as I've found in the past that some CD layers on SACDs are better than the CD-only pressings, some are worse and some are indistinguishable. Suffice it to say, the Denon AL32 processing worked

its magic on all of the CDs.

While I am not about to tell you that any of the CDs-via-AL32 made them sound *superior* to the SACD, I must reiterate that the gains are notable. Playing both The Hues Corporation and Detroit Emeralds discs revealed that these early-1970s, pre-disco epics, originally recorded in analogue, possessed the kind of tuneful bass that once had a certain breed of reviewers suggesting greater 'pace, rhythm and timing'. There was a sense of flow, of extension and of weight that came as close to the LPs as I've heard, with the dryness of CD players somehow ameliorated.

A far better illustration of this, however, is to be found in the lower registers on the Carly Simon release. Flipping from CD-only, to SACD to the SACD's CD layer, it proved to be one of the more vivid 'tells' when doing comparisons. Indeed, I recommend it if you manage to find a store that will allow you to audition the player. The player extracted lower registers that I can only liken to a change from KT120s to KT150s.

But bass isn't everything. Vocals are far more revealing, and thus far

'Denon's player elevates SACD to a new level of desirability'

KEEPING THE FAITH

It's no secret that Denon is a kissing cousin to Marantz, so the continued championing of SACD is no mystery. Both companies remain committed to the format, even as Sony seems to be abandoning it. More to the point – and this will impress those of you who, like me, enjoy the purism of Mobile Fidelity, Analogue Productions and others who leave their SACDs in stereo – Denon has always maintained a two-channel selection alongside its multichannel offerings, and has done so since its CD players of the 1980s and '90s, through to the first universal disc player – the DVD-A11 from 2003 – and its successors. Perhaps that's the point: although SACD does multichannel, the need for it has emigrated to Blu-ray audio. SACD is inherently more purist than other post-CD disc formats, so the two-channel-only status is no great sacrifice. Still, it's nice to have the option if you've some 5.1 SACDs that beg to be heard in surround. Which reminds me: I've been using a DVD-2900 since 2003, which I really must return to Denon.

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CD/SACD PLAYER



ABOVE: The lack of balanced XLR outputs is disappointing so standard 'Red Book' S/PDIF digital outs (coax and optical) are all that join the analogue RCAs

more challenging of a system's competence, and Simon's voice – familiar almost to the point of predictability – was so free of digital artefacts via SACD that I would have added a point to my disc review this month [see p93]. The title track is an ear-opener, the voice crystal-clear above solo guitar, then the band kicks in. All of a sudden, you have a move from unplugged intimacy to forceful, angsty rock with a serious kick to it.

AS SMOOTH AS SILK

It's an unexpected example of dynamic contrasts from a song one might be forgiven for thinking of as 'a bit wimpy'. The percussion from Jim Keltner has enough power to tax the Alexias, despite the rest of the track's delicacy. The balance maintained by the SACD-via-Denon bears comparison with the CD, the latter – despite the AL32's benefits – lacking the same levels of coherency. Relative levels from instrument to instrument seemed more natural, the CD exhibiting a trace of artifice that provided the sonic signature of that format versus the superior composition of the stereo SACD.

Love's *Da Capo* has a killer track in 'Seven And Seven Is', a drum/guitar assault that pre-dates The Clash's more manic moments by a decade, and surely must have inspired a thrash exponent or two. After the relentlessness of the track, which leaves you as breathless as an episode of 24, a thunderclap stops the juggernaut. Then you move into 'Orange Skies', so fragile and delicate that it makes a typical Donovan song sound like Motörhead. For the

DCD-2500NE, such changes of level, pace and texture, from heavy metal to summery pop, presented no challenges – the segues were as smooth as silk.

This disc is a marvellous showcase for solo instruments, such as flute, contrasting with hard, pounding rock. The latter is never allowed to swamp the former. The instruments enjoy spatial positioning and form that approaches the holographic qualities of the best analogue. And if it's space that reveals the resolution of a player, then the Belafonte concert will leave you dazzled.

I don't 'know' Carnegie Hall, and I was barely seven when this milestone release was recorded. But if ever a recording transported the listener to the venue... there's a reason why this set has been reissued on every format imaginable, as holy an audiophile release as Miles Davis' *Kind Of Blue*. If the sense of air and space is a definitive arbiter of natural-sounding playback – and I'm not suggesting it's the only thing that some find 'wrong' with 'digital' – then this player elevates SACD to a new level of desirability. Why? Because it only costs £1500. ☺

HI-FI NEWS VERDICT

Whatever appeals to you (or me, for that matter) about Denon's DCD-2500NE, be it the no-nonsense minimalism or simply the wonderful sound, this machine is a triumph. Sure, I lust after an Esoteric at five or more times the price, but the Law of Diminishing Returns sorts that out for most of us. This is simply a joy to use in every way, the sonics are superb and I could even learn to live without XLRs. SACD lives!

Sound Quality: 84%

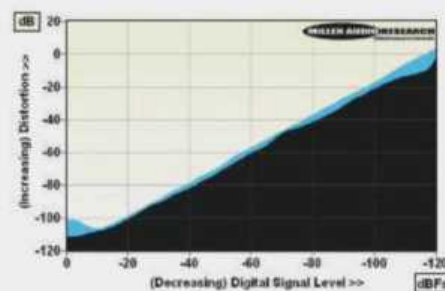
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LAB REPORT

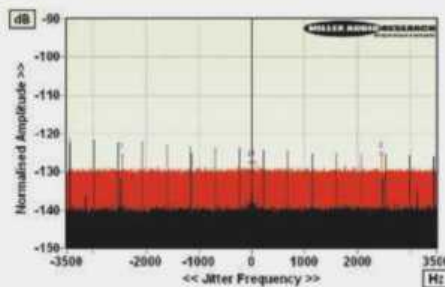
DENON DCD-2500NE

Successor to Denon's EISA 2010/11 award-winning DCD-1510AE, the new DCD-2500NE is clearly an evolved version of this proven chassis. Maximum output is a little higher at 2.3V (or 2.45V via SACD) with a full 110dB A-wtd S/N ratio achieved along with slightly lower distortion – 0.00025% through bass and midrange, increasing to just 0.00055% at 20kHz via CD [see Graph 1, below] but to 0.029% via SACD as THD+requantisation noise. Jitter remains as low as possible from CD and SACD [see Graph 2] while the analogue stage has clearly been 'tweaked', the output impedance now reduced from 320ohm to 96ohm and stereo separation widened from 96dB to 107dB at 20kHz.

Furthermore, and also in common with Denon's DA-300USB outboard DAC [HFN Oct '14] which shares the company's 'AL32 Processing' regime, the DCD-2500NE's behaviour adapts to either transient or steady-state signals. Tested with time-invariant signals (sweep or multitone) it yields a flat response with a steep cut-off amounting to –1.85dB/20kHz with CD while, with an impulse, not only is the time domain response free of pre/post ringing but it yields a magnitude response with a very slow roll-off of –1.5dB/10kHz and –6.6dB/20kHz. Indeed, this impulsive time domain response is almost identical to the 'Optimal Transient' filter used in Audiolab's M-DAC+ [HFN Jun '16]. With SACD, where the output is realised via the analogue FIR filter structure of the PCM1795 DAC and subsequent 4th-order LPF, the response rolls smoothly away from –0.5dB/20kHz to –1.6dB/40kHz, –4.2dB/60kHz, –10.5dB/80kHz and –20dB/100kHz. The older DCD-1510AE offered a very similar, and appropriate, high treble roll-off. PM



ABOVE: Distortion versus digital signal level over a 120dB range at 1kHz (black) and 20kHz (blue)



ABOVE: High resolution jitter plots via CD (16-bit limit, black) and SACD (red, with markers)

HI-FI NEWS SPECIFICATIONS

Maximum output level/Impedance	2.31Vrms / 96ohm
A-wtd S/N Ratio (CD / SACD)	110.3dB / 110.8dB
Distortion (1kHz, 0dBFS/–30dBFS)	0.00025% / 0.0037%
Distortion & Noise (20kHz, 0dBFS/–30dBFS)	0.00055% / 0.016%
Freq. resp. (20Hz–20kHz/100kHz)	+0.0dB to –1.85dB/–20.2dB
Digital jitter (CD / SACD)	116psec / 38psec
Resolution @ –100dB (CD / SACD)	±0.2dB / ±0.1dB
Power consumption	15W (1W standby)
Dimensions (WHD) / Weight	434x138x335mm / 13.7kg



Rogue Audio Sphinx v2

Featuring a tube preamp stage and state-of-the-art Class D power modules, this unusual yet affordable integrated amplifier packs a characterful punch

Review: **Nick Tate** Lab: **Paul Miller**

Naughty but nice' is how I would describe this little £1495 integrated amplifier. The company name sets the tone, showing a certain self-awareness on the part of the manufacturer, while the model name – the head of a human and the body of a lion – is rather apt too, in hi-fi terms. It's more than just a slick bit of marketing though, because it's actually an unusual hybrid of two technologies, both of which typically inspire a reaction: tubes and Class D audio power modules.

Rogue Audio has something of a reputation for interesting tube amplifiers, and is certainly not a newcomer to this particular party [see *HFN* Sep '14], having another, larger hybrid in its current range (the Pharaoh) and various all-valve integrateds and power amps. It's clear that serious thought has gone into what should make this strange brew sound good, but on the other hand it does seem that rather less time has gone into the styling, ergonomics and user-experience.

MINIMALIST TO THE CORE

Although not cheaply built, it still has a slightly 'home made' feel, the like of which you'd see back in Britain in the 1980s. £1500 Marantz amplifiers feel ten times more swish than this, on account of the silky feel of their controls and the superb brushed metal casework. This latest Sphinx v2, by comparison, seems positively anachronistic – and all the more apparent because (whisper it), there's no built-in DAC, no aptX Bluetooth and no, it can't stream anything to save its life. It is what it is, namely an unapologetically old school integrated amplifier with some very interesting bits inside.

Indeed, following the '80s vibe, a moving-magnet phono stage comes fitted as standard. Maybe the guys in Boulder, Colorado, never noticed that vinyl came,

went and is now back again, so impervious to fashion as this amp seems to be. There's a headphone socket too – a good old, honest 0.25in/6.3mm affair on the front panel backed up by a discrete amp section inside. The machined aluminium front panel is an unusual width, and sports four nice metal control knobs (including balance – remember that?), but they're clunky and not at all positive in action. If you've already spent a few minutes looking at the amplifier, then this will not surprise you in the least.

The master power switch is on the back, but there's a front on/off that toggles, rather slowly, between on and standby. Just

three line-level inputs were last spotted on an amplifier circa 1982, when tape, tuner and CD connectivity were the model of hi-fi best practice, but that's all you get from the Sphinx (plus the aforementioned MM phono of course). Unusually, the left and right channel gold-plated speaker binding posts sit either side of the back panel, while the short row of gold-plated RCA input and output socketry looks rather forlorn compared to your average modern integrated. Finally, the so-called 'skeleton' remote control is, frankly, an unattractive piece of semi-translucent plastic with nothing more than volume up, down and mute buttons.

RIGHT: The triode line stage and motorised volume can be seen on the right of the main PCB while the two modified Hypex UCD-180 Class D amp modules sit top right of our picture





If this all seems a little negative, then you'll be happy to hear that the really interesting bits are under the pressed steel case. Here, you'll find two matched 12AU7 triodes, and a little further back off the main (chunky copper) circuit board, sit a pair of Hypex Class D amplifier modules. Yep, that's why it's called Sphinx – because this Rogue amp is a hybrid of two very different technologies. The supplied tubes are pretty standard fare (although can be upgraded later), but its Class D modules are widely thought to be the best sounding of their ilk [see PM's boxout, below].

The company obviously has good taste then, and to give those modules a fighting chance it has a rather large 375VA toroidal transformer fronting up a potent linear power supply, with various regulated stages. An Alps volume pot sits at the front of the main PCB, and decent quality components are used throughout.

This compactly proportioned integrated amplifier claims 100W per side, proving plenty powerful enough in practice for most British rooms and loudspeakers [see PM's Lab Report, p57]. It needs a

while to warm up to give of its best; this is likely down to the triodes but it's only after a couple of hours that the Sphinx really gets its mojo working. Switch-on takes nearly ten seconds, as the tubes are given a soft warm-up. Rogue Audio claims this is a 'green' design, with 6W power consumption on standby, while eating about 130W at half power, which is where most, I assume, will use it.

LIVELY ANIMATION

Class D has had a bad rap but, while some will claim they all sound a tad sterile and opaque, that's about as useful as comparing a single-ended triode amp with a Krell KSA-50: Class A both. Listen to the Rogue Audio Sphinx v2 and you'll discover it doesn't sound as grey or as flat as you might have been 'educated' to expect. Indeed, this little integrated sounds rather lively and animated, with a musical charm of its very own – not something you'll read about every Class D design.

It's obvious that the hybrid nature of this amplifier is a really rather symbiotic mix – the tube preamp section imbuing


ABOVE: Power button toggles between on and standby mode, with LEDs to show status; 6.3mm headphone socket sits beside source selector, with balance and volume knobs to the right

the Hypex power modules with a sweeter, warmer and more mellifluous sound than they might otherwise warrant. The amp also enjoys the good sides of archetypal Class D, in the sense that it's smooth, even and solidly powerful.

All of which makes for a pretty classy sounding product – there's certainly no clanging, bashing, tizzy midband and treble. Japan's 'Swing' [*Exorcising Ghosts*; Virgin 32VD-1112] is a dull-sounding early '80s analogue recording, but there's detail aplenty for a quality amplifier and the Sphinx managed to get inside the murky mix and throw out a goodly amount of information. Nevertheless, it didn't grate, showing itself content to get into the groove and have fun. It worked well at unearthing the song's complex percussive midband elements, and did a solid job with Mick Karn's fretless bass playing too.

Indeed, low frequencies were strong and decently animated, although there was just the slightest sense of flatness to the bottom end. It wasn't quite as tuneful as I've heard from the similarly-priced Exposure 3010S2-D, for example, lacking just some the latter's *joie de vivre*.

Up top, the Sphinx proves smooth and spacious, with an appealing tonal balance, if not quite a neutral one. At this price, this is more of an observation than a complaint, because it's this that typically marks down £1500 amplifiers against those at twice the money. The Exposure is mushy, while the rival Rogue is simply a little bland – losing a little of the natural warmth and timbre of acoustic instruments for example.

So while The Police's 'Wrapped Around Your Finger' [*Synchronicity*; A&M CDA-63735] proved enjoyable, this rich-sounding recording was still stripped of some of its colour. All the same, the Sphinx soon got into the swing of things, 

'The Sphinx got inside the murky mix and threw out plenty of detail'

HYPEX, NOT HYPE

The Hypex Class D modules at the heart of Rogue Audio's Sphinx (both v1 and v2) are the inspiration of engineer Bruno Putzeys who invented the UcD (Universal class D) technology while working at Philips' Applied Technologies Lab. Philips holds the patent to UcD but its advantages are enjoyed by the Hypex modules [see www.hypex.nl]. A version of the Hypex UCD-180 module – rated at 120W/8ohm and 180W/4ohm – is employed here rather than the more sophisticated nCore Hypex module we saw in NAD's Master M22 power amp [*HFN* Apr '15]. Nevertheless, and unlike most Class D 'hi-fi' amps, these standard Hypex modules are single-ended, occupy a miraculously small footprint and offer excellent EMC performance. Distortion is fairly low and uniform with frequency [see Lab Report, p57] but the module's immunity to load impedance is arguably its greatest boon. While most Class D amps are 'tuned' to offer a flat frequency response into 6 or 8ohm, with variations into higher and lower impedances, the Hypex module's response is almost unchanged, regardless of speaker load. PM

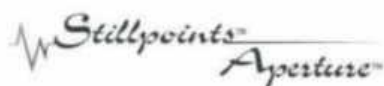


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Michael Fremer, Stereophile February 2015

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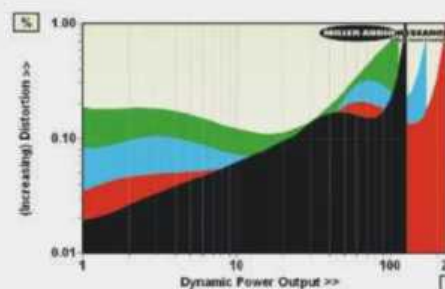
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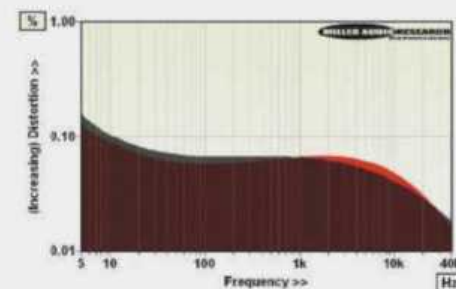
ROGUE AUDIO SPHINX V2

Rogue Audio mentions in its 'Quick Set-up' page that 'unity gain is at 12 o'clock on the volume control – for use as home theatre bypass'. However, full volume represents +31dB gain and 12 o'clock offers +17dB (x7 gain), so it's no use as any sort of bypass... Fortunately its 100W/8ohm power rating is more accurate, though at 2x105W/8ohm the Sphinx v2 has very little wiggle room, just as its optimistic 200W/4ohm specification is closer to 2x175W in practice. Moreover, and despite this featuring a Class D output stage, the Sphinx does offer some 'useable' headroom with 125W and 220W available under dynamic conditions into 8 and 4ohm loads, albeit limited to 175W and 115W into lower 2/1ohm loads [see Graph 1, below].

Fortunately the performance of Bruno Putzey's Hypex Class D modules [see boxout, p55] is typically very predictable. Distortion increases gently with output (0.025%/1W to 0.065%/10W and 0.15%/100W at 1kHz) but remains impressively uniform with frequency at 0.08% down to 0.03% from 20Hz-20kHz at 10W/8ohm [see Graph 2]. Consistency of response is another feature of the single-ended Hypex modules as illustrated here by its -0.7dB/20Hz to -0.5dB/20kHz span into 8ohm which is maintained at -0.6dB/20kHz/4ohm and -0.8dB/20kHz/2ohm. The ~0.005ohm output impedance is vanishing low at bass/midrange frequencies, increasing to just 0.045ohm/20kHz, but the A-wtd S/N is a little weak at 73dB (re. 0dBW). Whether this originates from the tube stage or Class D modulators is unclear, but as the noise floor is smooth and 'white' in nature its impact is more likely to be subjectively positive (having a 'dithering' effect) than encouraging a rough or abrasive sound. PM



ABOVE: Dynamic power versus distortion into 8ohm (black trace), 4ohm (red), 2ohm (cyan) and 1ohm (green) speaker loads. Maximum current is 10.7A



ABOVE: Distortion versus frequency at 10W/8ohm (5Hz-40kHz; black, left channel; red, right channel)

HI-FI NEWS SPECIFICATIONS

Power output (<1% THD, 8/4ohm)	105W / 175W
Dynamic power (<1% THD, 8/4/2/1ohm)	125W / 220W / 175W / 115W
Output impedance (20Hz-20kHz)	0.005-0.045ohm
Freq. response (20Hz-20kHz/100kHz)	-0.7dB to -0.55dB/-14.9dB
Input sensitivity (for 0dBW/100W)	79mV / 790mV
A-wtd S/N ratio (re. 0dBW/100W)	73.4dB / 93.5dB
Distortion (20Hz-20kHz re. 10W/8ohm)	0.077-0.028%
Power consumption (Idle/Max. o/p)	23W / 235W
Dimensions (WHD) / Weight	394x127x432mm / 12kg



ABOVE: A phono stage is joined here by three line inputs plus fixed and variable preamp outputs. Single speaker outlets feature substantial gold-plated 4mm posts

throwing out a pleasingly spacious stereo mix that fell back better than one might have expected.

The amp kept my attention as the downbeat verses alternated with the song's epic choruses. At the same time, the bass guitar underpinned things in a committed and purposeful way, propelling things forward. Stewart Copeland's dizzying drum work was well carried too, the amp tying everything together with relative ease. It didn't quite have the firecracker dynamics that the recording is blessed with, but the Sphinx made a serious attempt at them all the same.

PLENTY OF GRUNT

Feed this amplifier some trance music, and it really comes into its own. There's no need to focus on the natural timbre of acoustic instruments with Appaloosa's 'Travelling' from LTJ Bukem's *Earth: Volume 1* [Earth EARTHCD001], because it's an all-electronic drum 'n' bass track. Here, the Sphinx picks up its skirt and runs, and one can appreciate that substantial power supply and no small amount of grunt those Hypex modules are able to serve up.

The Sphinx pushes out a most capacious soundstage, underpinned by a strong bass synthesiser and a drum machine working at double speed. Over this, washes of keyboards fade in and out, and the amp handles it all with aplomb. Despite the almost machine-gun speed of the rim shots and hi-hat cymbal sounds, the Sphinx keeps on top of the proceedings with an authority that rather belies its price.

The result is a most enjoyable listen, although again you wouldn't call it the least coloured of amplifiers – there's a slightly 'tinselly sound' to electronic percussion,

centred around the upper midband. It's subtle but you still notice it if you've come from a better, and more likely costlier, amplifier. Also, the bass again turns in a strong performance, even if it's not quite as snappy as I prefer.

Despite its relatively compact size this latest version of Rogue's Sphinx proves a veritable powerhouse. One of its great abiding virtues is that it doesn't lose the plot when you're really cooking with gas. At volume levels that only owners of detached houses will ever know, the Sphinx v2 is 'covering your speakers' back' so to speak – never sounding like it's falling apart or about to deposit vast swathes of distortion through your prized high-frequency drive units.

Using a Technics SL-1200G turntable, all the majesty of Beethoven's *Pastoral* Symphony with Karajan and the Berlin Philharmonic [DG 2531 106] was there to hear in vast, larger-than-life scale, courtesy of the Sphinx and my reference ATC SCM40 loudspeakers. These are not an easy load and, with their infinite baffle cabinets, eat many lesser amps for breakfast. This one however stayed clean and open even at high volumes, and through crescendos. Tubes and Class D is clearly a classy combination in the hands of Rogue Audio. ⚡

HI-FI NEWS VERDICT

The undeniably quirky Rogue Audio Sphinx v2 offers a taste of the best of both worlds – gutsy, even-handed Class D power and a smooth, lyrical tube character. So this little Rogue is a cheeky integrated with an impish smile, a friendly face and no small amount of charm. Indeed, few integrated amps at this price point offer its desirable combination of attributes, and as such it's well worth auditioning.

Sound Quality: 81%



PS Audio BHK Signature 300

Huge power from an understated pair of hybrid tube/MOSFET monoblock amplifiers with a healthy dose of designer heritage. Apart from their weight, what's not to like?
 Review: **Andrew Everard** Lab: **Paul Miller**

There are times when I find myself wishing I specialised in reviewing something sensible: you know, like cartridges, for example, or headphones. Instead, I seem to have spent several decades choosing cars on the basis of 'can you get a pair of floorstanders in the back?' and casting a wistful eye over the websites of industrial trolley-sellers, in the way that some stare longingly at vintage valve amps on eBay.

Those thoughts came to mind when PM and I loaded the car with the review pair of PS Audio's BHK Signature 300 Mono power amplifiers, which sell for £14,000. True, they're not as huge, or as heavy, as some products to pass through these pages, but they're still very much a two-man lift, at almost 38kg *au naturel*, or nearly 42kg boxed. Each...

These are the Boulder, Colorado, company's flagship design, sharing many elements with the rather more affordable BHK 250 stereo amplifier (which sells for exactly half the price), including the design talents of Bascom H King, who has in his CV amps for the likes of Constellation Audio, Marantz, Infinity, and Conrad Johnson. You can read more about the man behind the amplifiers in PM's boxout [facing page], but even with that illustrious history, the story is that this is 'the first amplifier Bascom felt was good enough to lend his name to'.

Bringing in King is typical of the way PS Audio operates these days, and the design of the 300s is also typical of the company's current styling: unbox the amps, and what you have is a pair of units as purposeful as they are understated. The industrial design shuns the excesses so often used to give high-end products 'character'.

Yes, they're hefty and feel entirely solid in their cast aluminium casework, but they're hardly huge at a sniff over 22cm tall, and the minimal front-panel aesthetics,

with nothing more than an illuminated blue logo on display, mean they'll blend into the listening room quite easily.

Even the side-mounted heatsinks are hidden away behind neatly radiused end-caps. This layout means that, while the amps could be used on low-level stands if you *wanted* to make a talking-point of them, they seemed equally happy on my floor. The only minus point concerns their sticky rubber feet: this is not an amp to be slid around!

TWO AMPLIFIER STAGES

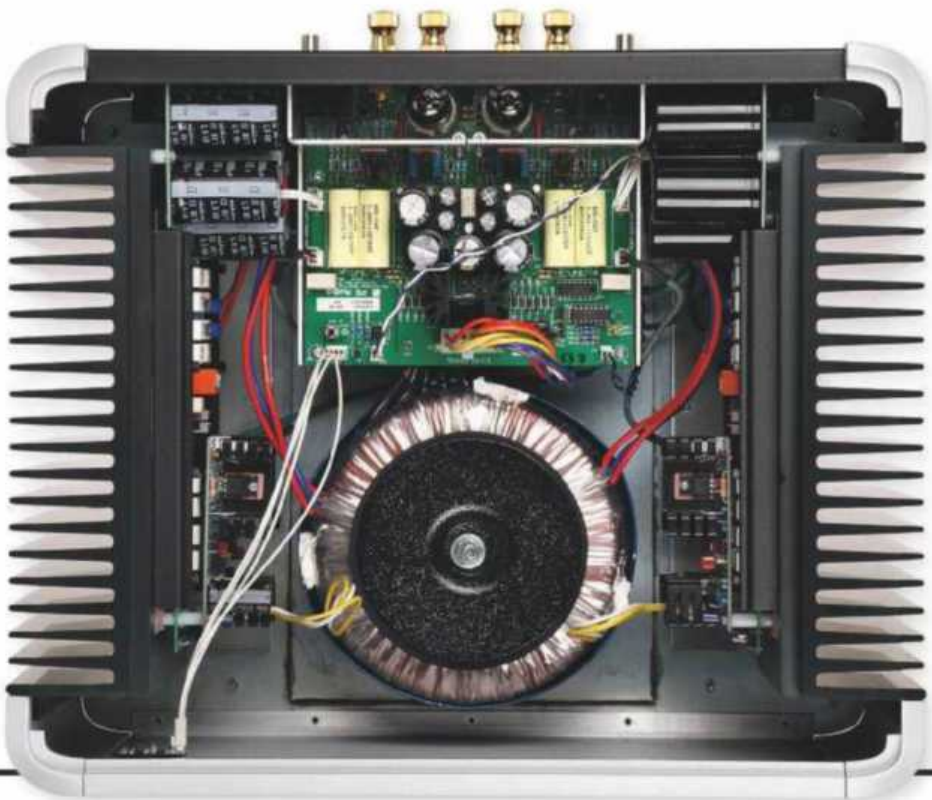
The internal design of the 300 is, as you can see from 'top off' shot here, exceptionally tidy, the large central toroidal transformer straddled by the two amplifier sections. Hang on – *two* amplifier stages? Yes: unlike the stereo 250 model, which is a two-channel amplifier not offering a bridged option, the 300 Mono does deliver its power – which is quoted as 300W/8ohm, double that into 4ohm and

'more than 1000W' into 2ohm – from a paralleled, bridged configuration [see PM's Lab Report, p61].

And that's not the only unusual aspect of the design: behind the toroidal transformer sits a separate input board, powered by its own transformer (which is hidden away beneath it), and using a pair of valves at its heart. What's more, while a pair of matched, high-quality Russian Gold Lion 6922 tubes comes as standard, this is an amplifier positively encouraging a spot of 'tube-rolling'.

A hatch in the rear panel can be removed to give instant access to the triodes, and automatic bias adjustment means the amplifier will optimise itself for whichever alternative you choose to slot in. The exceptionally clear instruction manual shows, with colour pictures, just how the valves are swapped, making it simple for even first-time 'rollers' to have a go.

So, input stage valve, output stages MOSFET. PS Audio explains this hybrid



RIGHT: A large toroid feeds the MOSFET output stage's PSU while a smaller transformer (under the green PCB) powers the tube input stage. Built as a 'dual mono' amp, the sides are bridged to achieve a single channel output



design is all about fitness for purpose, its thinking being that while the valves give the best 'timing and phase coherence', you can't beat the simple clout of solid-state when it comes to driving speakers. That thinking also informs the choice

of a balanced, quasi-complementary design.

The company explains that while complementary NPN and PNP pairs of output devices are typically employed in today's push-pull amplifier output stages, 'It turns

out that N-types have lower distortion and perform better than P-types'.

By using only NPN MOSFETs in its amplifier, and using the two channels of the 300 to push and pull respectively, the company says it achieves its aim of 'a

near-perfect balanced waveform without the degradation inherent in a [standard] complementary design'.

The BHK Sig 300s offer a choice of balanced XLR or RCA phono inputs, and have two sets of speaker outputs on

substantial combination terminals, machined from copper then gold-plated, plus a 12V trigger socket to enable switching between operation and standby in concert with a connected preamp.

Four fuses protect the amplifier, accessible from the rear panel, and the amp also has internal protection circuitry, which flashes the front-panel logo if triggered. Protection is provided against low impedance, short circuits, exceeding the wattage rating (as

'There's a wash of sound, filling the room with an addictive magic'

THE BHK CONNECTION

PS Audio's co-founder and driving force, Paul McGowan, scoops up the technical expertise that best suits his various projects. He brought in the engineering know-how to raise digital projects including the PerfectWave and NuWave DACs from mere concepts to very real and versatile products. And so his collaboration with industry veteran and designer Bascom H King for PS Audio's Signature amplifiers might well have been predicted. Bascom had recently been consulted on the solid-state Constellation amplifier project [HFN Jul '13 and Jul '15] but his passion for tube/transistor hybrid amplifiers has been well documented since his inaugural 1979 design, dubbed the 'Infinity Class A'. For this PS Audio assignment, Bascom specified Russian Gold Lion 6922 triodes for the input stage driving a balanced (bridged) MOSFET, rather than bipolar transistor, output stage. Fittingly, BHK's 'Signature' amp is a true powerhouse [Lab Report, p61]. PM

ABOVE: Fascia is simple, and along with the rest of the casework is a substantial metal casting. The blue button controls on/standby and doubles as an output protection indicator

if!), excessive heat, or DC on the outputs. A press of the flashing logo will clear the protection and reset the amp.

POWER UNLEASHED!

A new 'BHK Signature' preamplifier is on the stocks at PS Audio, but this wasn't yet available for review, so instead I used the company's excellent 'DSJ' DAC/preamp [HFN Jun '16] fed by my Mac mini computer and network audio sources, and connected to the power amps using Chord Company Epic balanced cables. And if one were to sum up the sound of the combination in just a couple of words, these would simply be 'Hoo' and 'boy!'.

These power amplifiers are indeed devastating. As PM's lab tests reveal, the stated power output is fairly conservative, both in continuous and dynamic terms, and this is readily apparent when listening. While not by any standards found wanting when it comes to delicacy and finesse, these amplifiers are capable of shifting a lot of air – and that's to put it mildly.

Opening up listening with Brian Eno's mesmeric new album, *The Ship* [Warp Records WARPCDD272, 44.1kHz/24-bit download from Bleep], the 300s do a fine job of delivering every nuance of the complex, multilayered mix, while at the same time unleashing their impressive

SME

MODEL 15



The Model 15 could be described as 'the ultimate in recovery vehicles', allowing the cartridge to retrieve the last nth of recorded material whether, digital or analogue, from the vinyl disc and thus approaches the ultimate in perfection. Receiving its inspiration from the superb Model 10 precision turntable the Model 15 seeks to emulate the excellence of our Models 20/3 & 30/2 turntables whilst retaining the more compact footprint preferred by many of our enthusiasts. The SME Model 15 has been designed with the same attention to detail combined with simplicity of operation that has come to be expected from all SME products. Its superb performance together with laid back styling make it a glamorous addition to your sound system that will astound and amaze listeners for many years to come.

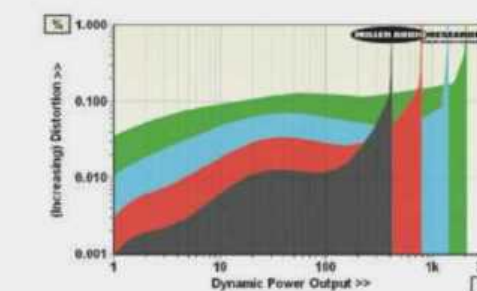
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PS AUDIO BHK SIGNATURE 300

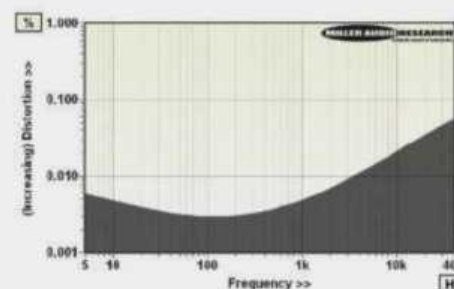
Rated at 'greater than 300W/8ohm and 600W/4ohm' PS Audio's flagship monoblock is true to its word, delivering 390W/8ohm and 690W/4ohm with a healthy dynamic capability of 420W, 790W and 1410W (1.41kW) into 8, 4 and 2ohm and a very substantial 2120W (2.12kW) into 1ohm loads, respectively [see Graph 1, below]. The clean 46A current capability ensures the BHK Signature 300 will comfortably deal with the most difficult loudspeaker loads and puts it a good 10A ahead of the 300W D'Agostino Master Power Classic Stereo [HFN Feb '16].

Distortion creeps up gently with increasing power output from 0.0009%/1W to 0.005%/10W, 0.012%/100W and 0.018%/200W but increases more aggressively at high frequencies from 0.005% at 1kHz/10W to 0.035%/20kHz and 0.055%/40kHz [see Graph 2, below]. Otherwise, PS Audio has engineered an impressively uniform 0.046-0.049ohm output impedance which only begins to increase above 20kHz (0.06ohm/30kHz and 0.3ohm/100kHz). This assists its very extended frequency response which is flat to within ± 0.02 dB from 1Hz-30kHz, falling slightly thereafter to -0.45 dB/100kHz. Into lower impedances this amounts to -0.75 dB/100kHz/4ohm, -1.4 dB/100kHz/2ohm and -2.2 dB/100kHz/1ohm.

Noise is not vanishingly low – that big toroid is only partially screened around its periphery – but 85dB (re. 0dBW) is a respectable enough A-wtd S/N ratio, even if a good 95dB+ is achievable these days. Readers may view a comprehensive QC Suite test report for PS Audio's BHK Signature 300 power amp, when available, by navigating to www.hifinews.com and clicking on the red 'download' button. PM



ABOVE: Dynamic power output versus distortion into 8ohm (black trace), 4ohm (red), 2ohm (blue) and 1ohm (green) loads. Maximum current is 46A



ABOVE: Distortion versus extended frequency from 5Hz-40kHz at 10W/8ohm

HI-FI NEWS SPECIFICATIONS

Power output (<1% THD, 8/4ohm)	390W / 690W
Dynamic power (<1% THD, 8/4/2/1ohm)	420W / 790W / 1410W / 2120W
Output impedance (20Hz-20kHz)	0.046-0.049ohm
Frequency response (20Hz-100kHz)	+0.0dB to -0.45dB
Input sensitivity (for 0dBW/300W)	83mV / 1475mV (balanced)
A-wtd S/N ratio (re. 0dBW/300W)	84.9dB / 109.7dB
Distortion (20Hz-20kHz, 10W/8ohm)	0.0048-0.035%
Power consumption (Idle/Rated o/p)	145W / 530W (each)
Dimensions (WHD) / Weight	434x221x356mm / 38kg (each)



ABOVE: A single balanced XLR input is joined by parallel sets of 4mm compression-fit speaker connections. Note 12V trigger comms and removable triode tube 'hatch'

power to handle the music's dynamics and deep, deep bass. From the off there's a big, atmospheric wash of sound, filling the room and working its addictive magic as it unfolds, but within the soundscape every bit of detail – and there's a lot of it, from creaks and pings to low rumbles – becomes readily apparent.

PUNCH AND DRIVE

Get rather more 'straight down the line', with Bad Company in their late-'70s pomp [from *Live 1977 & 1979*; Swan Song/Rhino Atlantic 081227952334, 96kHz/24-bit download], and the 300s power out the Wembley '79 set-closer 'Can't Get Enough Of Your Love' in thunderous fashion, having previously shown what they can do with the sheer punch of Simon Kirke's explosive drum solo on the earlier Houston '77 outing.

The amps' ability to punch and drive is also much in evidence with the 192kHz/24-bit version of The Dixie Chicks' *Taking The Long Way* [Open Wide/Columbia 82876807392]. The flat-out country rocker 'Lubbock Or Leave It' clearly benefited from the 300's resolution, from the right harmonies of the three voices to the twang of banjo and fiddle set against crisp drums, and the organ violin rising through the mix toward the end of the track.

Push the amps further with the drama of Barenboim's recording of Elgar's First Symphony [96kHz/24-bit Qobuz download] – CB's album choice, p98 – and they really show their stuff with a massive and majestic presentation of this magical performance. This progresses from the slow-burn development of the first movement to the blazing second section, with its skittering strings underpinned by the weight of percussion and the attack of

the brass section, before settling back into the lyricism of the third movement. It's wonderful stuff, and the combination of sweetness and sheer clout these amps can muster makes it even more so.

Maybe it's a sign of misspent teenage years on a diet of prog-rock and big choral works, but I'm a sucker for hi-fi able to deliver the finest detail of music while giving that sense of straining at the leash ready to let loose the dogs of war, and that's just what I like so much about the PS Audio amps. So I went all the way back there and ended my listening with Rick Wakeman's *The Six Wives Of Henry VIII* [A&M Japan UICY-94235]. I revelled in the explosive power the BHK Signature 300s kicked into the opening 'Catherine Of Aragon', the bass of Chris Squire, Bill Bruford's drums and Ray Cooper's percussion tight, jazzy and propulsive, Steve Howe's guitar shining through and of course Wakeman's keyboards noodling, snarling and growling.

Deft, dynamic and delicious – yes, that just about sums up the PS Audio BHK Signature 300s. ☺

HI-FI NEWS VERDICT

Flamboyant styling is traded for a simple, purposeful look, as PS Audio's flagship amps use their hybrid valve/solid state design to deliver where it counts: a sound combining absolute control and – when required – bat-out-of-hell power. Their speaker-driving ability is never in question, and neither is the massive slam they offer if you're brave enough: then, their masterful restraint turns into riotous fun.

Sound Quality: 87%



Unison Research SH

Aficionados of single-ended triode amps don't have to settle for less when listening to headphones rather than loudspeakers – Unison Research has catered for them too

Review: **Keith Howard** Lab: **Paul Miller**

The vast majority of the headphone amplifiers supplied to me for review have been solid-state, the one exception thus far being the Audio-Technica AT-HA5050H [HFN May '16], which is a hybrid design combining a valve input stage and transistor output stage. Here, in the form of the £1250 Unison Research SH, I'm experiencing an *all-valve* design for the first time, and not just that: a valve headphone amplifier with single-ended triode output.

WHY GO SINGLE-ENDED?

Given that any top-notch headphone amplifier will operate in Class A, crossover distortion cannot be a problem in a push-pull output stage, so why single-ended instead? The standard justification – I don't think we can use the word 'conventional' in any context relating to single-ended power and headphone amplifiers – is that push-pull output stages are dominated by odd-order nonlinearities, with even-order suppressed, whereas a single-ended stage will generate a (supposedly more natural) balance of the two.

This ties in with the notion, first widely promulgated by Jean Hiraga in the late 1970s, that the pattern of harmonics seen in a spectral analysis of harmonic distortion is at least as significant to sound quality as the level of that distortion. It's a claim that my own experiences with generating different harmonic distortion patterns mathematically do not entirely support, but there we are: single-ended designs, transistor as well as valve, have a loyal and enthusiastic following.

Reasons not to use a single-ended Class A output stage are more concrete. Principally, it is horribly inefficient, which explains why, unless they use huge output valves, single-ended loudspeaker amplifiers are always low-powered: there is a limit to how much heat the valves can dissipate,

which in turn limits the useful power that can be generated across the (speaker) load.

This same low efficiency applies in a headphone amplifier. For confirmation you have only to look at the SH's specification. Despite using EL84 output valves (maximum plate dissipation 12W), according to Unison Research it delivers a maximum of 1.4V into 150ohm, 1.1V into 33ohm and 0.6V into 10ohm, equivalent to 13mW, 37mW and 36mW respectively. Compare this, say, to the Teac HA-501 I use which PM measured as offering 2215mW/25ohm [HFN Apr '14]!

More pertinently, let's calculate what acoustic output the SH can achieve. For a typical medium impedance headphone with a sensitivity of 115dB SPL for 1V, 1.1V will deliver about 116dB which is adequate to accommodate short-term peaks in wide dynamic range music. Substitute the high impedance Beyerdynamic T1 g2 [HFN Mar '16] or Sennheiser HD 800 S [HFN May '16], with measured sensitivities of 101.3dB and 105.9dB respectively, and you get a different story, 1.4V generating about

104dB and 109dB respectively – figures which I would suggest are inadequate for wide dynamic range programme played at realistic levels.

TAKING THE TOUR

This is one respect in which the SH constrains the choice of partnering headphone but there is another – the residual hum level on its output, which is explored further in the boxout [facing page] and in PM's Lab Report [p65]. To reduce this you'd need to use a low-sensitivity headphone, but as described above you'd then sacrifice output capability. So you're between a rock and a hard place with headphone selection. Output impedance is not a problem, though, as 16dB of loop negative feedback reduces it to a specified 6.7ohm (PM measured a little less at <3.6ohm), which will cause only minor frequency response changes with most headphones.

Let's do a tour of the SH's fixtures and fittings. It comes with a choice of two fascias: the familiar cherry item pictured



RIGHT: The EL84 output tubes, configured in triode mode, drive a pair of headphone sockets via toroidal coupling transformers – visible here far right. The PSU transformer is on the far left



LEFT: Controls are minimal: between the twin output sockets and to either side of the central volume control are toggle switches to adjust gain and select digital or analogue input

here or a black alternative with cherry finish rings around the volume control and twin recessed ¼in jack sockets to the left and right which provide the paralleled unbalanced outputs. Between these a pair of toggle switches select, respectively, either high or low headphone sensitivity (ie, they alter the SH's internal gain), and either the analogue or USB digital input. On the right side panel there's a mains rocker switch while at the back there are, besides the IEC mains socket, a pair of phono sockets for the analogue input and a USB type B socket for connection to a computer.

PCM sampling rates up to 384kHz are supported via the USB link, as is DSD64 or DSD128 but not DSD256. The DAC chip is a high-spec item from ESS. While the use of such a DAC in a headphone amplifier of

poor power output and hum performance may strike some readers as ironic, there's no gainsaying that the SH offers a lot of hardware for its price. Note, though, that there is no S/PDIF digital input, no balanced

analogue input or balanced headphone output either, and no back panel line-level analogue output – so the SH cannot double up as a simple preamp.

Two headphones were used for the

listening: the Audio-Technica ATH-A2000Z [HFN Apr '16] and the discontinued Sony MDR-MA600 [HFN Oct '12], which remains my favourite £300 headphone of all time.



SPACIOUS STEREO

I've already alluded to the SH's hum issue, which is the first thing to strike you when you begin to listen. On the low sensitivity

switch setting it was so ludicrously high in level nobody would tolerate it. On the high sensitivity setting it was reduced but still readily perceptible on both the headphones used, the moment they were plugged in. But on the high sensitivity setting at least the hum was partially masked – or the listener distracted from it – when music was played.

Using the analogue input first, I began with the third movement of Mozart's Divertimento in E flat, K375 [Linn Records CKD 47; 192kHz/24-bit download], deftly played by the Scottish Chamber Orchestra, and I immediately experienced what about the SH's sound will endear it to many listeners. It portrays an unusually wide and spacious stereo image and populates it with musicians making a warm, easy-going, albeit slightly softened, sound. The portrayal was mildly hazy but enveloping, and the bassoon in particular had a sumptuous timbre. If this paints the SH as having the archetypal valve sound then in large part it has: in a way that makes it hard not just to sit back and enjoy it.

That spacious, mellifluous character was also much in evidence on 'Donna Lee', Thomas Gould's reinterpretation of the Miles Davis classic from *Bach To Parker* [Champs Hill CHRCD078; 96kHz/24-bit download]. The plucking of the double-bass was a little less emphatic than I'm used to, but the violin sound was warm and full without a hint of stridency. And the recording acoustic – realistically or otherwise I can't say since I wasn't there – was more expansive than typically served up by solid-state competitors.

I know what you're thinking: this civility might be a disadvantage on pop and

'Just sit back and enjoy the SH's archetypal valve sound'

HUMDINGER

As owners of super-sensitive loudspeakers well know, a power amp with high residual hum or noise is bad news because its level is unaffected by volume setting – it's with you always. Loud music may mask it but it re-emerges on quieter passages and between tracks. The situation with headphones – which have a typical sensitivity of 110 to 120dB SPL for 1V – is potentially far worse but to encounter a headphone amp with an intrusive hum problem, as here, is unusual. According to PM's lab tests, most headphone amps have a residual noise level of –90dBV to –100dBV. For instance, PM recorded –99dBV for the Audio-Technica AT-HA5050H [HFN May '16] and –93.4dBV for Teac's HA-501 [HFN Apr '14]. So if the headphone sensitivity is 115dB for 1V, the equivalent noise level will typically be 15 to 25dB SPL: roughly that of a capacitor microphone. The SH's residual noise level, by contrast, is –73dBV, which is 20dB or so worse [see Lab Report, p65]. Of course, tube headphone amps don't have to be like this – Copland's DA215, reviewed next issue, has a residual noise of just –89.9dBV.

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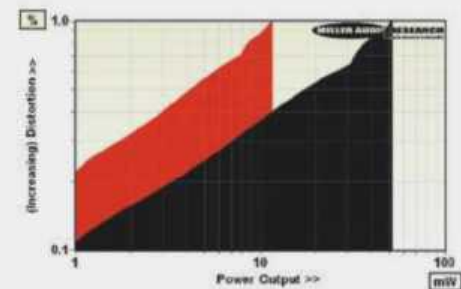


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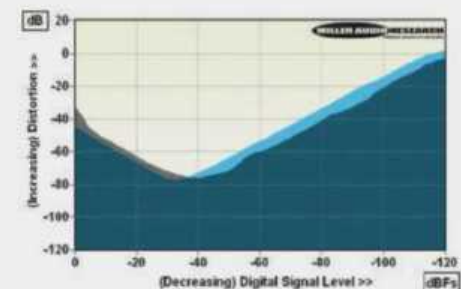
UNISON RESEARCH SH

Unison Research's SH is not the first tube-driven headphone amplifier we've tested, but it's not a powerhouse to match the Fostex HP-V8 [HFN Jun '16]. Unison rates the SH's 'power output' in volts, from 1.4V/150ohm through to 1.1V/33ohm and 0.6V/10ohm (equivalent to just 37mW in its 'Low' headphone sensitivity setting). In practice, the latter offers +8.3dB gain while the 'High' sensitivity mode yields a -1dB attenuation. 'Low' sensitivity mode delivers the higher output of 52mW/25ohm and 1.65V/1kohm while the 'High' setting offers just 12mW/25ohm and 600mV/1kohm [see Graph 1, below]. These figures are lower than typically achieved by plug-in, hub-powered USB DAC/headphone amps that we've tested, but many would argue that 1-20mW is still more than sufficient to drive a modern, dynamic 'phone to deafening levels anyway!

Graph 1 also shows that distortion increases linearly with output, from a minimum of 0.025% at 0.1mW to 0.1%/1W and 0.35%/10mW up to 1% at 50mW. Via the digital USB input, distortion follows the trend dictated by the ECC83/EL84 tube stages over the top 40dB of its range [Graph 2]. However, via analogue and digital inputs, distortion does not change substantially with frequency from 20Hz-20kHz while the (analogue) frequency response, with its extended sub-bass (-0.25dB/5Hz) and slightly 'sweetened' treble (-0.3dB/10kHz to -0.9dB/20kHz), is available through a usefully low 2-3ohm (Low) and 3-4ohm (High) source impedance. There's a further treble roll-off via the USB input, reaching -2.4dB/20kHz out to -26dB/90kHz (192kHz files). The A-wtd S/N of 89dB (re. 0dBV, line in; 94dB via USB) partially disguises the poor -73.4dBV (0.21mV) residual hum which is about 10x higher than typical. Jitter is a low 130psec, albeit partially masked by noise. PM



ABOVE: Continuous power output vs. distortion into 25ohm 'headphone' load (black, low sens; red, high)



ABOVE: THD vs. 48kHz/24-bit digital signal level over a 120dB dynamic range (1kHz, black; 20kHz, blue)

HI-FI NEWS SPECIFICATIONS

Maximum output (re. 1% THD into 47kohm)	1650mV
Max. power output (re. 1% THD into 25ohm)	52mW
Output impedance (20Hz-20kHz)	1.65-3.6ohm
A-wtd S/N ratio (re. 0dBV/ digital re. 0dBfs)	89.1dB / 94.1dB
Frequency response (20Hz-20kHz/25ohm)	-0.2dB to -0.95dB
Distortion (20Hz-20kHz, re. 10mW/25ohm)	0.24-0.38%
Digital jitter	130psec
Power consumption	35W (1W standby)
Dimensions (WHD) / Weight	225x126x322mm / 6kg



ABOVE: No balanced analogue inputs (or outputs) but simply one set of single-ended RCAs with a USB Type-B port for delivery of music files via a computer or media server

rock music. I thought so too and I turned next to 'Tank' from the remastered version of the first ELP album *Emerson Lake And Palmer* [Sony Music 88691937972].

Before Carl Palmer's drum solo there's a frenetic start to this track which, unquestionably, lost some of its energy replayed via the SH. The cymbal and drum sound was softened, and the whole portrayal came over as a little less manic. But that wide imaging did full justice to Eddy Offord's expansion of Greg Lake's bass guitar from mono to stereo in the first few bars, and enhanced the double-tracking of Emerson's keyboard contribution.

I prefer the leaner, sharper portrayal that I'm familiar with, but the SH flattered this 45-year-old recording in a way that undeniably made for easier listening.

CRISPER VIA S/PDIF

Switching to the USB digital input, the SH's essential character was retained. Grace Jones sounded too much pussy cat, too little tigress in 'Well Well Well' from *Hurricane* [Wall of Sound WOS050CD] but the rhythmically insistent bass tune was well rendered and again that wide imaging helped tease out the many other strands of the mix. Somehow the dynamic range compression seemed less obvious too.

That said, it's clear that the SH's USB stage doesn't deliver the sound quality of which the analogue stages are ultimately capable. Despite what ought to be the inherent inferiority of S/PDIF's embedded clock, the extra analogue cabling and my Chord QuteHD DAC being quite old in the tooth, the same track played via the analogue path was crisper, livelier and more rhythmically compelling. So, not for the first time then, the USB interface underperforms somewhat, despite

Unison Research's SH boasting galvanic isolation between its USB input and DAC stage.

Ella Fitzgerald's *Reach For Tomorrow* [Verve 839 838-2] is right up the SH's street, its spacious soundstaging and inherent warmth being tailor-made for Ella's creamy voice. But even on this less energetic material the difference between the analogue and USB feed remained apparent, the latter imposing a slight sense of veiling that, while not unpleasant, gave the impression of taking you a step further back from the master tape. Likewise on Gwyneth Herbert's more energetic, up-tempo *Annie's Yellow Bag* [Naim Label naimcd135], which sounded well controlled via USB but couldn't match the infectious energy of the S/PDIF equivalent.

With each and every track, I succeeded in forgetting about the SH humming along for some of the time, only to be reminded of it when I failed to blank it out for some reason while the music was playing or between tracks. Whatever the SH's attributes, this flaw rendered them moot – and explains my low sound quality score. ☹

HI-FI NEWS VERDICT

I sincerely hope the hum problem of our review sample is atypical of the SH, because if not it cannot possibly merit recommendation. But its essential sound quality – open and warm with expansive imaging – is attractive and will appeal particularly to those who find solid-state alternatives too dry and clinical by comparison. If you're tempted by the SH insist on hearing the sample you'd be taking home with you.

Sound Quality: 65%



Pioneer SE-Master1

Pioneer hasn't been a prominent player in the audiophile headphone market for some years. This, its expensive new flagship model, aims to put it back on top of the heap
 Review & Lab: **Keith Howard**

Of the Japanese audio manufacturers who chose an anglicised company name, Pioneer surely picked the best. It suggests an enterprise at the cutting edge, always looking to make technological progress, and Pioneer has often justified its aspirational moniker.

Many will think of its development of plasma televisions but my mind goes back to its double-speed DAT machines of the early 1990s that afforded many of us our first taste of high sampling-rate audio, and to the digital companding system it developed around the same time to achieve 24-bit resolution using 16-bit hardware. Pioneer has historically been a great supporter of hi-res digital – proof that the commitment continues being its XDP-100R portable player recently becoming the first to support MQA.

EXTENDED RESPONSE

Pioneer also has a long history of extending loudspeaker bandwidth into the ultrasonic using exotic supertweeters, beginning with the 100kHz-capable PT-R7, which appeared in the CS-995 loudspeaker as long ago as 1976. The later PT-R9 was used in Oohashi's famous experiments into the perception of ultrasonic frequencies.

So while Pioneer hasn't had a great reputation for headphones in recent years it's no surprise to find that its new £1699 SE-Master1 – manifestly an attempt to bludgeon its way back into the aristocracy of headphone makers – carries a Hi-Res Audio logo, which requires 40kHz bandwidth. In fact Pioneer claims a response out to 85kHz, although a graph in Pioneer's technical literature shows the response to be -30dB (re. 1kHz) at this frequency.

RIGHT: Connection is made separately to each capsule and allows either unbalanced or balanced cables to be fitted, the latter terminated with twin three-pin XLRs

The open-back Master1's objectives are stated as being high sound quality combined with good comfort, and the latter is certainly achieved. Its large, carefully shaped earpads achieve a good seal without the need of the stiffer of the two easily exchangeable tension rods that Pioneer provides.

Weight is on the high side at 585g including the unbalanced cable but the leather headband is broad enough and sufficiently well padded that I didn't find this an issue. Crucially, the earpad opening is sufficiently large to accept most pinnae without rucking them at all.

Within each capsule is a 50mm diameter drive unit whose diaphragm is formed – as usual with headphone drivers – like that of a large moving-coil microphone, with a central dome section surrounded by a large annulus that acts as the flexible surround, but is of sufficient size to represent a significant proportion of the total radiating area.

Plastics are most often used as the diaphragm material (dome and surround) although recently a number of

manufacturers have applied metal coatings to improve stiffness. Pioneer's driver is unusual in that the central dome is formed of aluminium alloy, while the annulus is made of PEEK (polyether ether ketone). Moreover, the aluminium is treated using a proprietary process called Parker Ceramic Coating [see boxout, facing page], claimed to improve stiffness.

In the circumstances it's disappointing that Pioneer quotes a fundamental bending resonance frequency of 15kHz for the dome, given that it's roughly the diameter of a 25mm

aluminium dome tweeter, the best examples of which postpone this to about 37kHz. Other identified resonances are at 2.6kHz – which will probably be masked by the length mode of the ear canal at around the same frequency – and 30kHz, above the audible frequency range. But our frequency response measurements (and Pioneer's own, as it happens) show a narrow, high peak at about 6kHz, which a CSD waterfall confirms as a high-Q resonance of unknown origin [see Lab Report, p69]. The hope must be that it is of sufficiently high Q that music signals will rarely, if ever, excite it fully.

Another outcome of the lab testing I must draw to your attention is the Master1's low frequency distortion performance, the like of which I've never previously encountered in a headphone. Headphones typically record around 0.1% distortion (90dB SPL at 100Hz), better designs perhaps 0.02% (in the test table we record anything below 0.05% as <0.1%).

At this level and frequency the Master1 recorded 1.8% THD and, as explained in the lab report, the distortion – which is dominated by odd-order (third and fifth) harmonics – worsens still further at lower frequency. If the review sample is

'Grace Jones proved the Master1 really can play tunes'



RIGHT: Uniquely the Master1 allows for two different tension bars to be fitted, so that its head clamping force can be adjusted to suit individual requirements



representative – and there's no reason to suppose that it isn't given the consistency of the two capsules' linear and nonlinear behaviour – this is a mystifying oversight that Pioneer should address immediately.

BALANCED DRIVE

For the listening I had two headphone amplifiers available: my resident Teac HA-501 [*HFN* Apr '14] which offers unbalanced output only, and Pioneer's own U-05 [*HFN* Aug '15], supplied with the Master1 to allow it to be driven in balanced mode. Two connecting cables are supplied, both 3.1m in length with one terminated in a ¼in jack plug for unbalanced connection, the other terminated in twin three-pin XLR plugs. Connection is separate to each capsule via small connectors of a type I haven't seen previously and which may be of Pioneer's own design.

According to the corrected frequency responses in the lab report, you might


expect the Master1 to exhibit a degree of 'boom and tizz' in its perceived tonal balance, with rising output below 1kHz and a sting in the tail around 6kHz (where the aforementioned resonance lies) and 10kHz. But I wouldn't be so rude as to suggest this. The Master1 has too much

bass and lower-midrange for my taste but to say that it booms, with all that implies in respect of a one-note bass and compromised LF transient performance, would be inaccurate. As for the tizz, I can't say that the Master1's treble bothered me other than occasionally, perhaps because that 6kHz resonance is, indeed, rarely if ever fully excited.

EMI'S SPACIOUS 'SIXTIES

I find classical music in general, and orchestral music in particular, the most obviously and detrimentally affected by a tonal balance that, like the Master1's, favours low frequencies over that vital part of the audio spectrum, from about 2kHz to 8kHz, known as the presence band. Music's sense of 'liveness' depends on these frequencies being fully represented, which they are not if overwhelmed by the lower-midrange and bass. So it was no surprise to find the Master1 falling somewhat short with such programme material.

An interest in EMI's Stereosonic technology from the 1950s recently encouraged me to buy the remastering of Sir Thomas Beecham's recording of Grieg's *Peer Gynt* suite [EMI 9 65934 2], which proved to be a reminder of why recordings of this period are so often treasured. It has a wonderfully spacious, natural soundstage and, apart from tape squash on climaxes, wears remarkably well given that it was recorded 60 years ago. Sadly some of this life and 'air' was suppressed here, betraying the age of the recording.

Some modern hi-res classical recordings suffered similarly. The third movement of Robin Ticciati's Schumann Symphony No 2 [Linn Records CKD 450; 192kHz/24-bit download] lost some of its ethereal magic and inherited a slight coloration on the violins, but the SCO's adroit rendition of Mozart's *Divertimento* in E flat, K375 [Linn Records CKD 479; 192kHz/24-bit download], fared rather better. 

CERAMIC COATING

Exotic as 'ceramic coating' sounds, there is one on all the aluminium items about your home with an anodised finish. Anodising is an electrochemical process which uses an acid bath to 'grow' the natural oxide surface layer of aluminium into a thicker coating. Aluminium oxide – alumina – is a ceramic, and so 'ceramic coating' has been used by audio manufacturers to make anodising sound less prosaic. But there's anodising and anodising since the acid used and other details of the anodising process affect the nature and physical properties of the oxide coating, and hence the alumina-aluminium-alumina sandwich that results. Plasma deposition is a much costlier alternative, used to create the diaphragms of Raidho Acoustics' Ceramix drivers which have a 150µm layer of alumina on either side of a 100µm aluminium 'core'. Details of the Parker process used by Pioneer, or its effect on aluminium's physical properties, I have been unable to find.

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Hi-fi News March 2015



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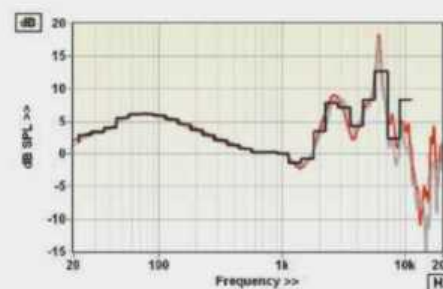
LAB REPORT

PIONEER SE-MASTER1

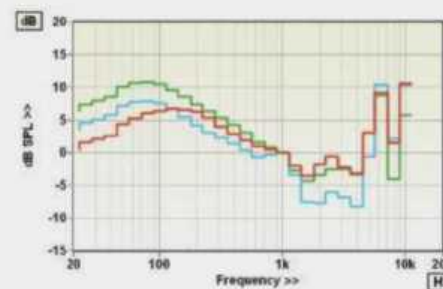
Pioneer specifies the Master1's sensitivity as 94dB but doesn't identify the input level. If we assume 1mW then this is equivalent to 107.5dB SPL for 1V, a low sensitivity for a modern medium impedance headphone. In fact we recorded 110.6dB SPL for 1V input at 1kHz, averaged for the two capsules, so Pioneer's spec is conservative – although this is still a lower sensitivity than many competitors'. The measured impedance varied between 41.7ohm and 55.4ohm (20Hz-20kHz), sufficient to result in a 0.42dB modification of frequency response when driven from a headphone amp of 10ohm source impedance and 0.95dB with a 30ohm source.

The uncorrected frequency response [Graph 1, below] rises progressively below 600Hz to a peak of about +6dB (re. 1kHz) at 75Hz. Furthermore, it has a peak of only about +9dB between 2kHz and 3kHz, and shows a narrow peak at 6kHz. But the responses of the two capsules match to within ± 3.7 dB (40Hz-10kHz) – a good result for a headphone – and (not shown) evinced very little variation at LF across the 10 measurements made per capsule (between which the headphone is removed from and replaced on the artificial ear). So the large earpads provided excellent sealing, even though the default tension rod – the less taught of the two – was used.

With free-field, diffuse-field and Harman corrections applied, all three averaged third-octave responses [Graph 2] indicate that the Master1's perceived tonal balance will have excess bass, and excess treble too at around 6kHz. Distortion performance was very disappointing at LF with both capsules recording 1.8% THD for 90dB SPL at 100Hz (4.0% with N2 harmonic weighting, reflecting high levels of third and fifth harmonic). A 20Hz-20kHz sweep at an input voltage equivalent to 90dB SPL at 1kHz showed the THD to peak at 5.9% at 37Hz, with the N2 figure reaching 16.4% at 36Hz. KH



ABOVE: Unequalised responses (L/R, grey/red; average 3rd-octave, black) show a lack of the 2-3kHz output typically required to achieve a natural tonal balance



ABOVE: Third-octave freq. resp. (red = Harman corrected; cyan = FF corrected; green = DF corrected)

HI-FI NEWS SPECIFICATIONS

Sensitivity (SPL at 1kHz for 1Vrms input)	110.6dB
Impedance modulus min/max (20Hz-20kHz)	41.7ohm @ 4.3kHz 55.4ohm @ 55Hz
Capsule matching (40Hz-10kHz)	± 3.7 dB
LF extension (-6dB ref. 200Hz)	11Hz
Distortion 100Hz/1kHz (for 90dB SPL)	1.8% / <0.1%
Weight (inc cable and 0.25in connector)	585g



ABOVE: Pioneer's 50mm drive unit combines a 25 μ m-thick aluminium dome with a PEEK surround. 'Parker Ceramic Coating' is applied to enhance the dome's stiffness

Grace Jones's 'Well Well Well' from *Hurricane* [Wall of Sound WOS050CD] proved the point I made previously about the Master1's bass: this headphone really *can* play tunes. Indeed, I found the Master1's mildly skewed tonal balance more acceptable on this track than on any of the classical items – but that's not to say its fingerprint was absent and my hand strayed to the volume control to try to add snap to a sound that was, on occasion, a little 'lazy'.

A DARKER HUE

Bucky and John Pizzarelli's suave take on the classic 'Route 66' from *Live At The Vineyard* [Challenge Records CHR 70025] already has a slightly bass-heavy vocal, perhaps because John P is singing close to the mic in this live performance. Whatever, the Master1s darkened the tonal hue of the vocal still further and made it slightly harder to hear some of the artificial reverb. Ella Fitzgerald's *Reach For Tomorrow* [Verve 839 838-2] evinced a bias towards the chest tones too, and this was one occasion where the Master1's upper treble drew attention to itself by imparting a mild pitch to the tape hiss.

Comparing balanced and unbalanced connection to the Master1 via Pioneer's U-05 DAC/preamp convinced me that the unbalanced option sounded all the more vital and, crucially, more engaging. The Scottish Ensemble's recording of Tchaikovsky's *Serenade for Strings* [Linn Records CKD 472] has a somewhat murky string sound, and the unbalanced connection

proved the more capable of cutting through to the detail within.

No excuse need be made for the inherent resolution of Arne Domnérus's *Antiphone Blues* [Proprius PRSACD 7744, converted to 88.2kHz/24-bit PCM]. Spånga Church in Sweden provides the luxuriously reverberant backdrop to improvised solo saxophone and simple organ accompaniment, and contributes as much to the listening experience as the two instruments. Via the balanced connection the sound remained magnificently spacious but only via the unbalanced connection was there a sense of a gauze being lifted, revealing more subtle details.

Whether the same result would pertain with a different headphone amplifier I can't say, but via Pioneer's own the Master1 sounded better with one side of each driver connected to earth. ☺

HI-FI NEWS VERDICT

I suspect there's a fine headphone latent within the Master1, albeit slightly obscured by its warm tonal balance and bass distortion issues. Bass lovers may not care about the former, of course, but the latter is less easily ducked. If classical music forms a significant part of your listening diet, a more neutrally balanced headphone will likely be preferred, though rock/pop fans will surely have a more positive experience.

Sound Quality: 78%



Pro-Ject DAC Box DS2 ultra

Pro-Ject's most ambitious 'Box series' USB DAC to date not only handles DSD256 but is trimmed with tweaks to attract the enthusiast-on-a-budget. Is it really fully-loaded?

Review: **Andrew Everard** Lab: **Paul Miller**

Visiting the Munich High End Show back in May, I was struck by just how wide and diverse Pro-Ject's range has become in the quarter century since the company was founded, and the line-up shows no sign of slowing its expansion. Here we have the latest digital-to-analogue converter from the Vienna-based company's Box Design sub-brand, the – deep breath! – Pro-Ject Box Design DAC Box DS2 ultra, selling for £499, as part of a 'MkII' overhaul of the DS range, which includes the Stream Box DS+ [HFN Mar '16].

The 'ultra' is the most ambitious offering of its kind from the company, with DSD conversion up to DSD256/11.2MHz, a 'DSD direct path' through the circuitry designed to allow the most accurate handling of the signal, PCM conversion at up to 768kHz/32-bit and user-selectable digital filtering.

OVERFLOWING OFFERINGS

Agreed, we've encountered DACs offering a similar specification in these pages over the past year or so – the difference here is in the aggressive pricing, easily besting the sub-€1000 target the company set for the DS2 ultra as a celebration of its 25 years in business. That's perhaps a sign of the times for Pro-Ject/Box Design: after all, it marked its 20th anniversary five years back with a celebratory version of its original turntable.

Not that the Box Design range was actually short of digital devices before the arrival of this latest model. The printed catalogue I picked up at the show is a pretty substantial publication, and a look at the brand's online presence demonstrates just how diverse – OK then, complicated – the offering has become.

The company just doesn't seem to be able to resist replacing and supplementing models, seemingly at the drop of a hat, apparently filling gaps in the range most would struggle to identify. For example, there are three variations of its Stream

Box network music player, a trio of phono stages and the same number of offboard power supplies – and that's only in its DS range, one of five it offers.

From the E series at the entry level all the way up to the RS Line – which is the closest Pro-Ject gets to full-size components – the story is repeated, and publicity material suggests yet another sub-range is on the way: an upmarket version of the DS2 line-up (of which this DAC is a part) with wooden side-cheeks.

Take all those ranges as a whole, and there's a baffling array of products in the Box Design range, and I can't help feeling many consumers will struggle to negotiate their way through the options to find the right one for their needs.

Anyway, the DAC Box DS2 ultra is pretty clearly positioned. It's the most upmarket model the company makes

and, as the slightly confused product information sheet explains, uses the premium 'Verita' AKM4490EQ converter from Japanese company Asahi Kasei. This confers 768kHz/32-bit capability as well as quad-DSD, and provides a number of user-selectable digital filters.

FIXED-LEVEL OUTPUT

The AKM4490 is becoming a popular device among manufacturers wanting to bring extended high-resolution capability to their products: as well as the Teac and Hegel models referred to in PM's boxout [facing page], you'll find it in Astell & Kern's AK380 personal player, Esoteric's K-05X and K-07X SACD/CD players, in multiple implementations in Denon and Marantz AV products and even in a Kenwood in-car navigation system! It's used here with the same company's AK4137 sample-rate



RIGHT: Compact design features a four-layer PCB and a 'Velvet Sound' AK4490 DAC hosting LPCM to 768kHz and DSD to 11.2MHz (DSD256) via its XMOS-based USB input



LEFT: Solid fascia is well finished, and gives a clear display of the file format being decoded, but its design is complicated by the sound and filter options. There's no remote control

converter, which is used to upsample all incoming digital content to 768kHz before it's passed to the DAC, making the most of the high-speed operation of the converter to shift noise well out of the audio spectrum. A simpler version of the DAC Box DS2 – yet another alternative – will be offered later this year, minus the sample-rate conversion.

The DS2 ultra offers a choice of digital inputs – asynchronous USB, two coaxial and three optical – and it has a single optical digital output plus stereo analogue outs on RCA phono sockets, with switchable output gain via a rear-panel push-button offering a 6dB increase.

The output stage operates in Class A, but there's no balanced connection option, however welcome this would be on a DAC with high-end aspirations, and neither is there the option of variable output level, to allow the DAC to be used straight into a power amp. That said, Pro-Ject does offer a 'digital preamplifier' in its RS Line, the Pre Box RS Digital, although this 'only'

supports file formats up to 384kHz/32-bit and DSD128/5.6MHz, but has a choice of two internal DACs and both valve and solid-state output stages. See what I mean about having to pick your way through the variety of specs offered across the Box Design range to get just the product you want?

That preamp also supports headphones, with a choice of gain settings, but such an output is noticeable by its absence on the DS2 ultra – even though it's almost becoming a 'must have' on devices such as this these days. And so is a remote control, although there are 12V trigger connections for remote on/off. Power is provided by an offboard 18V supply, with an add-on upgrade, the Power Box DS2 Source, on the cusp of being launched.

While the optical and coaxial inputs are, as usual, limited to 192kHz/24-bit, the full potential of the DS2 ultra is realised via its USB input, for which Windows drivers are supplied. It's plug and play when used with Mac OSX computers. Input selection is

manual, using the front-panel buttons, and there are indicators for both PCM and DSD sampling rates, along with two selectors for 'sound mode' and the five filter options. The whole enterprise is built on a steel chassis and wrapped in high-quality aluminium casework.

IMPRESSIVE PERFORMER

Given the source of the enabling technology – as already noted, the DAC is found in some very good equipment – it's hardly surprising that the DS2 ultra is capable of a pretty impressive performance, whether with CD-quality content, hi-res PCM or even DSD files.

Yes, there's some shortage of the weight, power and impact available from more ambitious DACs using this converter, which is presumably down to the limitations of the output stage here. This may well improve with the addition of the uprated power supply, but in general the sound is clean, precise and informative, if a little bleached at times.

Don't give in to the temptation to hit the gain button on the rear panel to try to give the sound a bit more oomph: the 5.2V maximum output this will deliver could cause some problems for the input stage of your amp, being more than double the nominal CD line output level. Indeed, it certainly made the various amps with which I used the DAC sound rather overblown and chesty with big orchestral recordings and other complex mixes.

Caution is also advised when experimenting with the various sound-modifying features provided by the DS2 ultra: PM explains some of the problems in the digital filtering implementation in his boxout [adjacent] and Lab Report [p73], but I wasn't prepared for just how great would be the effect of the couple of apparently errant filter settings.

Engage them and it's as if the life is sucked out of the music: it's not quite 'duvet over the speakers' territory, but

'The drums in "Superstition" fairly cannon out of the speakers'

VELVET SOUND

While ESS's Sabre DACs seem to have captivated the attention of many digital designers, a few are still casting their net a little wider, if only to explore the possibility of achieving a 'different' sound. Audio chip supplier Asahi Kasei is making some in-roads here, its top-end 'Velvet Sound' AK4490 DAC and matching AK4137 sample-rate converter [see www.akm.com/akm/en/product/featured/velvetsound] having been used to great effect in Hegel's HD30 [HFN Jan '16] and Teac's UD-503 [HFN Apr '16]. AK's solution offers native handling of DSD up to 11.28MHz (DSD256) and 768kHz (LPCM) with a choice of four digital filter algorithms. (Pro-Ject's literature suggests five filters, but 'Natural Tone' Filter 1 is actually a NOS – non-oversampled/filtered – mode.) This leaves the four digital filters already described in my boxout for Teac's headphone amp/DAC although, in Pro-Ject's DS2 ultra, the 'Acoustic Tone' minimum-phase, short delay/slow roll-off and 'Traditional Tone' linear-phase, slow roll-off FIR filters are incorrectly implemented and will result in a severe treble loss with standard CD/48kHz media. The 'Acoustic Sound' minimum-phase short delay/sharp and 'Traditional' sharp roll-off FIR filters operate correctly [see Lab Report, p73]. PM

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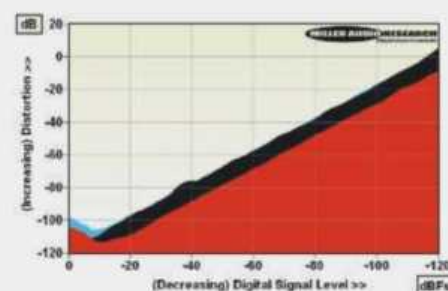
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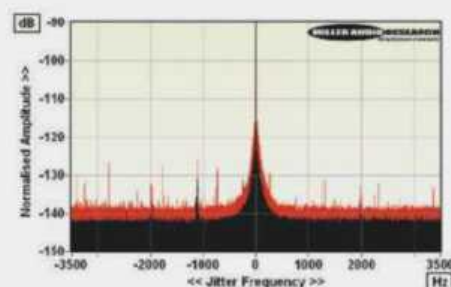
PRO-JECT DAC BOX DS2 ULTRA

Tested with digital Filter 5 and in 0dB gain mode, the DAC Box DS2 ultra offers 2.5V from a 46ohm source impedance with an impressive 111dB A-wtd S/N ratio. We've seen AKM's AK4490 DAC deliver very low levels of distortion and jitter before [Hegel HD30, *HFN* Jan '16] and the same is true here – THD is just 0.0002-0.0006% at 0dBfs, falling to a minimum of 0.00008-0.0003% over the top 20dB of its range [all 20Hz-20kHz, see Graph 1 below] while jitter is just 10-15psec via S/PDIF and USB at all sample rates [see Graph 2]. Note this is correlated jitter and that the graphs do also reveal an uncorrelated, noise-like, jitter in the broadening of the peak at its base. Distortion also increases slightly (2nd harmonic) to 0.0007%/1kHz in 'Sound Mode 2' and to 0.0009%/1kHz in its (5.24V output) +6dB gain setting. Channel balance is within tight ± 0.05 dB limits and separation a very fine 125dB through the midrange.

The response, time domain behaviour and stopband rejection is governed by your choice of digital filter [see boxout, p71]. However, while the 'Slow roll-off' Filters 1-3 offer little time-domain distortion, they do *roll-off* very early and audibly indeed, the response being -10dB/10kHz to -30dB/15kHz with 44.1/48kHz media and -7.5dB/20kHz to -28dB/40kHz with 96kHz files! Fortunately, the minimum phase Filter 4 and traditional FIR filter 5 both function correctly, offering a full >135dB stopband attenuation and response(s) that stretch to -0.3dB/20kHz (48kHz files) to -1.0dB/45kHz (96kHz files) and -16.5dB/90kHz (192kHz files). Readers may download full QC Suite test reports for the DAC Box DS2 ultra (inc. every filter permutation), when available, by navigating to www.hifinews.co.uk and clicking on the red 'download' button. PM



ABOVE: Distortion versus 48kHz/24-bit digital signal level over a 120dB dynamic range (S/PDIF 1kHz, red; USB input 1kHz, black and 20kHz, blue)



ABOVE: High resolution jitter spectra with 48kHz/24-bit data over S/PDIF (black) and USB (red)

HI-FI NEWS SPECIFICATIONS

Max. output level / Impedance	2.68Vrms (5.24V +6dB) / 46ohm
A-wtd S/N ratio (S/PDIF / USB)	110.6dB / 110.5dB
Distortion (1kHz, 0dBfs/-30dBfs)	0.0006% / 0.0002%
Dist. & Noise (20kHz, 0dBfs/-30dBfs)	0.0009% / 0.0006%
Freq. resp. (20Hz-20kHz/45kHz/90kHz)	+0.0 to -0.3dB/-1.0dB/-16.5dB
Digital jitter (48kHz/96kHz / USB)	<10psec / <10psec / 20psec
Resolution @ -100dB (S/PDIF / USB)	± 0.1 dB / ± 0.2 dB
Power consumption	4W
Dimensions (WHD) / Weight	206x72x200mm / 1kg



ABOVE: Unbalanced analogue outs on RCAs offer two gain settings and are joined by DSD-ready USB, three optical and two coaxial S/PDIF digital inputs. Trigger connections are included while 18V power is supplied via a wall-wart supply

it's pretty close, especially with high-resolution music such as the recent Linn Records release of Scottish Opera's live *HMS Pinafore* in 192kHz/24-bit [CKD 522], which loses much of its sense of presence and event and becomes rather more of a warhorse. Get the filter choice wrong – and that means options 1-3 – and you may also find Mr Gilbert's clever libretto somewhat hard to follow. And after all, old jokes are still *good* jokes, and worth hearing.

SOUND MODE EFFECTS

That's unfortunate, as when the DS2 ultra is good, it's really *rather* good, as is clear with the HDtracks 192kHz/24-bit release of Stevie Wonder's *Original Musiquarium 1* [Tamlam/BMG MOTD2-6002]. The drums opening 'Superstition' fairly cannon out of the speakers, what little they lack in absolute extension more than made up for by the speed and attack the DAC can muster, while maintaining the clarity of the instrumental threads of a track.

However, I found little difference in the presentation offered by the DAC's three 'sound modes' (as if five filter options weren't enough!) beyond a slight softening as one moved up from 1 through 2 to 3. If I were using this unit long-term, I'd probably waste an evening or two experimenting with the various options, then stick to Sound Mode 1 and Filter 4, the latter giving the sound marginally more snap and slightly tighter image focus than 5.

Things are even pretty impressive with CD quality music, as one might hope: I loaded up Radiohead's newly released outing, *A Moon Shaped Pool* [XL Recordings XLDA790], and enjoyed the way the DS2 ultra unravelled the dense, mesmeric mix. It gave a good insight into what was going on within the wash of sound, and then upped its game to reveal even more as I switched from the

standard 44.1kHz/16-bit version to 48kHz/24-bit files of the percussive 'Burn The Witch'.

Pushing the limits of what the DS2 ultra can do is a bit tricky, given the relative lack of content beyond 192kHz/24-bit and DSD64. However, drawing on downloads of familiar albums from the useful 2L label 'Testbench', plus some albums from the always excellent NativeDSD.com, I was able to establish that, despite its slightly lightweight overall balance, this DAC Box was able to demonstrate the benefits of higher sampling rates not in the way one actually hears the music, but in the richness of the tone of instruments and the areas of presence and air.

Even with the simplicity of The Pipays' 'Jellyfish', from the NativeDSD '8 Ensembles In 1-Bit' compilation [JL002], which is no more than female voice and double-bass, recorded by the husband and wife team when some spare studio time was available, the higher DSD resolutions give the sweet, simple performance more space to breathe. This is all too clear when switching from, say, the DSD64 version to the DSD256. And *that* is what the DS2 ultra does so well. ☺

HI-FI NEWS VERDICT

Pro-Ject's DAC Box DS2 ultra is quite an achievement for the money, and what it loses to pricier DACs in absolute weight and conviction it claws back in the way it can reveal the differences between various file formats. However those just plain odd digital filter settings serve to undermine the good work elsewhere in the design: stick to Filters 4 and 5, and you'll get a better idea of what it can do.

Sound Quality: 79%





Soundsmith

Soundsmith Otello *High Output Cartridge*

The Otello is Soundsmith's entry level Fixed Coil design, realizing an affordable pathway into the world of high-performance cartridges. Built by hand like all Soundsmith cartridges, the Otello provides a perfect balance of tone and resolution at a great price. The result is a cartridge that is at ease with any type of music. Just slightly warmer than other Soundsmith designs, Otello yields a richness of timbre that is utterly beguiling with a level of speed and dynamic range that no other cartridge in this price.

£459

Soundsmith Zephyr MIMC *Low Output Cartridge*

The handcrafted Zephyr MIMC (Moving Iron for Moving Coil Preamps) is based on the world-famous Sussurro cartridge and captures the gist of the latter's sonic signature at a much more reasonable price. The Zephyr MIMC has been specifically designed to complement both unipivot arms and gimbaled bearing arms. Its sonic attributes include evenly balanced frequency response, dynamic shadings and remarkable detail retrieval; its slam will leave even the most die-hard analog buffs breathless.

£1419



Soundsmith Paua *Low Output Cartridge*

Featuring ultra-low internal moving mass, a specialized telescoping alloy cantilever and highly polished low mass nude Contact Line stylus, the Paua will add a unique quality of warmth and smoothness to any analog system without leaving behind all the critical details you want and need to hear. The Paua reaches new heights of stylus control and performance, as is confirmed by its incredibly high channel separation figures.

"Ledermann has created a true analog masterpiece" - Jeff Dorgay, TONE

£3599

Soundsmith Hyperion *Low Output Cartridge*

The HYPERION is the cartridge of choice for the most esteemed audio equipment manufacturers. Why? Because when they exhibit their gear at HiFi shows, they want their turntable, amplifier or speaker systems to sound the very best that they can! Peter Ledermann's radical design utilizes an actual "cactus spine" for the cantilever. The naturally tapered shape, stacked columnar fibers and desiccated resin damping fit the exact parameters of the perfect cantilever: Low mass, extreme rigidity, internal damping, and tremendous strength. Also available in a Dual Compliance Design for older Linear Tracking turntables as the HYPERION LT. HYPERIONS are offered with a choice of CL or OC-CL stylus.

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BEHIND THE MUSIC WITH HI-FI NEWS & RECORD REVIEW

Claudio Abbado *Conductor*

No musician can have been so loved by his players. **Christopher Breunig** looks back with admiration at a figure forced by illness to rethink the purpose of his life and work

You can watch endless films and go to concert after concert and still remain uncertain as to 'how does conducting work?'. With Claudio Abbado, who died at 80 on the 20th of January 2014, even some of the players were uncertain. 'He is attentive to what individual players suggest and he's better than anyone else in moulding that into a logical whole. I don't know *how*...' said one of his Berlin principals.

And in Paul Smaczny's 2004 documentary *Claudio Abbado – Hearing the Silence* [EuroArts 2053279] Abbado's close friend, the [Downfall] actor Bruno Ganz struggles to reconcile the elegance, and a 'huge kind of distance, which he could overcome in a second', and the atmosphere at Lucerne concerts where a whole audience was drawn into a complete raptness.

That documentary shows excerpts from an early Stravinsky

→ Abbado's first LP with Martha Argerich – now on Speakers Corner – was issued in 1967

← Claudio Abbado was principal conductor of the LSO and then Karajan's successor at Berlin



rehearsal where we see a fairly conventional approach: criticisms of ensemble, tempi, early entries, etc. From 1967 there's a televised Beethoven 'Emperor' Concerto with a young Maurizio Pollini and the RAI Orchestra, Rome – Abbado's movements unremarkable, quite 'bandmasterish' even [www.youtube.com/watch?v=BNikyNOwHNI].

Political idealists, they were taking music to industrial workers in Italian factories at that time. For DG they would later record the piano concertos by Bartók (Nos 1 and 2 only), Beethoven, Brahms, Schoenberg and Schumann.

Abbado's debut concert with the Vienna Philharmonic came in 1965. He had studied music first at the Milan Conservatory and from 1957 at the Vienna Academy of Music, where his conducting tutor was Hans Swarowsky (who made an interesting Mahler Fourth for Supraphon). With VPO rehearsals closed, even to students, he and Zubin Mehta joined the Musikverein choir, so that they they could watch Karajan, Krips, Scherchen, Walter, et al, preparing the great works.

Abbado's first recording with the orchestra was of Beethoven's Symphony No 7 (Sofiensaal; Feb '66). It's reissued in the 7CD set 'The Decca Years' [4785365]; EMG's *Monthly Letter* review praised its 'dignity, vitality and sensitivity' adding that Abbado 'allows the VPO time to play'. There would be a complete late-'80s Beethoven cycle taken from Musikverein concerts: lovely Klimt LP sleeves, but reviewers felt you lost a sense of continuity by virtue of editing.

Far better was the Berlin Philharmonic cycle from 2000, where Abbado had used the

Jonathan Del Mar Edition; however, Abbado preferred later performances of Nos 1-8 given at the St Cecilia Academy Rome and this set, with the same Ninth,

comes as DG 4775864 (5CDs), or EuroArts 205 7378 (4DVDs).

LONDON AND BERLIN

Born in Milan, with musically gifted parents and siblings, at 15 Abbado had met Bernstein, whom he later assisted in New York for five months (an improbable duo?), having won the 1963 Mitropoulos Prize in a conductors' competition.

His UK concert debut with the Hallé in 1965 was followed a year later with his first LSO concert and he was soon recording with them (Decca and DG). After a four-year spell as Principal Guest Conductor he took over the LSO from Previn in 1979, staying until 1987. Some of the players disliked his diffidence in rehearsals and that, notwithstanding the costly 'Mahler, Vienna and the Twentieth Century' Barbican series of 1985, he recorded Mahler in Chicago and Vienna instead. The LSO

"You heard more of the score from top to bottom" says Blacher

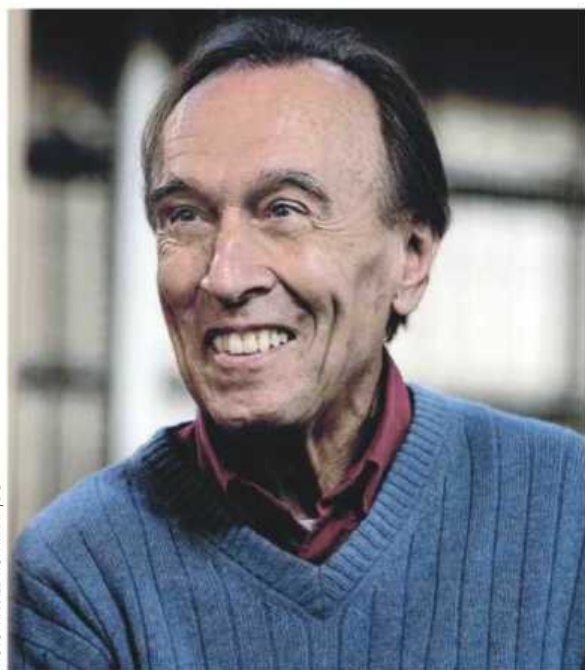


PHOTO: HARALD HOFFMANN/DG

didn't get its cycle until the abysmal efforts of Gergiev on LSO Live!

Elected by the players as Karajan's Berlin Philharmonic successor in 1989, Abbado effected many changes: bringing in 70-80 younger musicians and new modern repertoire (Nono, Rihm, Schoenberg, *et al*), creating a more transparent sound – 'A more structural approach has taken over. You hear more of the score from top to bottom' remarked concert master Kolja Blacher – and developing an atmosphere where everyone relished working together. 'It's a culture of joint music-making, making music *together*', said Abbado himself. He was never 'Maestro', simply 'Claudio'.

THE LUCERNE CHAPTER

Nonetheless he surprised the Berliners after 12 years by not renewing his contract. Instead, in 2003, working with Michael



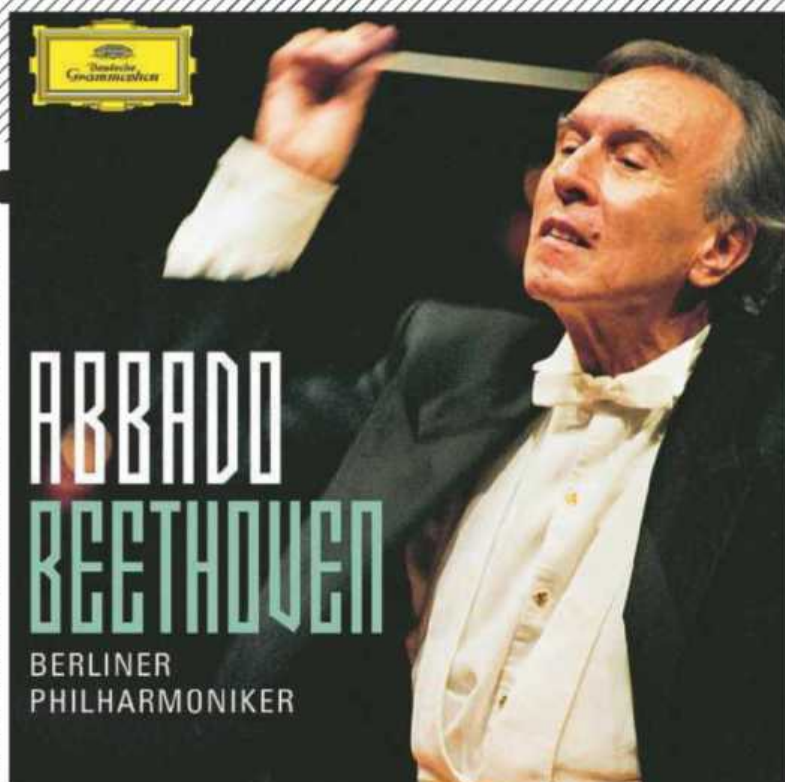
PHOTO: DEUTSCHE GRAMMOPHON

Haefliger (son of the tenor, Ernst) he re-formed the Lucerne Festival Orchestra, based on his Mahler Chamber Orchestra but with Berlin Philharmonic luminaries and others such as clarinettist Sabine Meyer, cellist Natalia Gutman, members of the Hagen Quartet... a deluxe ensemble fitting for the new KKL concert hall.

The original Lucerne orchestra, founded in 1938 (Toscanini conducted their first concert), and comprising the best Swiss orchestral players, had finally lost favour, audiences preferring visiting groups. Abbado had made his debut there in 1966, and Audite has an excellent Beethoven/Schubert/Wagner Lucerne compilation CD [95.627] – the *Siegfried Idyll* was BBC Radio 3's library choice. (YouTube has a worthwhile documentary about its history and renaissance.)

➔ Last July the nine Beethoven symphonies, the piano concertos and other works were repackaged as DG 4794642

➔ Abbado with his friend, pianist Maurizio Pollini. Their recordings together include concertos by Bartók, Beethoven, Brahms and Schumann



Nearer home, Abbado became Artistic Director of the Orchestra Mozart when he was 71. This Bologna-based chamber orchestra provided an opportunity for DG to record Abbado's more developed readings of Bach's *Brandenburg Concertos* [4778908], seven Mozart Symphonies [Archiv 4777598/4779792] and Schubert's 'Great C major' [4794652]. There is also a very fine Schumann Symphony No 2, recorded live in Vienna [4791061]. Italian government funding ceased, I believe shortly before Abbado's death, but it's now hoped that crowd-funding will revive it.

In 2000 Abbado underwent extensive surgery for stomach cancer: 'I had to take a few weeks

off,' he said in interview, but 'I said to the musicians, you're my best medicine!'. Later, he confided to Sir Simon Rattle that 'I still feel that music saved my life in that time!'

As his Mahler CO timpanist suggested, 'In some way, this illness has given him additional strength'. It was certainly a fruitful Indian Summer. Debussy's *La Mer* and Mahler's 'Resurrection' Symphony, Lucerne 2003, were musically stupendous if inadequately transparent in sound [DG 4775082]; but so much followed, up to the Bruckner Ninth from the last concert [DG 4793441] and Mozart K466/503 with Argerich – the first pianist he'd recorded with, back in 1967. A touching symmetry. ☺

ESSENTIAL RECORDINGS

Beethoven/Berg Violin Concertos

Harmonia Mundi HMC902105
Outstanding performances by Isabelle Faust with the Orchestra Mozart (she plays Beethoven's 'timpani' cadenza).

Brahms: the four Symphonies, etc

DG 4356832 (four discs)
This is now my preferred (Berlin) cycle; it supersedes earlier Abbado recordings. The set also has the *Haydn Variations*, *Academic* and *Tragic Overtures*, the *Alto Rhapsody* and three other choral pieces.

Bruckner: Symphony No 1

Accentus ACC30274 (CD); ACC40274 (180g LP)
A work long associated with Abbado, although

this is the 1891 'Vienna' edition, live with the Lucerne Orchestra, whereas his two VPO versions were of the revised Linz/Nowak.

Mahler: Symphony No 9

Accentus ACC20214 (DVD)
From a 2010 performance with the Lucerne Festival Orchestra, arguably Abbado's most profound realisation – hall lights dimmed as the finale's embers die away. (CD choice: DG 4716242, live Berlin Philharmonie.)

Prokofiev: Romeo and Juliet (excerpts)

DG E4534392
Equally superb playing and recording in this 68m selection from the ballet and Suites, in dramatic order.

Vinyl Release

BEHIND THE MUSIC WITH HI-FI NEWS & RECORD REVIEW

Neil Young *Everybody Knows...*

The LP that kick-started Neil Young's career as a solo artist is now available on 180g vinyl. **Steve Sutherland** takes a fresh listen and hears the early cries of Grunge

Whenver two or more guitar geeks are gathered together and start a conversation about the immortals, a select few axes are sure to be eulogised.

There's the Muddywood, built by ZZ Top's Billy Gibbons from a cypress wood plank found at the site of the shack in Mississippi where blues legend Muddy Waters was born. According to Gibbons, 'It plays like melted butter'. There's Willie Nelson's Trigger, the Martin acoustic he's been playing so long its body's full of holes. When the IRS arrived to sell off his stuff for unpaid back taxes, Willie had his daughter duly spirit it away to a basement in Hawaii. 'It's now part of me...', declared Willie. 'When Trigger goes, I'll quit.'

FORMIDABLE SOUND

There's Jack White's secondhand J B Hutto Res-o-glas Airline, a cheapo plastic thing Jack loves. 'It makes me feel like I have to take something that's broken and make it work... an old guitar (has) already got soul inside of it.' There's BB King's S30

Gibson, Lucille, so called because that was the name of the woman two guys were fighting over at a gig he was playing in Arkansas in 1949 when the place went up in flames. 'It loves to be petted and played with...' coo-ed BB. 'It excites me.'

And then there's Old Black, the instrument responsible for the formidable sound of the album we're here to celebrate. They say a bad workman always blames his tools and, truth be told, there was a fair amount of banter along these lines in the rehearsal studio when Jim Messina was struggling in vain to get anything resembling a tune out of this guitar he'd recently purchased. Feeding back, fighting back, uncontrollable, no matter how hard Jim fought the damn thing, it just wouldn't be tamed to play along.

At the time we're talking about Jim was a guitarist in Los Angeles - an hipster outfit Buffalo Springfield alongside Stephen Stills,

'Young plugged it into his 1959 amp... the room began to vibrate'

STEVE SUTHERLAND

Steve edited NME from 1992-2000, the Britpop years, launching NME.com and reviving the NME Awards. Previously he was Assistant Editor on Melody Maker. Among his many adventures he has been physically threatened by Axl Rose, hung out awhile with Jerry Garcia and had a drink or two with Keith Richards...



Richie Furay and Neil Young. The beast in question was a second- (or third- or fourth- or more?) hand 1953 Gibson Les Paul Goldtop of uncertain provenance which someone at one stage had painted black in the repair shop. That paint was now all bashed up and peeling off but aesthetics, of course, weren't the point. 'It sounded like hell,' Jim recalled years later.

The exact details and date of the fateful transaction have been lost in the mists

of time but this much is certain, sometime between late 1967 and early 1969, Neil Young acquired the monster he christened Old Black.

By some accounts, Young bought it off his bandmate for 50

bucks. Some others have it that he handed over an orange Gretsch 6120 Chet Atkins in exchange. Whatever, here's what happened next: Young took it home and then plugged it into his 1959 Fender Deluxe amp. 'Immediately the whole room started to vibrate... I went, 'Holy s**t!' I turned it halfway down before it stopped feeding back.'

GLORIOUS MAELSTROM

What Young instantly knew was that the two had become one, that something had fused between the noise he was carrying around in his head and the noise this hunk of wood was squalling. It was like it was yelling his emotions - like it was part of him; his Excalibur, just waiting for its rightful owner to come and stake claim.

What he surely can't have known is that the glorious maelstrom shaking the room would become the bedrock of his signature sound for the ensuing five decades; a sound endlessly emulated but never matched, a sound so famous whole musical movements and outsider philosophies have been built around it.

Truth be told, Old Black and Young were pretty alike at this point, both waifs and strays. Young was coming off the back of



GARY BURDEN

Neil Young caught on camera in the 1970s. This June sees the 70-year-old singer embark on a series of dates across the UK which take in Glasgow, Belfast, Leeds and London



➔ Priced £29.99, the 180g reissue of Neil Young's *Everybody Knows...* is available online at www.amazon.co.uk

the acrimonious break-up of Springfield and an underwhelming solo LP, uncertain of his next step. He'd recently hooked up with another bunch of footloose renegades who'd recorded one forgettable album under the name of The Rockets and also seemed to be drifting nowhere.

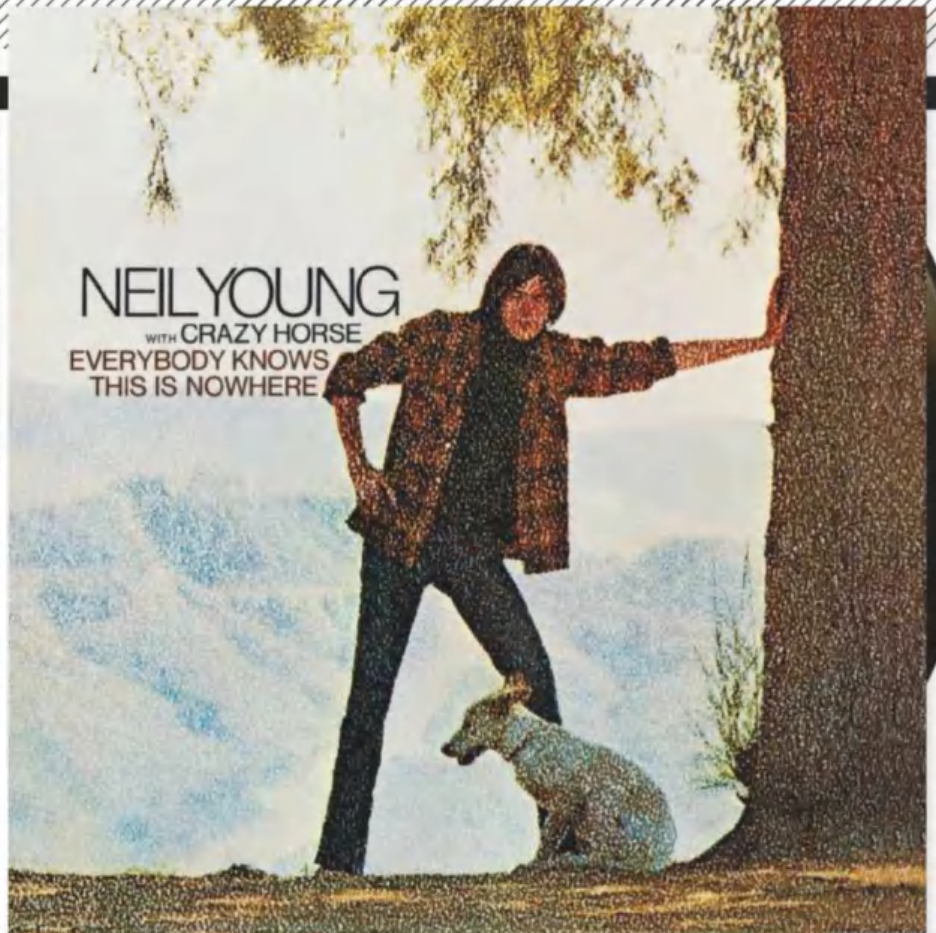
If Young had any notion at all of what to do next, he was harbouring a vague notion of forming an American Rolling Stones and for some strange reason only he could see, this outfit seemed to fit his bill. They were rough, raw and extremely rudimentary but, like Old Black, once they locked into a groove they produced a thunderous racket.

RAGGLE-TAGGLE

So Young coerced three of The Rockets – bassist Billy Talbot, drummer Ralph Molina and, cream of the crop, whipsmart guitarist Danny Whitten – to join him in the recording of what was planned as his second solo effort. He named this new band Crazy Horse after the legendary Oglala Sioux chief who led a victorious war party at the Battle Of Bighorn. And in this new outfit's honour, Young applied a torn-off tape strip above Old Black's pick-ups, sporting a slogan which read: 'It ain't easy bein' a f***in' Indian!'

Producing was David Briggs, another kind of accidental arrival who'd done a few records no-one remembers when he picked up a hitch-hiking Young in his army personnel carrier. They immediately synched in their shared fetish for clapped-out classic cars (Young drove a hearsel!) and the perverse notion that the wilder it got, the more worthwhile.

The raggle-taggle group convened in Wally Heider's, a funky new studio where Jefferson Airplane had just done *Volunteers* and Creedence Clearwater Revival had recently fashioned their ace *Green River* LP, and proceeded to get down to a basic *modus operandi*. This consisted of Talbot and Messina holding down a series of



interminably pedestrian grooves which tended to speed up and slow down depending on the levels of excitement being generated by Young and Whitten who appeared to be engaged in some stunning sonic mating ritual. Thus stoner rock and, later, Grunge were born.

GUITAR VALHALLA

The ensuing album, 1969's *Everybody Knows This Is Nowhere*, owes its rightful reputation as one of the greatest ever made largely down to its three most jamming tracks which, for the standards of the time, sounded as much *hewn* as performed. The first we encounter is 'Cinammon Girl', the opening track and, of the three, the most rooted, albeit loosely, in traditional pop verse-chorus structure.

Rampant, celebratory and lyrically hallucinatory, it was penned, like the other two songs, while Young was laid low in Topanga with a 103° temperature and is famed for its guitar interplay, especially the one-note leads.

The second of our mighty trio is the awesomely murderous 'Down By The River', nearly ten minutes of guitar Valhalla with Young's keening vocal for the first time aligned with the music to create a convincing emotional reality.

The final soiled gem is 'Cowgirl In The Sand', another marvellously indecipherable stagger and romp.

The title track is ragged C&W, 'Round And Round (It Won't Be Long)' a woozy ballad, 'The Losing End (When You're On)' a sorrowful slab of open-heart surgery on a Hank Williams tip, while 'Running Dry (Requiem For The Rockets)' weaves another Rocket, Bobby Notkoff's violin, into the melancholy mix.

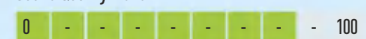
Subsequently Whitten succumbed to heroin but the rest have remained Young's faithful crew down the years. He's done more great stuff, of course, but *Everybody Knows...* remains defiant and proud, top of his mountain. ☺

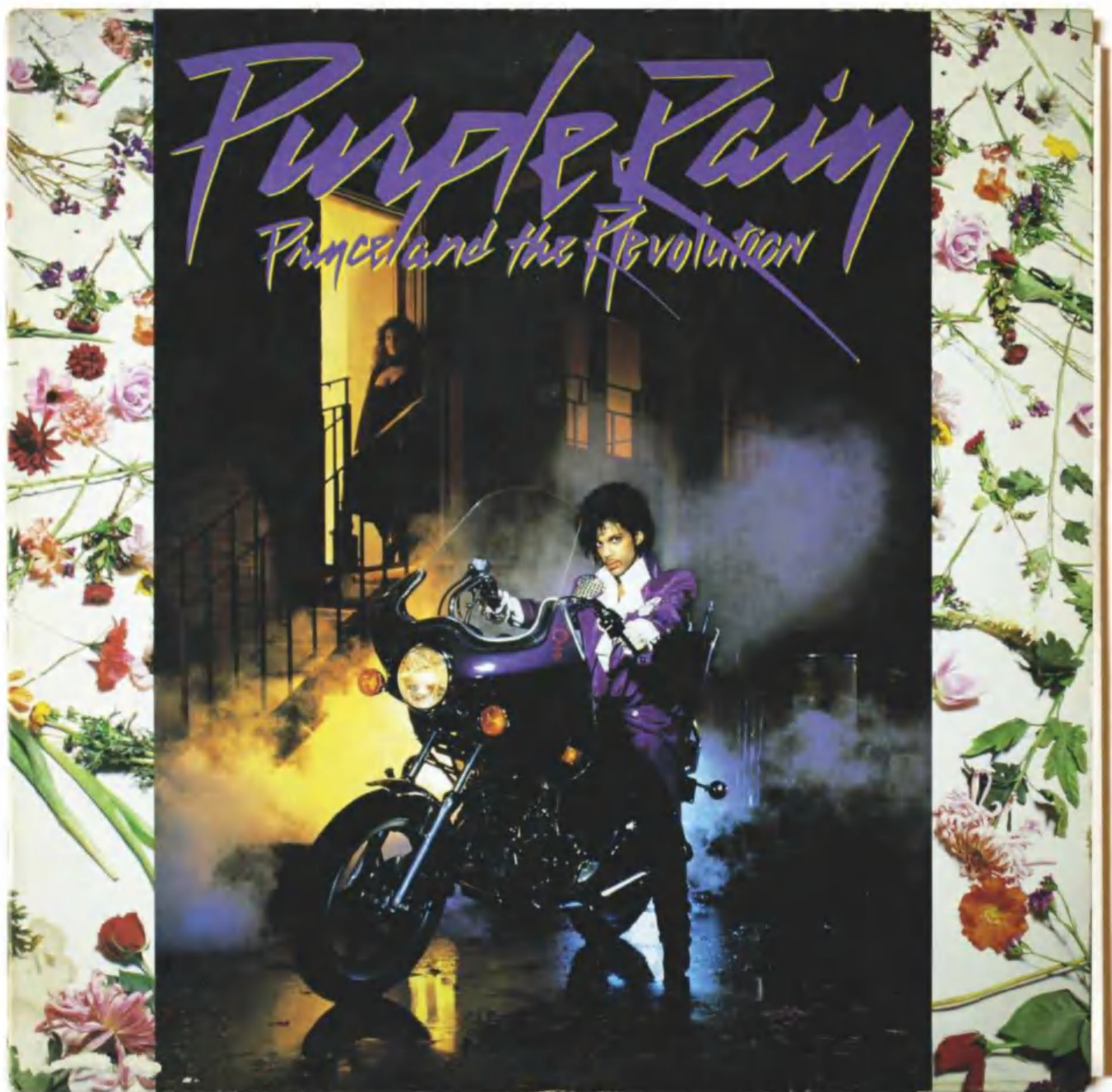
RE-RELEASE VERDICT

Released on Warner Bros/Rhino, this 180g reissue boasts a thick cardboard sleeve with original artwork and, if ordered from Amazon, includes a voucher to download an MP3 version of the album under the company's AutoRip scheme.

Our copy exhibited no playing issues and we could find no noticeable weaving or warping of the vinyl. Soundwise the presentation was fluid with instruments well separated. This is a straightforward yet attractively presented pressing, if slightly on the pricey side. HFN

Sound Quality: 75%





Prince *Purple Rain*

The soundtrack to a semi-autobiographical film, Prince's sixth studio album came packed with signature songs and a soaring power ballad lasting over eight minutes. It was this astute mix of commerciality and emotion that would take him to global superstar status...

Words: **Johnny Black**

The arguments over which of Prince's albums stands as his definitive statement will run and run, with *1999* and *Sign O' The Times* both deservedly high on the list, but there's no doubt that the album which established him as the creative superstar of the '80s was *Purple Rain*.

It's almost impossible to separate the album from the film of the same name because *Purple Rain* was conceived in the wake of Michael Jackson's ground-breaking, cinematic 'Thriller' video, and at the dawn of the impact of MTV.

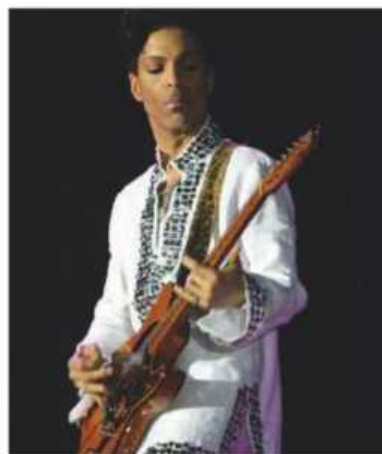
Rightly understanding that those two factors would be paramount in shaping the future of popular music, Prince conceived of the album and the movie as virtually a single entity, each integral to the whole.

THE REVOLUTION

His previous albums had been, effectively, solo performances with Prince using his mastery of the studio to multi-track all of the musical parts. For *Purple Rain*, however, he decided it was time to be seen as the leader of a band which he named The Revolution.

Alan Light, Prince's tour manager at the time, reckons, 'I think he understood that to deliver the impact he wanted with *Purple Rain*, the image of him as a badass guitar player fronting a real band was something that would resonate much stronger with rock fans than the image of the mad funk genius.'

The creation of *Purple Rain*, therefore, became a collaborative effort that consciously integrated



Side one of the original LP, released in the US on Warner Bros



(Top) WBS press shot of the singer

Promo still from the film Purple Rain

Matt 'Dr' Fink standing with band members (rear, second from left) in this shot for the Lovesexy album in 1988

Prince live on stage at the Coachella Valley Music and Arts Festival in April 2008



live performance elements that would carry through into the movie and the tour that followed.

'The whole summer of 1983, we were holed up in a warehouse in St Louis Park,' remembers Revolution keyboardist Matt 'Dr' Fink. 'We were rehearsing the material that he brought in, and we were also co-writing some of it.'

At the same time we were working with an acting teacher and a dance instructor. It was a good three months of work, leading into the filming in the fall of 1983.'

The concept was perfect for the era, but ultimately the whole edifice would stand or fall on the quality of the songs. The title track gives an indication of how Prince was thinking. His 1999 tour had followed one by Bob Seger into several mid-West arenas, and he became intrigued by what it was that made Seger so popular.

Matt Fink suggested that it had a lot to do with Seger's mastery of the anthemic rock ballad. As a

consequence, says Alan Light, 'He really set out to write a big, arena-scale power ballad. The result was "Purple Rain". Of course, the end result exceeds even Prince's initial

target – while the chords and structure begin from a very classic, accessible, almost country-music style, the voicings

and arrangement, and then that incredible vocal and guitar solo, make it much more than just a generic rock ballad.'

OPEN MOUTHED

The finished track was put together in a single day in that aforementioned warehouse near Minneapolis and in August 1983, the song was premiered during a gig at Minneapolis nightclub First Avenue.

'Mouths were open, people were stunned and perplexed,' stated

"Badass guitar player would resonate more than funk genius"

eleanor mcevoy

naked music



Diverse vinyl DIV052LP (180 grm)

ALBUM REVIEWS: VINYL

ELEANOR McEVoy NAKED MUSIC

In February, the CD of this lost out to Tony Bennett for Album of the Month... the LP has no challengers. As you'll recall, this is undiluted, lean McEvoy with sparse use of an electric piano, acoustic or electric guitars, tapping on an acoustic guitar and singing a cappella, the songs self-penned or co-written with Lloyd Cole or Rodney Crowell. Heady stuff for that alone, but this has even more resonance for me. I heard her play a selection of the tracks armed only with guitar, at a gallery showing paintings by the artist who inspired them. Rushing home to hear it on my system, hell, yeah- it's as close to 'real' as you can get, short of seeing her live (which I recommend).

Unbridled, intimate gorgeousness.

— Ken Kessler, HiFi News

"Eleanor McEvoy is one of those artists who can do no wrong... what a voice!"

— Alex Lester, BBC Radio 2

"A clutch of fine songs... there seems to be nothing this girl can't try her hand at"

— Acoustic magazine

"A master craftswoman at work, her songs as evocative as ever." — The Irish Post

"Nothing short of a classic"

— Maverick magazine ★★★★★

"Eleanor at her best... a treat."

— Rock Society magazine

"Naked Music is an excellent album from one of our finest performers"

— R2 magazine ★★★★★



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VINYL ICONS

PRODUCTION NOTES

Although several *Purple Rain* tracks, including 'Baby I'm A Star', 'When Doves Cry', 'Computer Blue', 'Darling Nikki' and 'The Beautiful Ones', were recorded at Sunset Sound in Los Angeles during January 1984, the cuts that are most firmly lodged in the public consciousness all came to fruition at The Warehouse, a concrete-built structure on Flying Cloud Drive, just off Highway 7 in Eden Prairie, a nondescript suburb of Minneapolis, in the autumn of 1983.

Prince had built a soundstage and recording studio inside the cavernous building, whose naturally reverberant sound is best heard on 'Let's Go Crazy'. 'On one side of the warehouse was Prince's huge stage,' observed Mark Cardenas, keyboardist of Prince protégés The Time. 'On the other side was The Time's little club set-up. It was a reminder of how big Prince was and how little we were.'

Susan Rogers moved to Minneapolis in the summer of 1983 because, 'I had been working for Crosby, Stills & Nash as a maintenance tech when I heard that Prince was looking for someone to work with. I jumped at the chance. He wanted me to remove his home console and put it in this warehouse, which seemed a little crazy, but we managed to make it work. I mean, nobody had really done that before.'

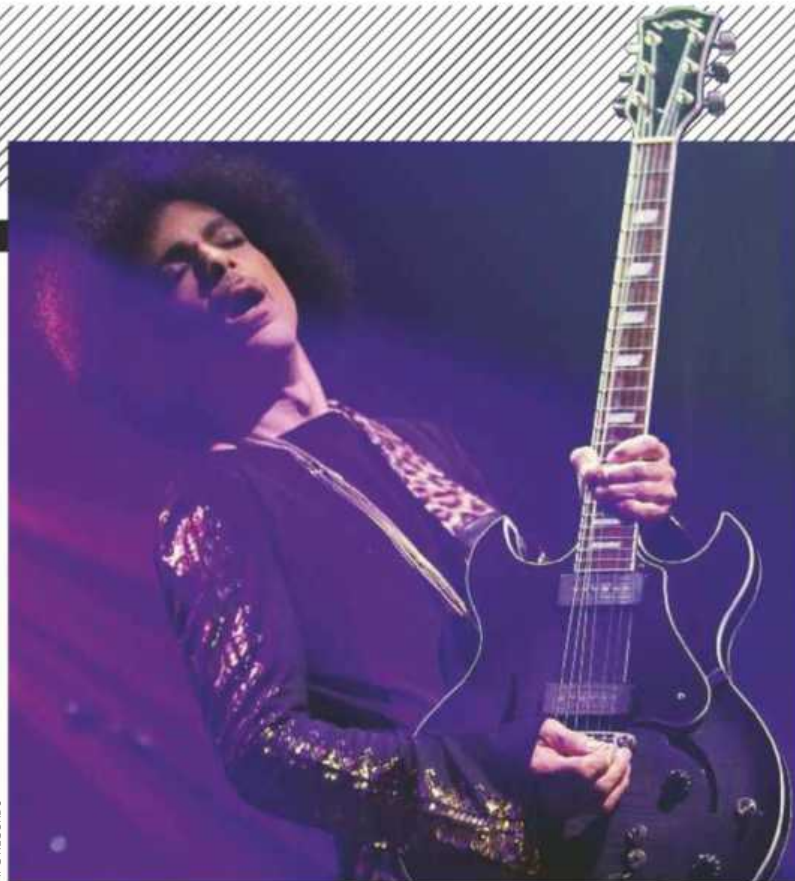
The drummer in Prince's band, Bobby Z, has recalled that, 'What Prince was doing was unique. He put this board right in the middle of this very echoey place, and rolled tape without giving the technical aspects of it any real thought.'

'There was never any proper separation between the board and the instruments. If it sounded OK, that other just didn't matter to him. He believes in spontaneity and getting good performances, not whether a mic is placed properly.'

On *Purple Rain*, the results speak for themselves.



NPG RECORDS



← New Power Generation (NPG) Records press shot of Prince live on stage with a Vox Series 77 guitar

← The First Avenue club in Minneapolis where Prince played 'I Would Die 4 U', 'Baby I'm A Star' and 'Purple Rain' for the first time to a live audience. The songs were recorded and appeared on the actual album, after having been polished at The Warehouse

↓ Poster that was included with the original LP shows Prince standing in front of a transparent Matt 'Dr' Fink (sitting) and drummer Bobby Z, who is leaning against the stairs

Prince subsequently. 'I saw the silhouette of someone over on the side and focused on this one stunned person who could see the future. That's where my "Purple Rain" solo came from, from playing to that person.'

'They brought in a live recording truck,' says Matt Fink. 'A lot of the basic tracks for the album were taken from that Minneapolis show. The other songs were pretty much Prince in the studio, like the song "When Doves Cry".'

'He just came in, cut it ["When Doves Cry"], and mixed it in a day,' remembers engineer Peggy McCreary.

"It was the most amazing thing I'd ever seen... He took the bass out. I remember him saying "No-one else will have the guts to do that." And he was right; it became a hit.'

NOT CONFIDENT

Removing the bass was indeed a radical move, but it was one about which he was not 100% confident, according to the then President of Warner/Reprise Lenny Waronker.

'He was uptight about it, and he wanted me to hear the record. I hadn't talked to him in years. I listened to it, and there was so much action going on and so much bottom end that he didn't need bass. I said, "It sounds good. Why

didn't you put bass on it?" He said, "When I make my records, I work on them 'til I think they're finished."'

A LONG NIGHT

Fabulous songs though 'Purple Rain' and 'When Doves Cry' were, Prince knew that the powerfully raucous hard rock of 'Let's Go Crazy' was the ideal cut with which to open the album. 'Prince pretty much put that entire arrangement together,'

reveals Matt Fink. 'I don't think we contributed that much to "Let's Go Crazy" beyond my piano solo. He's the one

that came up with that big "Dearly Beloved" preacher's opening. That still gets people going.'

'Take Me With U', sung as a duet with Prince protégé Apollonia, was

"It was the most amazing thing I'd ever seen... He took the bass out"





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Alternate Format Discography



➔ On stage at the Rally 4 Peace in Baltimore, May 2015

recorded in January of 1984 at Sunset Sound in Los Angeles, and proved a little trickier to complete.

'Apollonia couldn't sing, really,' explained engineer Susan Rogers. 'She was in the film, and he needed the song for the movie. He asked her to do the Vanity 6 song "Sex Shooter", and she starts singing "When I'm sixty-four" in this soft voice. I remember thinking, "This is goin' to be a long night".'

'Prince took her into another room for 15 minutes alone, and tried to coax her into being a little bolder, a little more assertive. By the time we recorded it, the whole thing just clicked. She had this campy quality to her voice that was perfect. She sounded like an actress pretending to sing.'

IDEAL SINGLE

Another superb track recorded live at First Avenue in August was 'I Would Die 4 U', whose snappy dance groove made it an ideal fourth single from the album.

'At first he wanted me to play the bassline manually,' notes Matt Fink. 'We tried it during rehearsal first, which I could pull off, but it was not easy. Sometimes I would get off rhythm a little bit because you had to be so spot on, and you had to play it with two hands!'

In the end, neither Fink nor Prince could perform the bassline convincingly, so they resorted to sequencing it. 'I had the sequencer ready to go during the live show and then all Bobby Z [keyboardist] would have to do is hit the play button. We did some groundbreaking technological things that day.'

Purple Rain is now in the Library of Congress's National Recording Registry list of sound recordings that 'are culturally, historically, or aesthetically important'.

Damn right it is. 🎵



Given Prince's untimely death on April the 21st this year, the current tally of 133 versions of *Purple Rain* will indubitably swell in the coming months, as his legendarily vast tape archives are plundered to locate rare out-takes, alternate versions and other 'rarities' that will give the biz another opportunity to pay tribute to the memory of His Diminutive Purpleness. Meanwhile, here's my rundown of what I consider to be the most interesting artefact already out there.

ORIGINAL LP (1984)

This showed up in American outlets on June the 25th 1984 [Warner Bros 25110-1]. Having been mastered by the estimable Bernie Grundman and pressed by the Allied Record Company (a sub-division of Warners) it sounded very good indeed.

Grundman did virtually all of Prince's releases and his work remained untouched for many years. This being the era of coloured vinyl, Warners simultaneously released a purple vinyl version [925 110-1] which enjoys a surprisingly good reputation for sound quality.



8-TRACK CARTRIDGE (1984)

Intriguingly, Warners released not one but two different versions of the 8-track. On Version 1 [W8 25110], as was the way with

this format, the tracks are hacked about, not only in terms of their running order but also to make them fit the timing restrictions of the endless tape. Thus both 'Purple Rain' and 'Computer Blue' have their beginnings and endings split across two different sides.

On Version 2 [S160175], the original track order is maintained, and it's 'The Beautiful Ones' and 'Baby I'm A Star' which suffer the splits. Collectors probably find such quirks charming. Regular music lovers will find it irksome at best.



CASSETTE (1984)

Cassette was still a significant format back then, so Warners supplied one [4-25110], employing Dolby HX Professional Headroom Extension and B-type noise reduction. Frankly, I've no idea what it sounded like but, if the coloured vinyl and CD versions are anything to go by, I'd lay odds on it being better than average.



ORIGINAL CD VERSION (1984)

Having been launched in 1982, CD was still the new kid on the block at this point, but Warners treated it with more respect than many other companies.

This release [9 25110-2] retained the Bernie Grundman master, but a slightly mysterious bunch of folks known as the WCI Record Group pre-mastered it for CD. Rumour has it that they used a dynamic range expander for this, though fans seem to agree they did a creditable job.



24K GOLD CD (1988)

This is a hard-to-find re-mastered Japanese limited edition [43P2-0004] which includes a lyric booklet picture sleeve, fold-out Japanese lyric insert and a gold embossed obi-strip. It's manufactured by the Warner-Pioneer Corporation.

20TH ANNIVERSARY DVD REISSUE (2005)

I know it's not a CD but, given that the album and movie were conceived by Prince as effectively one item, it's worth considering this 2-disc special edition which, as well as a nicely cleaned-up movie, offers three insightful documentaries, eight music videos and the tracks 'Take Me With U' and 'I Would Die 4 U'/'Baby I'm A Star' with extended instrumental jams.

180G VINYL REISSUE (2009)

Rhino did a fine job with this reissue (R1 25110), which was re-mastered by Kevin Gray at AcousTech Marketing in Camarillo, California, and pressed by Optimal Media Production in Germany.

The vinyl is protected by heavy duty pink plastic, and the inner sleeve is a gatefold with lyrics and graphics on the outside fold.

The end result was a significant improvement over the original 1984 vinyl, critics praising it for having a terrific overall sound.

FLAC DOWNLOAD (2013)

Rhino was also responsible for this 192kHz/24-bit download reissue. Let me suggest that you check out samples of the files posted at <http://forums.stevehoffman.tv/threads/digital-purple-rain-comparison-thread-with-samples.469515/>. These will facilitate comparisons between the original CD, the SHM-CD and the FLAC versions themselves.

Finally, a 30th Anniversary reissue of *Purple Rain* was much-touted but never appeared.

Meet the Producers

BEHIND THE MUSIC WITH HI-FI NEWS & RECORD REVIEW

New
Series

Rick Rubin

He co-founded the label Def Jam while still in his college dorm and his marriage of thrash metal and hip-hop would go to the top of the charts. This month **Steve Sutherland** celebrates the work of a record producer who claims to have 'no technical ability at all'

Rick ain't normal. He's strange by strange standards. He's got his own vibe. When was the last time you saw a bison in a studio?

Just in case you were wondering, paying these respects is Jay-Z, a man not exactly renowned for expressing his admiration of others.

Rick, of course, is Rick Rubin, the softly-spoken, bearded barefoot Buddha responsible for sculpting bits of Ice-T, Billy Squier, Mountain and Wilson Pickett into the mashed-down old-school hip-hop monster '99 Problems' – the brutally brilliant stand-out track on Z's 2004 *Black Album*. Jack White reverentially refers to it as, 'the story of America in a nutshell.'

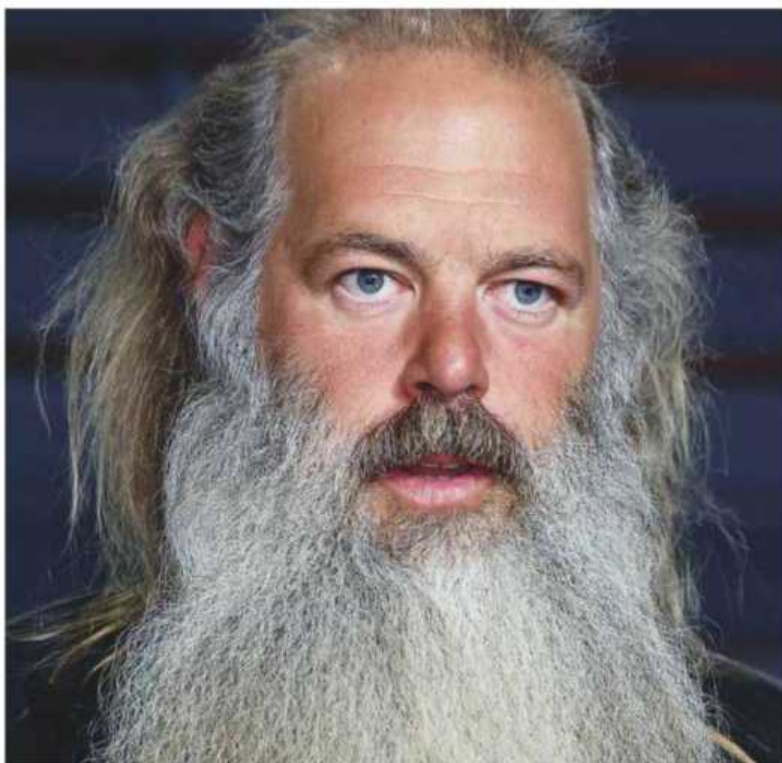
CREATIVE BLOCK

Another chap not greatly inclined to aim many accolades in any direction bar himself is Kanye West. West has taken to calling Rubin 'The God' after sending out an SOS with five weeks to go before the scheduled release of 2013's hugely acclaimed *Yeezus*. West was suffering a creative block. What Rubin heard was too many and too much. He advised West to cut the tracks and deconstruct them. 'Instead of adding stuff, try taking stuff away.' West did. And it worked. Fabulously.

Like Harvey Keitel's Mr Wolf in *Pulp Fiction*, Rubin'd honed in on the root of the problem and expressed the solution, employing the dual principles which have served as the foundations of his illustrious career – cross pollination of genres and merciless stripping back to the essence. In the business of rescuing legends, there is no one his match. He's the sonic doctor to the stars. But he didn't start out that way.

➔ Rick Rubin caught on camera in February 2015 at the *Vanity Fair* Oscar Party held in Beverly Hills, California. He celebrated his 53rd birthday in March this year

⬇ Kanye West's sixth studio album, *Yeezus*, which was released in June 2013. With just five weeks before the album's scheduled release date the production was stripped right back by Rubin, to subsequent critical acclaim



HELGA ESTEB / SHUTTERSTOCK.COM

Frederick Jay Rubin was born in 1963 to a pretty well-to-do family in Lido Beach, Long Island. An only child, he was into AC/DC and Aerosmith. His entry in the school year book read: 'I wanna play loud, I wanna be heard, I want all to know, I'm not one of the herd.'

Upon leaving school, he enrolled into NYU Film School, formed a punk rock group called Hose and, attracted by the excitement of the scene, started going to hip-hop clubs despite often being the only white guy present.

Hooking up with scenester DJ Jazzy Jay of the Zulu Nation, Rubin pitched in to learn the rudiments of hip-hop, producing T La Rock's 'It's Yours' in 1984 out of his dorm. Although Rubin loved hip-hop, he felt many of the tracks

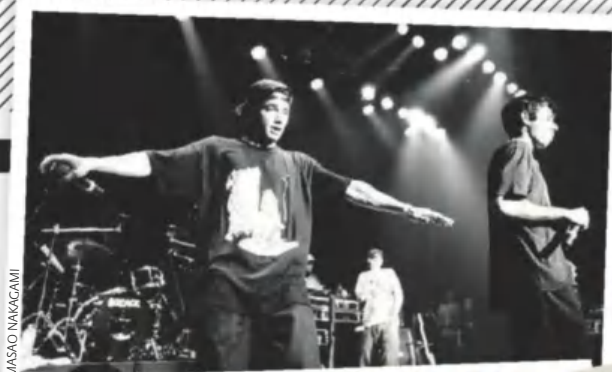
he was hearing were too disco and glitzy, so his effort with La Rock was a naked exercise in percussion and vocal, the sleeve deliberately reading: 'Reduced by Rick Rubin'. His label he called Def Jam.

BRILLIANTLY BRATTISH

LL Cool J's 'I Need A Beat' followed soon after, Rubin partnering with promoter Russell Simmons to grow his label's roster and persuade local punks The Beastie Boys that grafting their attitude onto hip-hop would make a thrilling, and profitable, hybrid in the shape of the brilliantly brattish *Licensed To Ill*.

Simmons' brother Run was the Run in Run DMC and, while producing their third album, *Raising Hell*, Rubin suggested they tackle a track off Aerosmith's 1975 LP, *Toys In The Attic*. At first Run resisted the 'hillbilly s**t', but Rubin persevered and when 'Walk This Way' was released as a collaboration between





the down-on-their-luck 'Smithers Steven Tyler and Joe Perry and the DMC crew, history was made.

'Walk This Way' became the first hip-hop track to breach the Billboard Top 5, saved Aerosmith's career and made Run DMC superstars, the fantastic video's high rotation on MTV introducing white suburban kids to the inner ghetto groove, a marriage of convenience between rock and rap which entirely re-invigorated modern American music.

Another notable Rubin triumph around this time was Slayer, an extremely heavy rock band previously cursed by muddy and indistinct production. Dispensing with all reverb and shortening the songs, Rubin created *Reign In Blood*, one of the heaviest things ever recorded. When Def Jam's distributor CBS balked over 'Angel Of Death', a song about Josef Mengele, Rubin got Geffen to distribute it instead – a sure sign that, while creating smash hits, Rubin would not be daunted in pursuing his more controversial enthusiasms, such as the gruesomely graphic Geto Boys and dopily misogynist Andrew Dice Clay.

Rubin quit Def Jam in 1988 and headed West to LA to form his own Def American label

↑ **Beastie Boys live at Club Citta Kawasaki in Japan**

← **Slayer guitarist Kerry King**

↗ **'It's Yours' – Def Jam's first release**

↗ **The Red Hot Chilis in 2011**

↘ **Rubin with Mourielle Herrera in 2016**

which would specialise in even more hardcore rock and rap. This was about the time I met him, spending the best part of a day running around LA.

What I remember most is that he had a huge stuffed bear in the hallway of his palatial home up in the Hills, that he played me loads of Beatles bootlegs at a time when the Fabs had quite fallen from fashion, that we lunched at Hugo's in West Hollywood where, being a health and meditation nut he brought his own pasta for the chefs to cook, and that he longed to work so much with heavy metal rockers AC/DC that he created his own version in The Four Horsemen, whose crazed singer Frankie Starr sadly died soon after as a result of a car crash.

Rubin ran Def American until 1993 when, seeing the word in a dictionary, he buried the 'Def' bit in a funeral service delivered by the Reverend Al Sharpton claiming death by mainstream. In the meantime, he took Red Hot Chili Peppers under his wing, installing them in a mansion in Laurel Canyon, rehearsing them for months, getting them to concentrate on writing proper, heartfelt songs.

The band emerged cleaner, leaner and tighter, the resulting album *Blood Sugar Sex Magik* a massive hit including 'Under The Bridge', a poem Rubin found discarded in one of Anthony Kiedis' notebooks which he cajoled the singer into turning into one of the band's most famous songs.

COLUMBIA PRESIDENT

In 2007, Rubin was invited to take over as President of the mega Columbia label, a position he accepted because he thought he

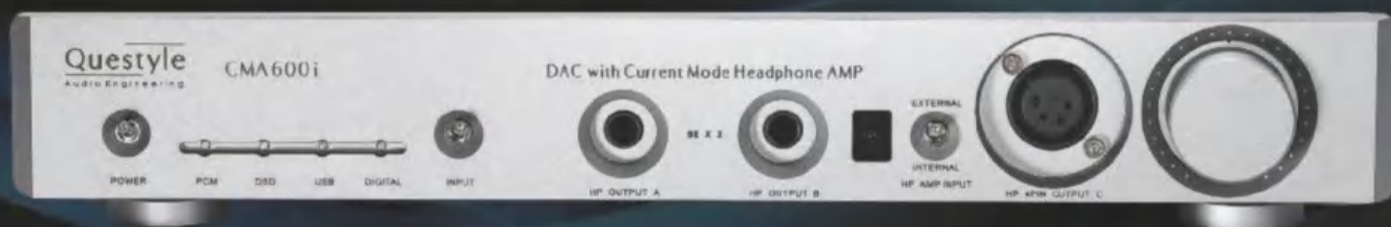
could make a real difference. 'Most people in this business don't care about music,' he declared. 'They're in the banking business.' Among Rubin's stipulations

when he took the job were that he would have no desk, no phone and could continue to work with any artist who took his fancy no matter what label they were on. He left the post in 2012.

'I don't even know what a traditional producer is or does,' he said at the time. 'I feel like the job is like being a coach, building good work habits and building trust... I do not know how to work a board. I don't turn knobs. I have no technical ability whatsoever. My primary asset is I know when I like something or not. It always comes down to taste. I'm not there to hold their hands or babysit...' ☺

"I do not know how to work a board. I don't turn knobs"





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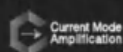
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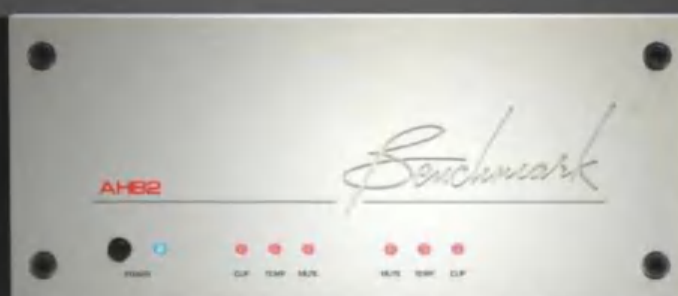
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MEET THE PRODUCERS

BEHIND THE MUSIC WITH HI-FI NEWS & RECORD REVIEW



1985

Run DMC & Aerosmith's 'Walk This Way' brings hip-hop into the mainstream and becomes a global hit, winning a Soul Train Music Award in 1987



1986

Another metal/hip-hop mix, The Beastie Boys' 'Fight For Your Right To Party' reached No 7 on the Billboard Hot 100. Rubin appears in the video wearing a Slayer t-shirt



1991

Discarded by the band's vocalist until Rubin persuaded him otherwise, The Red Hot Chili Peppers' 'Under The Bridge' went to No 2 on the Billboard Hot 100



2002

The single 'Hurt', by Trent Reznor of rock band Nine Inch Nails, is covered in 2002 by Johnny Cash with Rubin at the helm



2004

Released by the American rapper Jay-Z in 2004, '99 Problems' was Rubin's first hip-hop production in years and drew widespread critical acclaim



2012

Rubin works with ZZ Top. 'I Gotsta Get Paid' from the *Texicali* EP is a rewritten cover of a '90s hip-hop song



2012

The first single to be released from Lana Del Rey's *Paradise* EP is the ballad 'Ride'. Produced by Rubin, the extended play version enters the US Billboard 200 at No 10

much of the job is about creating an environment in which the artist feels safe so they can allow themselves to be more vulnerable. There's something very beautiful in seeing someone allowing themselves to be vulnerable. I think that, more than anything, is my job.'

AN AMERICAN GREAT

Never was this more true than in 1994 when Rubin took it upon himself to resurrect the forgotten Johnny Cash to his rightful place in the pantheon of American greats.

Working closely with the ailing artist, he helped cherry-pick the tunes and produced *American Recordings*, *Unchained*, *Solitary Man*, *The Man Comes Around*, and the posthumous *A Hundred Highways* and *Ain't No Grave* – a series of albums unrivalled in their emotional depth and delivery.

What most people remember is Cash's painfully intimate rendering of Nine Inch Nails' 'Hurt', but the whole long run is a testament to Rubin's claim that, 'We just wanted to do great music.'

He may have the Midas touch but, reassuringly enough, not everything Rubin touches turns to gold. In 2014 he put down \$3 million and bought Shangri-La, a beautifully minimal studio in Malibu with a room which could accommodate a whole band

playing together. Originally constructed in early 1976 for Bob Dylan, it was an idyllic location in which to record, and Rubin has put it to good use with Black Sabbath, Jake Bugg and Eminem.

However, our very own Adele took the unprecedented step of ditching much of the stuff she recorded with Rubin at Shangri-La in favour of the earlier demos she'd done with Paul Epworth and his team for her second LP, *21*.

And then there was also a bit of a farrago over Metallica's *Death Magnetic*, the album Rubin produced with such compression and density in

1998 that some, complaining there was no dynamic range, announced themselves against Rubin's uniformly loud 'brickwalling' and called for the album to be remixed.

OMNIPRESENT FORCE

But these are the exceptions that prove the rule. Rick Rubin rules. Or, as *The Daily Beast* recently remarked: 'It would not be an exaggeration to suggest that he is an omnipresent and priceless force in modern music.'

Rubin, of course, is somewhat more modest: 'What's important is to find music that is timeless,' he said recently. 'I still believe that if an



artist gains the belief of the listener, anything is possible. It will never be over, the music will outlast us all.'

While I was writing this piece, *NME.com* published a short interview with Ben Bridwell of the rather splendid Band Of Horses.

Ben was talking about how he was struggling to get his new, self-financed album finished when, completely out of the blue, he was cold-called by Rick Rubin, who he had never met.

Rubin told him he's been driving along when one of Ben's songs had come on the radio and he'd had to pull over it hit him so hard.

Next thing you know, Rubin invites Ben to visit and play him some of the new stuff and ends up mentoring the album, offering sage advice and, finally, getting Universal to bankroll it.

'He's got such a great ear,' opined Bridwell. 'Maybe the best ear that exists.'

↑ Johnny Cash's *American Recordings* was made at Cash's home, overseen by Rubin

↓ Tony Iommi (guitar), Ozzy Osbourne (vocals) and Geezer Butler (bass) of Black Sabbath



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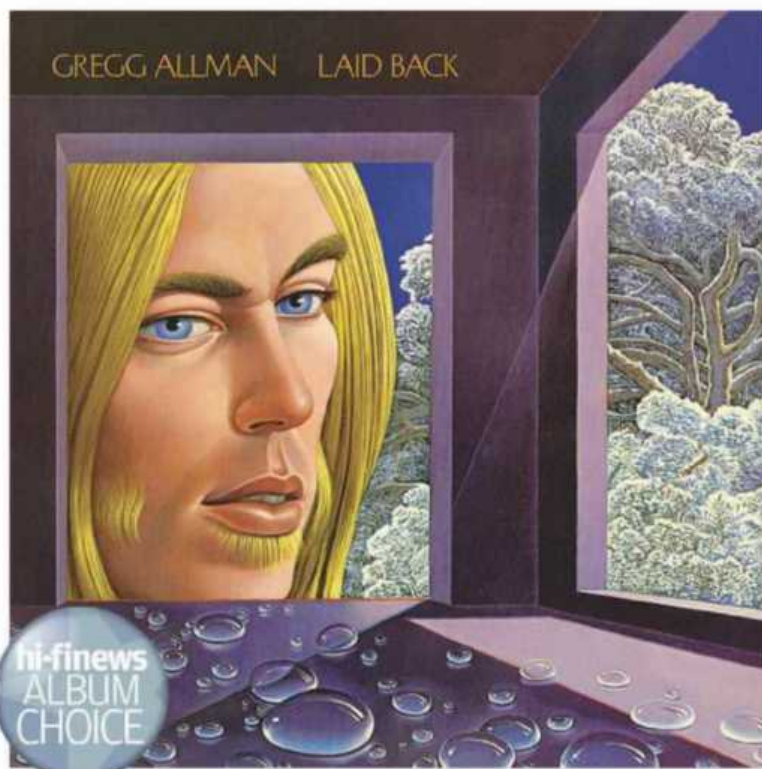
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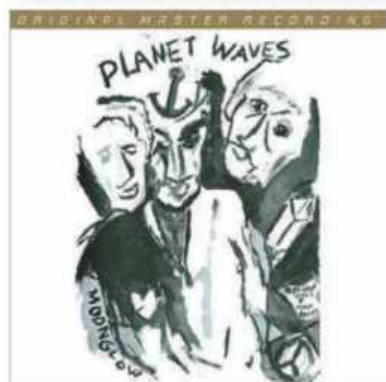
GREGG ALLMAN

Laid Back

Analogue Productions APP091 (200g vinyl)

Allman has only issued six proper solos since 1973, but this – his first – may be the best. Not to say that he's lacked critical success since then, with his latest a rich, blues-only feast, but this is an ear-opener because it's a stylistic bridge between The Allman Brothers and his solo career. However, because Gregg was lead vocalist for so many Allmans tracks, it sounds in places exactly like one of the band's efforts, especially a moody remake of 'Midnight Rider' and with the presence of assorted band members amongst other stellar players. Most impressively, this sounds simply fantastic so... yeah, it's OK to think of it as 'another audiophile Allmans LP' despite its moments outside of the group's style zone. **KK**

Sound Quality: 91%



BOB DYLAN

Planet Waves

Mobile Fidelity MFSL 1-433 (180g vinyl)

Another post-Golden Age Dylan LP worthy of reassessment, this 1974 album enjoyed the presence of The Band in its entirety – Dylan's best-ever accomplices. It's not rich with stand-out tracks, but it does feature two versions of the staggering 'Forever Young' and was a near return to form for Dylan after a couple of less than adored LPs. With The Band behind him, Dylan was, unsurprisingly, going to enjoy rootsy, earthy backing for a set of pensive and personal songs, but still with enough surprises to ensure it enjoyed initial success. *Planet Waves* may not have worn as well as *Blood On The Tracks*, but middling Dylan is still better than just about anything else. **KK**

Sound Quality: 89%



HARRY 'SWEETS' EDISON

Sweetenings

Pure Pleasure PPAN R52023 (mono; 180g vinyl)

Mono fans will get a kick out of the period disclaimer on this wonderful jazz set from 1958 about how stereo will not cause the LP to 'become outmoded'. Concerns about stereo vanish because Edison's gorgeous trumpet playing swiftly charms you with its expressiveness. This is so melodic, accessible and downright classy that you can wallow in the swing influence of his previous employer, Count Basie. It opens with the first appearance of the exquisite 'Centerpiece' and contains highlights such as 'Jive At Five' and the stunning 'Imagination' which are so evocative of '50s jazz that it seems like a soundtrack for a late film noir. **KK**

Sound Quality: 88%



THE LITTER

\$100 Fine

Sundazed LP5504 (180g vinyl)

This US cult band's second LP, from 1968, is adored by fans of garage rock and early psychedelia. Reminiscent of a number of the groups of the era and the genre, The Litter were heavily influenced by the British Invasion, especially the artsier element, so this concludes with nothing less than a nine-minute cover of The Zombies' 'She's Not There' – shades of Vanilla Fudge and Blue Cheer! Most of the set is original, however, oozing with the tropes of the period: scorching guitar riffs, addled lyrics, distortion, etc, etc. But then, those who love psychedelia would have it no other way. The surprise is the sound. Some tracks are muddy, but some are transcendent. **KK**

Sound Quality: 87%



AUDIOPHILE: DIGITAL



COMPACT DISC



SUPRAUDIO



DVD



BLU-RAY



VINYL



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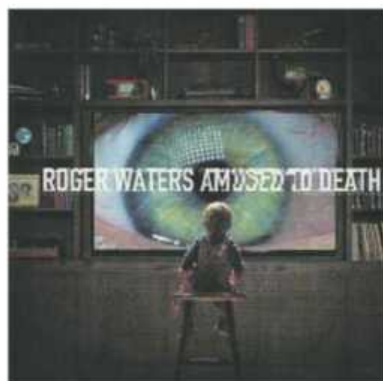
CARLY SIMON

Anticipation

Mobile Fidelity UD5000 2166 (stereo SACD)

Released mere months after her eponymous 1971 debut, Simon's second was a leap in quality in every way. By this time, with her confidence growing, Simon's role as a new kind of feminist – serious without being strident – made her music and message both accessible and worthy. With hindsight, we can see she was forging, too, the genre that would later include introspective singer-songwriters as varied as Aimee Mann and Suzanne Vega. A distinctive voice, gorgeously-crafted performances, memorable melodies, poetic lyrics rich with emotion: it may have served a university-graduates-who-became-yuppies demographic, but, damn, it's gorgeous. KK

Sound Quality: 89%



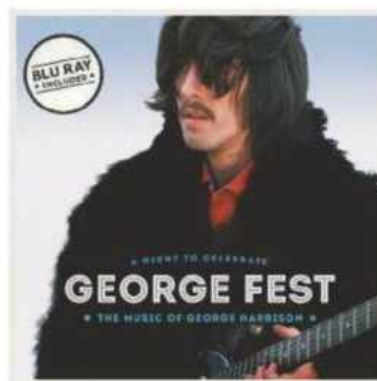
ROGER WATERS

Amused To Death

Analogue Productions 88765478842

This is the third solo studio album, released in 1992, by the former Pink Floyd bassist/vocalist. Waters told the BBC in an interview in 2013 that it should be regarded as the third part of a sequence with *Dark Side Of The Moon* and *The Wall*, but that is wishful thinking in the extreme. Then again, Waters' character is not under discussion. I find this too miserable to sit through, but must comment on the sublime sound, which is, after all, the point of the 2015 remastering. Alas, stellar guests aside, this is essentially for Floyd fanatics and audiophiles, who won't be disappointed. Dig out your best 'phones to savour the use of Q Sound. KK

Sound Quality: 90%



VARIOUS ARTISTS

George Fest: A Night To Celebrate

BMG/Hot Records 538187792 (two CDs + Blu-ray)

Oh, dear: a well-meaning tribute concert that, alas, sucks. However noble the intent, after the divine *Concert For George* performed by those who actually knew him, a bunch of contemporary artists showing their 'appreciation' of the late-Beatle seems forced. OK, son Dhani is involved, Norah Jones (daughter of George's mentor, Ravi Shankar) has a link to Harrison, and Brian Wilson is of the stature of the guests at the earlier concert, while Ben Harper and Heart's Ann Wilson are worthy enough. But 26 so-so covers by the likes of Black Rebel Motorcycle Club and a Blu-ray of the gig? No thanks. The best track is 'Handle With Care'. Which they should have done. KK

Sound Quality: 80%



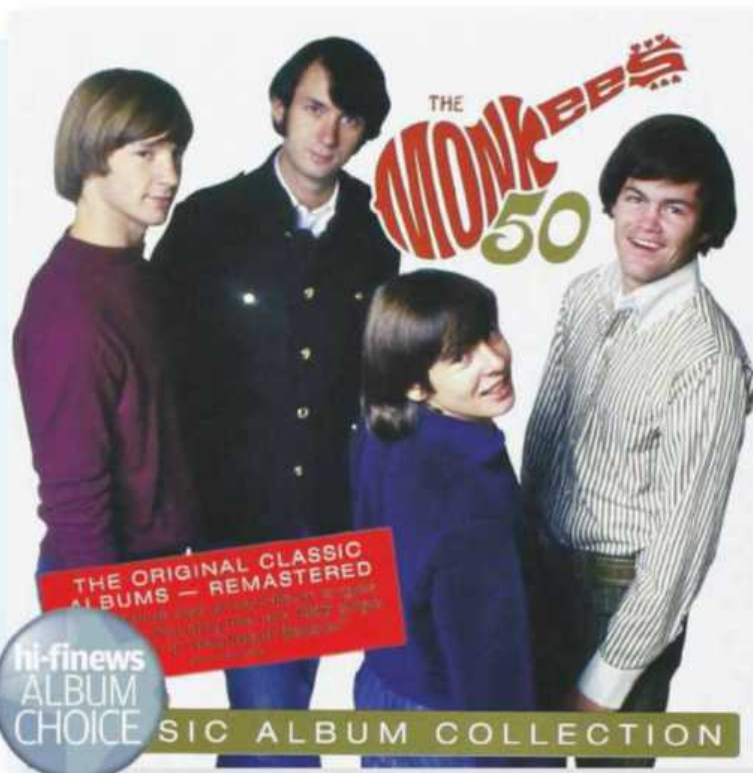
THE MONKEES

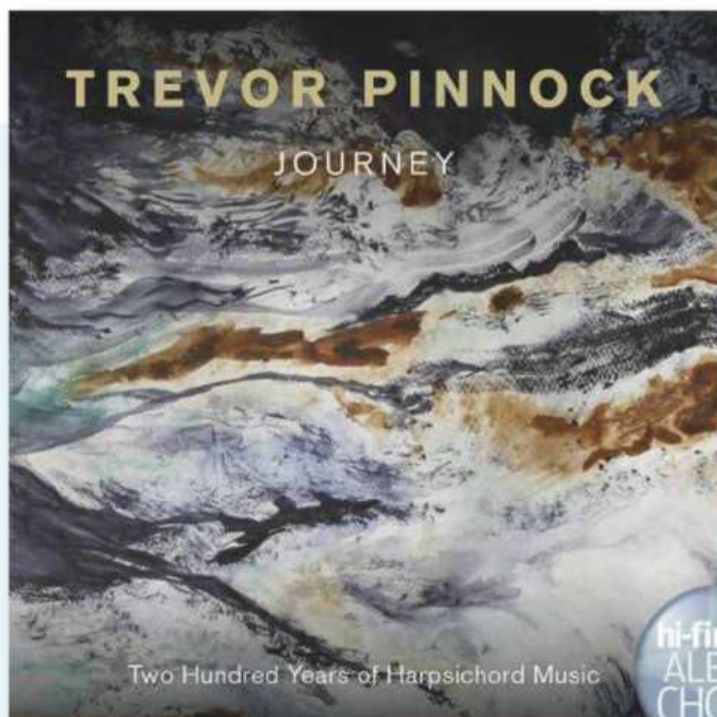
50 – Classic Album Collection

Rhino 081227949860 (10 discs)

So what if The Monkees were the original, pre-fabricated 'boy band'? They don't deserve the disrespect they've suffered for the past half-century because: 1) the group included real musicians in Nesmith, Tork and Dolenz; 2) they were backed by the finest studio players in LA (just like The Beach Boys); 3) they worked with truly incredible songwriters, including Carole King, Neil Diamond and Boyce & Hart; and, above all, 4) the music was terrific. This contains their nine studio efforts, from the eponymous debut to *Changes*, plus a tenth CD with 13 rarities. It may not cause you to bury your prejudice, but note that during 1967 they outsold The Beatles and The Rolling Stones combined. Daydream believers? Perhaps. KK

Sound Quality: 90%





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ALBUM
CHOICE

TREVOR PINNOCK

Journey (96kHz to 192kHz/24-bit, FLAC)

www.linnrecords.com; CKD 570

Marking his 70th birthday, this recital reflects both the journeys made by early composers from one country to another and those made by Trevor Pinnock in company with his preferred, rich-toned, 1982 American harpsichord modelled after an 18th-century Hemsch instrument, which he's been playing for 40 years. We haven't previously featured a solo harpsichord in this *HFN* section – recorded at the concert hall at Kent University, Canterbury, by Philip Hobbs in Aug '14, this

programme has pieces by JS Bach (*The Sixth French Suite*), Bull (his pictorial, galloping *The King's Hunt*), Byrd, Cabezón, Frescobaldi, Handel (a floridly decorated *Chaconne* in G), Sweelinck and Tallis, and ends with three Scarlatti sonatas. Pinnock – such a lovely musician – makes every line sing, his playing full of energy; and as tracks end you can just hear a very slight linking background noise. **CB**

Sound Quality: 95%



TRIO C TOT DE DERDE

Nitro-Nitro! (DSD64)

www.nativedsd.com; SKU TRIOC2011

Well, this album is an absolute riot and all delivered in sparkling sound quality. The fourth album by The Third is an infectious mix of klezmer, gipsy and Balkan folk music, played by the three members of the Dutch ensemble with real panache and enjoyment. Netherlands-based, the trio improvises, explores and just goes for it, violinist Carel den Hertog, accordionist Coos Lettink and clarinetist Caspar Terra having that wonderful combination of intuition, trust and an easy-going fluidity that only comes from a lengthy collaboration. Recorded for the band's own label almost five years ago in a resonant church acoustic, this isn't all music to get you up on your feet, the trio being just as impressive with the yearning and wistful as it is with the stomping stuff. This is an exuberant, attention-grabbing set, beautifully rendered in DSD sound. **AE**

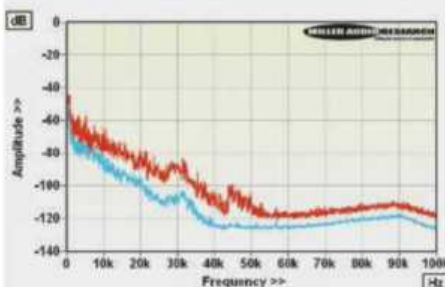
Sound Quality: 85%



OUR PROMISE

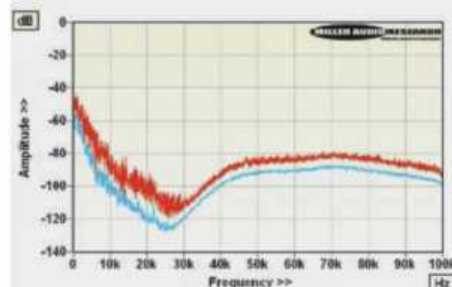
Following our Investigation feature [*HFN*, Jun '11] where we examined the claimed quality of high-resolution downloads, *Hi-Fi News & Record Review* is now measuring the true sample rate and bit-depth of the HD music downloads reviewed on these pages. These unique reviews will be a regular source of information for those seeking new and re-mastered recordings offered at high sample rates and with the promise of delivering the very best sound quality. (Note: asterisk in headings denotes technical reservation explained below.) **PM**

LAB REPORT



Tested in 192kHz guise there's excess bandwidth to capture the ~40kHz harmonic range of Pinnock's harpsichord and unused dynamic range, too, at this low recording level. Note bursts of (likely) spurious at ~30kHz and ~45kHz. **PM**

LAB REPORT



Recorded using a dCS 904 ADC (with DSD module included), this is a native DSD64 file. The sound of guitar, flutes, harps, bodhran and a bouzouki occupy a ~28kHz bandwidth until the unavoidable requantisation noise takes over. **PM**



COMPACT DISC

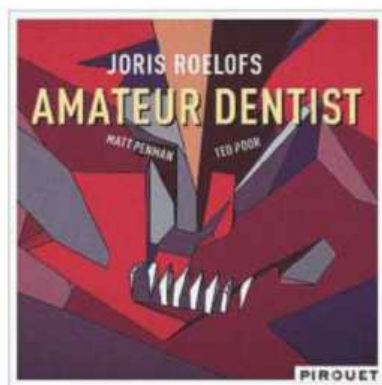
SUPRAAUDIO

DVD

BLU-RAY

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JORIS ROELOFS

Amateur Dentist (96kHz/24-bit, FLAC)

www.hifiresaudio.com; Pirouet PIT3090

Ignore the shiver-inducing overtones of the title of this album by Dutch bass clarinetist Roelofs and you're in for a treat. In fact, ignore the 'oh really?' reaction to the mention of bass clarinet. Having witnessed a killer set on that instrument by Courtney Pine not so long ago, I was up for hearing what Roelofs could do – and here, along with Matt Penman on bass and Ted Poor on drums, he delivers a set packed with instrumental colours, fine musicianship and plenty to keep a high-quality system busy, too. From the almost percussive lower registers of the instrument all the way up to its soaring solo potential, Roelofs keeps the attention, whether with the traditional jazz feel of tracks such as 'Broadway' and 'Pseudo Bebop' or the very short but very chilling title track, almost literally setting the teeth on edge. It's an intriguing and innovative set. **AE**

Sound Quality: 85%



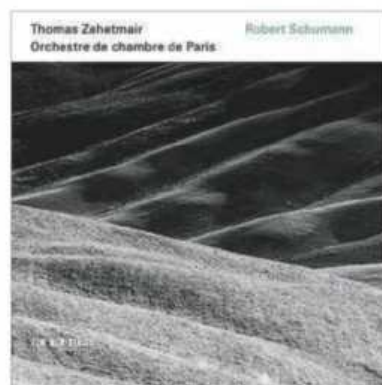
MARTIN ALBRECHT et al

The Scriabin Code (44.1kHz/24-bit, FLAC)

www.hifiresaudio.com; Rodenstein Records ROD K05

See here: this could be either a classical album or a jazz one, so blurred are the lines in this unusual, challenging recording. Led by Martin Albrecht on clarinet and bass clarinet, the quartet – Daniel Prandl plays piano, Dirik Schilgen drums and Katharina Gross bass – improvises and interprets around the works of Scriabin, with some of the originals played by pianist Asli Kilic, and joined by the occasional foray into electronica and sound effects, as on 'Never Ending Story'. OK, so it all sounds a bit high-falutin' – one track, 'Rausch', may well have you stifling giggles – but strangely it works, the musicians producing a set which rewards the attention with a fascinating series of pieces. It's recorded and mixed by Markus Born and Ekhard Steiger, and produced by Albrecht. I'm not sure this has given me any greater insight into Scriabin, but it's been fun exploring. **AE**

Sound Quality: 80%



SCHUMANN

Symphony No 1 'Spring'; Violin Concerto; Phantasy; Paris CO/Thomas Zehetmair (96kHz/24-bit, FLAC)

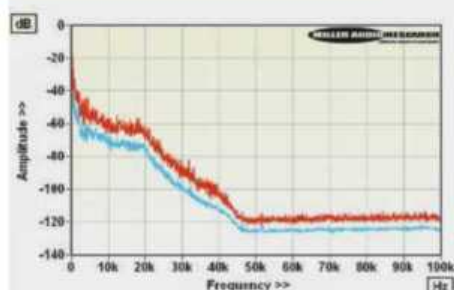
www.hifiresaudio.com; ECM 4811369

Written for Joachim in 1853 (as was the more coherent *Phantasy* in C), Schumann's Violin Concerto was suppressed until 1937 – with perhaps some justification. Zehetmair found many errors in the printed edition when preparing for his 1988 Teldec CD, and this is his second recording. Choosing a chamber orchestra for Schumann is now the norm but such is the reverberance of the venue, the Théâtre des Champs-Élysées, it could be of any size. And I didn't like effectively a separate acoustic for the solo violin. These two works with violin are fine but I've struggled with the symphony, which I just think is mediocre both as a recording and a performance, Zehetmair labouring rather obvious points. Certainly the orchestral playing in the Scottish CO/Ticciati Schumann cycle [Linn Records] is far superior. **CB**

Sound Quality: 65%

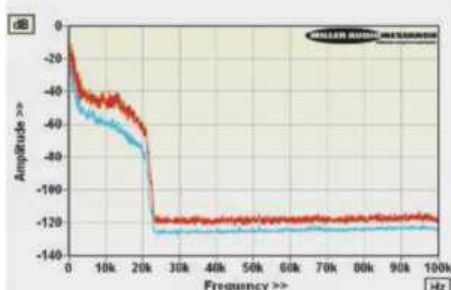


LAB REPORT



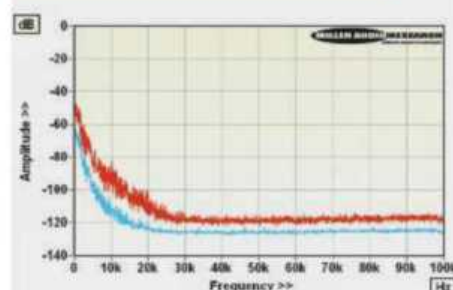
Recorded at Kyberg Studio, Oberhaching, and polished at CS-Mastering in Munich, this 96kHz offering is 'digital' throughout and benefits from a very low noise floor but there's evidence of overload on the percussion feed downstream. **PM**

LAB REPORT



This may have the 'limited' 20kHz bandwidth of a 44.1kHz recording but it's only during the densest passages [trk 7 'Hetzjagd', see Graph] that the clarinet and percussion really punch through and occupy the fullest range. **PM**

LAB REPORT



Artistic interpretation notwithstanding, this 96kHz recording from the Théâtre des Champs-Élysées is still very clean, albeit at a low mean level with occasional string-dominated flourishes above -10dBfs [trk7, see Graph]. **PM**



ANDRA DAY

Cheers To The Fall

Warner Bros/Buskid Records 9362492756

It's always encouraging when a new singer is discovered by Stevie Wonder because he's hearing a voice with no visual distractions. Andra Day is a soul-jazz oriented singer-songwriter from Spokane, Washington, and this debut album has already been Grammy-nominated. In terms of performance, production, songwriting and musical arrangements, it's almost impossible to fault but I do feel I've heard too many impeccably trained and controlled voices like hers over the years. When she eventually masters the art of sounding like Andra Day – as I'm sure she will – rather than a combination of the all-time greatest voices of soul and jazz, this woman will blossom into a truly extraordinary singer. *JBk*

Sound Quality: 92%



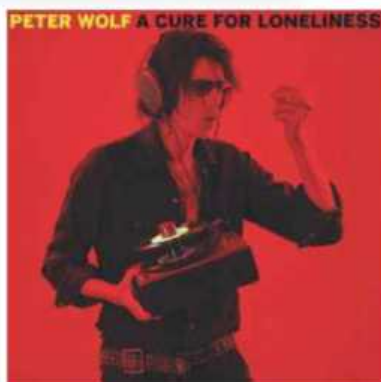
SHEL

Just Crazy Enough

Dave Stewart Entertainment/Moraine/Membran DSE234095

The four Holbrook sisters, who form the core of SHEL, hail from Colorado, but they have co-produced their excellent second album in Nashville with former Eurythmics mainstay Dave Stewart. They write their own songs, several of which have been used in TV series and, as the album progresses, it's easy to hear why. Cuts like 'You Could Be My Baby' and 'Rooftop' are not just instantly catchy, but also beautifully arranged and delivered with exceptionally sweet harmony vocals. Even their obligatory metal cover (Metallica's 'Enter Sandman') is well worth hearing. If these young ladies don't rack up a string of hit singles sometime soon, then there's simply no justice. *JBk*

Sound Quality: 92%



PETER WOLF

A Cure For Loneliness

Concord Records CRE3895302

Peter Wolf was the frontman of '80s hitmakers The J Geils Band, and his eighth solo album finds him in fine fettle. It won't revolutionise how you think about rock, but it offers more spark and imagination than I'd have expected. Wolf wears his early blues influences on his sleeve but he's also taken on board some of the AOR suss of Tom Petty with cuts like 'Peace Of Mind' and 'Wastin' Time'. And there's a sly humour about 'It Was Always So Easy' and 'How Do You Know' that elevates this high above the standard blues-rock offerings of today. His live and sprightly bluegrass re-tread of the Geils Band's 'Love Stinks' is another good reason to check this album out. *JBk*

Sound Quality: 90%



THE TRUDY

Always Never Beautiful Forever

Miron Music MIRO33

The Trudy have been around since 1979 when they evolved out of influential post-punkers The Cardiacs. They've never achieved more than cult acclaim and this album probably won't rocket them to mega-stardom. Despite that, their songs are catchy, poppy and edgy enough to make them very interesting indeed. Vocalist Melissa Jo Heathcote delivers smart lyrics in a chirpy, girlish style that hasn't been heard since the '90s heyday of Sleeper and Elastica, and the band navigates its twisting and turning arrangements with admirable tightness. Decidedly unfashionable, but easily among the most invigorating bands operating today. *JBk*

Sound Quality: 88%





COMPACT DISC



SUPRAAUDIO



DVD



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BRIAN BROMBERG

Full Circle

Artistry Music ART7047

Packed with catchy tunes and uptempo grooves, this is the virtuoso bassist's first album since 2012's *Compared To That*, and marks his happy recovery from a back injury that almost ended his career. As he's done before, Bromberg plays astonishing solos on his guitar-like piccolo bass, but here he also returns to the instrument of his teens: the drums. And with guest musicians like Kirk Whalum and Arturo Sandoval, the pace never lets up. Topping and tailing the album are two Dixieland tunes, taken from an acetate recorded 65 years ago with Bromberg's late father on drums, but with acoustic bass now joyfully overdubbed by Bromberg himself. A real celebration. *SH*

Sound Quality: 82%



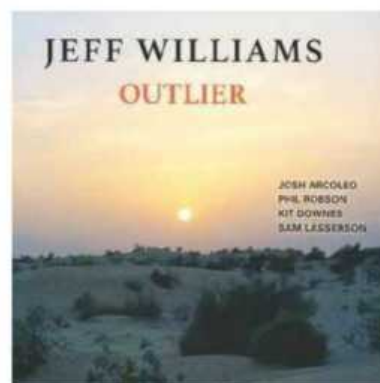
HIROMI

Spark

Telarc TEL38247-02

After her 2003 debut *Another Mind*, the phenomenal pianist assembled a trio with fellow Berklee graduates Tony Grey and Martin Valihora, later adding guitarist Dave Fiuczynski to create Hiromi's Sonicbloom. Bassist Anthony Jackson, whose credits range from Madonna to Metheny, not to mention a string of Al DiMeola albums, had actually guested on *Another Mind*. But in 2011, along with the powerhouse drummer Simon Phillips, who'd spent 20 years with Toto, he teamed up with Hiromi as The Trio Project. Hiromi's energy and technique is as boundless as ever, and on their third album together, these three astounding players still drive each on to greater heights. *SH*

Sound Quality: 85%



JEFF WILLIAMS

Outlier

Whirlwind Recordings WR4684

American drummer Jeff Williams played on the London label's Lee Konitz album *First Meeting* in 2010, but more recently he's assembled the great UK quintet heard here. Saxophonist Josh Arcoleo, guitarist Phil Robson, pianist Kit Downes and bassist Sam Lasserson really do bring Williams's compositions to life, starting with the floating, atmospheric title track. After a Monkish 'The Interloper' comes a jazz-funk number, 'Dream Visitor', but there's an entrancing lyrical contrast when the group reworks 'Meeting A Stranger', a tune from Williams's 1997 *Jazzblues* album. With 'Oddity', a fine fast blues, this album snakes to a satisfying conclusion. *SH*

Sound Quality: 88%



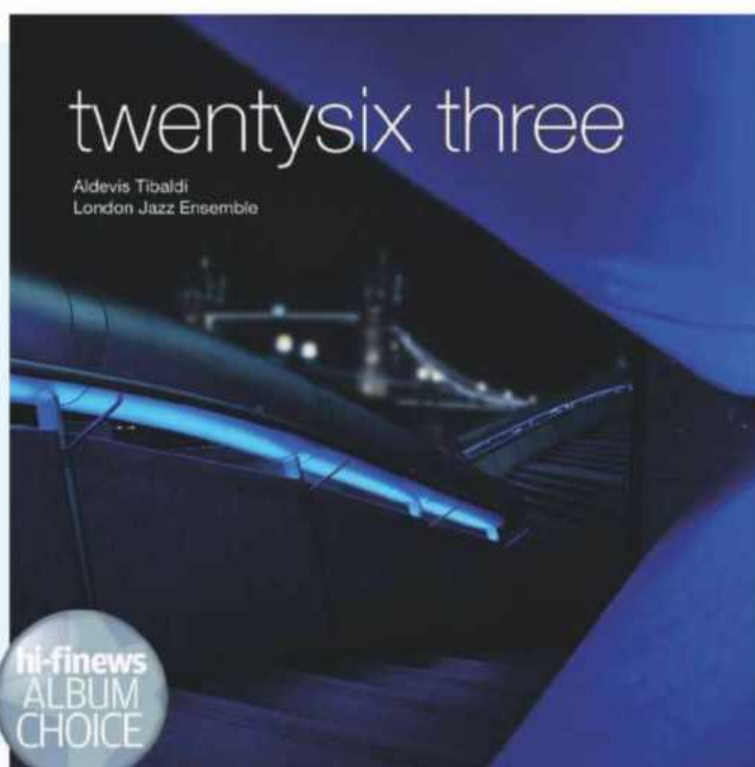
ALDEVIS TIBALDI

Twentysix Three

GaleTone Records GALETCD263 (GALETLP263; 180g vinyl)

Since arriving in London in 2004, Italian saxophonist Tibaldi has worked with Paloma Faith and Roy Gelato and even collaborated with ex-Loose Tubes trumpeter and yachtsman John Eacott on Eacott's algorithmic composing project, *Floodtide*. Here Eacott returns to conventional music-making alongside Aldevis, together with trombonist Paul Taylor, and the sextet line-up is completed by versatile pianist Liam Dunachie, bassist Richard Sadler and drummer Chris Gale. Together they've conjured up an album of accessible, tuneful, relatively uncomplicated jazz that's thoroughly enjoyable. Recorded 'on analogue equipment' with no overdubs, it also has a warm, relaxed and easy sound that lets the music flow. *SH*

Sound Quality: 90%





COMPACT DISC



SUPRAAUDIO



DVD



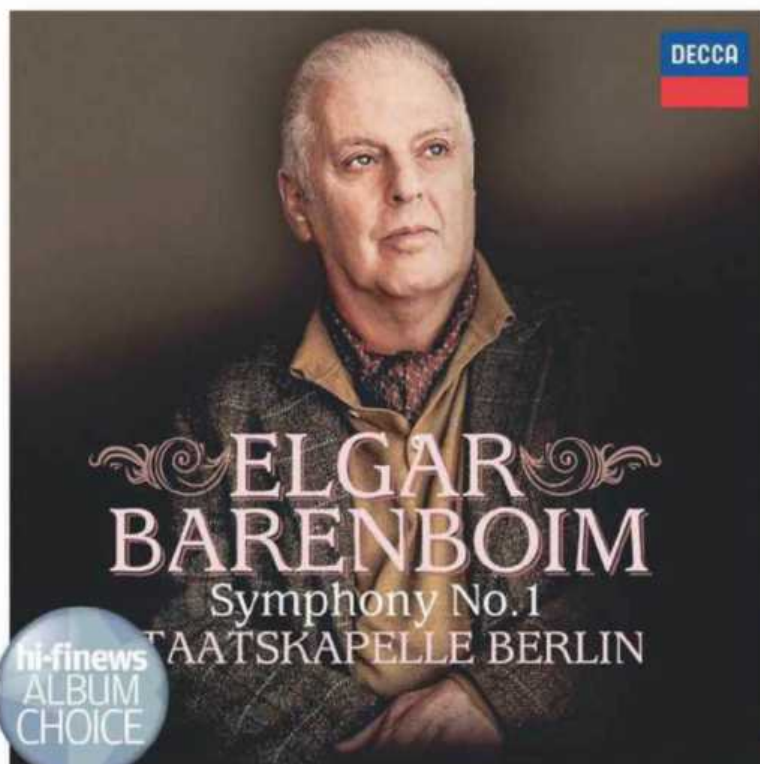
BLU-RAY



VINYL



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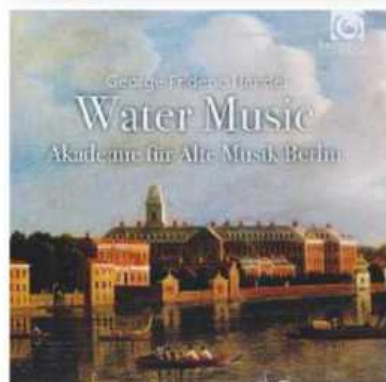
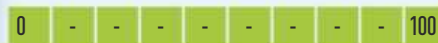
**ELGAR****Symphony No 1**

Staatskapelle Berlin/Daniel Barenboim

Decca 4789353 (downloads up to 96kHz/24-bit res)

It was Barbirolli who prompted Barenboim to explore the music of Elgar, and various LPO/CBS recordings followed. But his re-examination of the two symphonies for Berlin Staatskapelle performances has resulted in readings that far surpass their 1970s forebears: in particular this First, live from Sep '15 and produced by Andrew Keener. Arguably – and it's a big claim – we've had no finer realisation of this great work. As much is suggested as soon as the opening processional has faded away, and the fine detail, impetus and phrasing make this a CD to hear over and over. Of course the unique palette of this orchestra is unlike the 'English sound', but no Elgarian should miss this. **CB**

Sound Quality: 95%

**HANDEL****The Water Music – Suites 1-3**

Akademie für Alte Musik Berlin

Harmonia Mundi HMC902216 (downloads up to 96kHz/24-bit res)

Sign of the times: the disc comes with a voucher code for a 96kHz/24-bit download. The days of Hamilton Harty's orchestrations are long gone: authentic performance recordings (Boyd Neel, Thurston Dart) date back to the 1950s. The Akademie is of course a – modest sized – period instrument ensemble, and they perform these Suites with vibrant keenness. The brash timbres of natural horns and trilling trumpets are particularly exciting! Handel didn't publish this music and the Suites were compiled later, according to instrumentation. The famous 'Hornpipe' [track 12] is fast, clipped, but with lovely echo effects. **CB**

Sound Quality: 87%

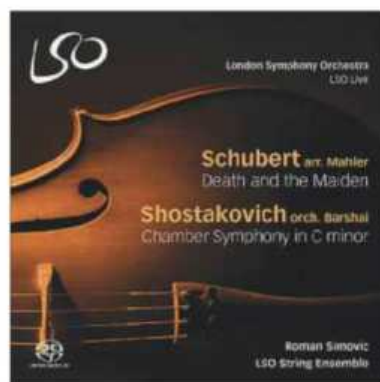
**PROKOFIEV****Symphony No 5; Scythian Suite**

Deutsches SO Berlin/Tugan Sokhiev

Sony 88875185152 (downloads up to 44.1kHz/16-bit res)

Last year I reviewed Andrew Litton's identical BIS coupling with some enthusiasm [see *HFN* Sep '15, p92] but I certainly wouldn't say Sokhiev's *Scythian Suite* was 'quite jolly' – it has more of the heady dissonance of the benchmark Abbado/DG. The Symphony is unhurried, Sokhiev meticulously searching within the orchestral textures but nowhere permitting an ugly sound (notwithstanding Prokofiev's heavy scoring). In this he reminded me of the classic Karajan/DG Fifth – they also share the same preoccupation with finding each movement's climactic moment. A reading to respect more than thrill to. **CB**

Sound Quality: 78%

**SCHUBERT/SHOSTAKOVICH****'Death and the Maiden' Qt/Chamber Symphony**

LSO String Ensemble/Roman Simovic

LSO Live LSO0786 (SACD; downloads up to 96kHz/24-bit res)

In 1986 we had a very fine (premiere?) ECO/Tate recording of Mahler's adaptation of the Schubert Quartet, D810, for string orchestra. His notebooks showed that at least the *Andante* was performed in Hamburg in 1894 (a complete edition was undertaken by David Matthews/Donald Mitchell). Rudolf Barshai's authorised transcription of Shostakovich's most poignant string quartet, No 8, is more familiar. This LSO coupling comes from an Apr '15 Barbican concert. The Schubert playing is so fluid and light as to defy the old 'loss of intimacy' criticism – in fact you miss this more with the Shostakovich. **CB**

Sound Quality: 82%





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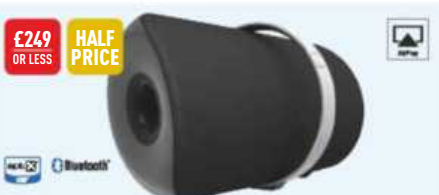


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Paul Miller Editor

Technician and writer on all things audio for some 30 years, Paul Miller took over the editor's chair in 2006. He invented the QC Suite, used across the audio industry

Top of the class

We all think we know what the archetypal tube amp or CD player sounds like but **Paul Miller** asks whether such beliefs are even credible in an era when hi-fi design is both sophisticated and diverse

However hard we try to resist, even the most experienced and open-minded of enthusiasts will, from time to time, revert to 'pigeon-hole' impressions of sound quality. So valve amplifiers sound warm and cuddly, vinyl sounds inherently 'musical' and CD players sound, well, 'digital'. Another favourite is Class D. This imbues said amplifiers with a grey, gritty and generally uninvolved sound, right? Er, no.

The fact that these expressions are so ingrained in our subjective evaluation of sound quality is both convenient – as a recognisable starting point for discussion between audiophiles – but also anachronistic, as the roots of these prejudices (and I use the term reservedly) have typically long since perished. Time and technology have moved on, so that perhaps we all need to take a step back and resist daubing new products with a brush of old tar.

A GOOD BREW

This particular issue of *Hi-Fi News* carries two perfect examples of why we should all be cautious of stereotypical reviews seen elsewhere. The Rogue Audio Sphinx v2 [p54] and Leema Elements Monoblock [p38] are both amplifiers with Class D output stages. But read our reviews and you'd be hard-pressed to detect one defining sonic trait shared between the pair of them. So what now of a 'Class D sound'? As ever, the root of good sound is as much to do with how the ingredients of a circuit are blended as the choice of ingredients themselves. Class has very little to do with it.

Most amplifiers are Class A/B types but, even if we took two near-identical 100W designs with complementary output stages, one might employ two or

more pairs of power transistors in parallel while the other may have just one pair of higher-current output devices. Both these Class A/B amps are ostensibly very similar, but this one difference in execution could make a world of difference to their sound.

NOT DIGITAL

Class D is no different in this respect. Sure enough all Class D output stages represent the audio signal as a very high frequency PWM (Pulse Width Modulation) waveform, low-pass filtered to reveal the underlying music. But there's plenty of scope for interpretation in Class D design. The

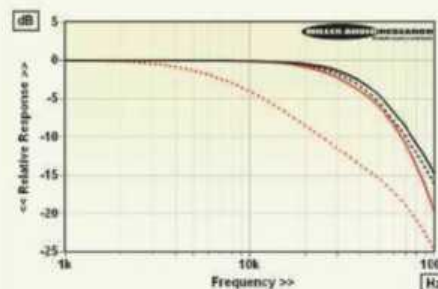
overwhelming majority of Class D amps use *analogue* modulators, so the 'width' of elements in the PWM signal is continuously variable. There are precious few *digital* Class D amps (again, be suspicious of reviews

that mix 'Class D' with 'digital amp') and here the PWM clock rate is typically locked to the incoming sample rate. Also, the PWM 'widths' are discrete, their number determined by the quantisation (bit depth) of the data. But they are still all Class D!

OK, so what about our Rogue and Leema amps? Well, these use Class D modules sourced from Hypex [pictured, below]



ABOVE: Hypex UCD-180 Class D amp module



ABOVE: (Treble) freq. resp. for Rogue Sphinx v2 (black, 8ohm; dotted, 2ohm) versus Leema Monos (red, 8ohm; dotted, 2ohm)

and NXP Semiconductors, respectively, but they behave differently. The Leema Monos use bridged modules while the Sphinx is single-ended, and while both incorporate a low-pass filter network, in the Sphinx's case this has less observable impact on output impedance, distortion and frequency response.

MOVING TARGET

Importantly, the output filters' reactance causes a rise in output impedance. This amounts to 6ohm/20kHz (peaking at 22ohm/50kHz) in the Leema but just 0.05ohm/20kHz (peaking at merely 0.62ohm/90kHz) in the Sphinx. The impact on the amp/speaker frequency response – and therefore tonal balance – is clear enough from my graph [above].

While there's little to choose between the Rogue and Leema into any easy-going 8ohm load [solid black and red traces, respectively], as the speaker impedance falls so does the Leema Mono's treble output [dotted red trace].

In practice it'll vary up and down in sympathy with the HF impedance trend of the partnering speaker. So a speaker with rising impedance trend will promote a brighter balance with the Leema Monos, just as a declining impedance will do the opposite. But the Rogue, another 'Class D', just keeps on truckin' regardless. 🎧

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Barry Fox Technology journalist

Barry Fox trained in electronics with the RAF and worked as a patent agent, but he gave that up to enter journalism. He is one of the world's top technology writers

An insult to the music

Will charity shops fill up with unwanted CDs as people turn to downloads? They will only if online music companies start offering comprehensive sleeve notes and artwork, reckons **Barry Fox**

You can learn a lot from visiting well-run charity shops. Ten years ago, as the world turned on to CD and DVD, charities were knee-deep in vinyl LPs at peanut prices because no-one wanted them.

There were even bigger piles of musicassettes and VHS movie cassettes. Now the shops give vinyl a prouder place, at higher prices. Vinyl buffs scour for music gems and the cassettes and VHS tapes have gone – junked to make space.

Charity shops have for years also had a few CDs, but most of them are budget 'Best Of' compilations and magazine giveaways, usually dumped on a grubby shop shelf without any attempt at sorting, even into Classical and Popular.

There are still seldom enough worthwhile CDs to encourage music lovers to make anything other than a casual drop-in visit worthwhile.

REPETITIVE LISTENING

So it seems that despite the vinyl revival and the online music download and streaming trend, people are not yet mass-dumping CDs. The situation with DVDs is very different. Just about every charity shop is now stuffed to the gills with them for a couple of quid each.

Why the big difference? Good music bears hearing many times. Few movies, even good ones, will be watched more than once or twice. After all, how many times do you want to see *Die Hard* or *Batman* or a thriller with a twist in the tale?

Online on-demand delivery from services like Netflix, Now and Amazon has completely wiped out the mass-market for DVDs. Video rental stores like Blockbuster have disappeared and there are only a few high street outlets selling

RIGHT: A small selection of unsorted CDs sits in a British high street charity shop. People aren't mass-dumping their collections of music discs quite yet – unlike DVDs and VHS cassettes



MIKE ANDREWS

DVDs. Blu-ray has not been the new cash cow the industry hoped it would be. Ultra HD 4K will most likely come down a line. Netflix has already started 4K streaming and Sky is gearing up.

In a couple of years the charity shops will be junking DVDs, too. Will the released space be used for music CDs people have finally thrown out in favour of downloads or home server copies ripped from their own CDs to hard disc?

NEEDED IN A HURRY

I'll wager that a lot depends on what the big online music services do about sleeve notes and artwork. A young gadget

journalist recently told me why he liked vinyl. 'Having to get up and turn the disc over makes me more involved in the music. And I am discovering the pleasure of holding a disc

and looking at the sleeve pictures and artwork, and reading about the music and the musicians and composers,' he said. 'I never bought CDs, so it's all a new experience to me'.

Normally I avoid buying downloads if I can possibly find a pressed CD. Recently I wanted a copy of a new album by

Georgie Fame, *Swan Songs*, because it contains a nice tribute to a now-departed musician friend. I needed it in hurry and couldn't find a copy in a local shop, or wait for mail order delivery.

LOW-RES COVER

So I reluctantly bought a download from iTunes. In my ignorance of buying from Apple I expected to get a PDF file of the sleeve booklet, as for instance provided by Linn. But all that came down the line from iTunes was the music in sub-CD quality and a low-res cover picture. There was no information on anything about the music, musicians or dedications. I'm told this is normal.

If so, it's an insult to the music and to the musicians. And it looks like a very good reason for music lovers to continue buying physical discs whenever possible and certainly not give their CD collection to a charity shop.

Who knows, we may eventually see a CD revival, fuelled by jaundiced ex-vinyl revivalists who have been turned off by the dubious pleasures of coping with static, surface scratches, warping and dishing, not to mention the high cost of stylus replacement, the hassle of cartridge alignment and general loss of enthusiasm for jumping up and down every 20 minutes. We'd love to know what *Hi-Fi News* readers think... ☺

'We may eventually see a CD revival, fuelled by jaundiced ex-vinyl revivalists'

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Barry Willis

Journalist for top American audio-video publications

While his main interest is high-end audio, Barry Willis also writes about the culinary industry, visual art and theatre for a huge variety of US newspapers and magazines

Lessons unlearned

The failure of a digital processor from a now defunct brand finds **Barry Willis** pondering the foresight of companies when designing components. What happens if they later need repair?

Mistakes were made.' Among the more enduring statements made by former US President George Bush the First, this was his response to journalistic inquiries about wrong-doing by officials in the administration of his predecessor, Ronald Reagan.

The passive voice implied that no individual humans were responsible; mistakes have a way of happening all by themselves. Indeed they do – especially with high-performance audio products.

A NEW GENERATION

Held in awe by reviewers during a brief heyday, the Canadian company Sonic Frontiers sank beneath the waves and ultimately morphed into Anthem, a still-thriving brand. Among a new generation of digital processors, the company's SFD-2 debuted for \$4650 in 1993. A DAC with a tube analogue output stage, it was praised among other attributes for its then-new UltraAnalog AES20 input receiver and D20400A converter chips. Reviewers gushed about its sound, but none noted fundamental problems with its mechanical construction.

'With no shield there was still barely room for a pencil-point soldering iron'



ABOVE: The interior of the SFD-2 as seen from above – clearly there's little wiggle room here



ABOVE: Side view of the Sonic Frontiers SFD-2 showing the analogue output stage with tubes

A diagnostic exam of one failed unit may offer some insight as to what went wrong for the company as a whole. The SFD-2 pictured here has remained unchanged since first purchased. It worked perfectly until recently – rather amazing considering its near-daily use over 23 years. I traced its failure to an intermittent switch on the front panel. Replacing it should have been a simple operation, but the anatomy of the SFD-2 could not be more unfriendly.

The piece was clearly built under the assumption that it would work flawlessly forever and never need repair. The chassis is a single sheet of folded heavy-gauge sheet metal, with no access panels. During assembly, the front dress plate was installed first, followed by the function PC board behind it.

The three major PC boards followed: power supply on one side, analogue output board on the other side, and digital processor board in the centre, surrounded by an RF shield.

These three boards were joined by short jumper cables, probably before installation in the enclosure, and secured to the chassis with machine screws. Input and output connectors were installed

from behind, with short connecting wires from the three PC boards soldered to them during final stages of assembly. There is no 'wiggle room' inside for troubleshooting. The entire unit has to be disassembled for any repair.

Replacing a faulty front-panel switch should be a painless 30m procedure, but with the SFD-2 instead it becomes a six-hour ordeal with high likelihood of causing further damage.

I couldn't replace the switch at any reasonable cost. Instead, I removed the RF shield and soldered jumpers to the switch legs, rendering it unusable for any input other than coax. Even with the shield removed, there was barely room for a pencil-point soldering iron.

THINKING AHEAD

Had Sonic Frontiers been thinking ahead, it would have provided an access panel on the bottom, hinged front and rear panels, and internal connections with long enough leads so that everything inside could be folded out and examined while still in operation. None of that was considered. It's like a car that requires the removal of the engine to change a tyre.

Designers, think hard about the need for repairs before you start your first production run. Build a prototype that's easy to take apart and put back together, then refine it so it's even easier. Failure to do so may come back to haunt you. ⚡

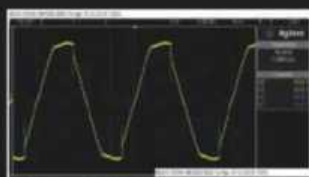
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Jim Lesurf Science Journalist

Jim Lesurf has spent a lifetime in audio, both as an engineer at UK hi-fi company Armstrong and reader in Physics and Electronics at St Andrew's University

Direct action

The recent re-birth of Technics' most iconic turntable sees **Jim Lesurf** let us into a secret – he's been using a direct-drive deck from the Japanese brand for years. Now all he needs is some oil...

I must confess that I was excited by the news that Technics has now resumed producing a high-quality direct-drive turntable in the form of the SL-1200G and limited edition SL-1200GAE [see *HFN* Jun '16].

As an engineer I tend to believe that the simplest and most 'direct' method of achieving a given aim will usually be the best. Cables, for example, should be as short as possible and signal paths contain as few devices as is feasible. There should be no avoidable conversions or processes.

For the same reason, I've always preferred direct drive as the preferred method for rotating a turntable. Of course, in terms of practical engineering, it will be the levels of design skill and manufacturing care that are brought to bear that eventually determine how well the result will perform. Hence, carefully made belt- or idler-wheel driven turntables can also work superbly well and I'm as impressed as anyone by some of the non-direct drive designs on offer.

ULTIMATE ELEGANCE

Yet the engineer in me often has the feeling that these belt and idler alternatives lack the ultimate elegance of a well-made direct-drive design which, after all, is one moving part.

Prior to the arrival of direct-drive turntables I'd been happily using a Goldring-Lenco GL75 with a Shure M75 series cartridge. This gave very pleasing results, and its combination of high turntable mass/inertia and a tapered spindle to drive the idler wheel made it a very handy arrangement. It was a good advert for idler-wheel drive in my experience. But as belt-drive began to displace idler wheels I encountered the Technics SL-10 and the later models.

'I'd gloss over the type of deck used for fear of being branded a heretic'



ABOVE: Technics' £2799 'Grand Class' SL-1200GAE Limited Edition direct-drive turntable, which was reviewed exclusively in the June '16 issue. A more affordable SL-1200G model is also available

These just seemed 'right' to me. Some of the early models had a motor on to which the turntable was placed. But the SL-1500's turntable *is* the motor. When it comes to mechanical rotation, it's about as simple an arrangement as you can get. (The SL-1500 was the 'with arm' version of the old SL-150.)

During the era when belt-drive ruled the roost in the UK I tended to gloss over

the type and make of turntable I used for fear of being branded a heretic. It seemed a pity to me that the days of direct-drive manufacture had really passed. That said, it was also believed at the

time that vinyl itself would vanish. So I've hoped for a comeback.

Following their continued use in the DJ and club scene, direct-drive turntables have gained something of a 'classic' status and are now viewed with increasing regard. So I guess it is time for me to come out of the closet and admit that I've been a user for over 30 years.

And it doesn't seem to have done me any harm. I'm still happily using my SL-1500, along with a Shure V15 cartridge.

In doing so I guess I've chosen to ignore the conventional wisdoms of the 1980s and '90s when it comes to playing vinyl. Namely: a Japanese direct-drive turntable with its own 'S-shaped' arm and a moving-magnet cartridge during an era when the world and its brother felt that moving-coil designs sounded better.

And seen in traditional engineering terms, I've even been using a cartridge assumed not to suit such a basic Japanese curvy arm. Some fish prefer to swim upstream, I guess.

WEAR AND TEAR

Yet it worked then, and still works now. When I close my eyes and listen, the results sound great to me – though I do sometimes wonder how many more years the deck has left in it before the wear and tear of continued use makes itself known.

So yes, my old Technics will finally wear out one day. Until then, my only niggle is that I can't for the life of me find the tube of oil that originally came with it. I know I put it down somewhere... ⚙



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Steve Harris Contributing Editor

Steve Harris edited *Hi-Fi News* between 1986 and 2005. He loves jazz, blues music, vinyl and vintage hi-fi and anything that makes good music come to life

Good copy, bad copy

At the annual *Hi-Fi News* show in 1996 a company showed machines able to deliver 96kHz/24-bit audio but, as **Steve Harris** explains, fears over copyright protection meant audiophiles missed out

You could say that hi-res audio celebrates its 20th anniversary this year. It was at the September 1996 Hi-Fi Show, organised as usual by *HFN/RR*, that Pioneer gave what was believed to be the UK's first public demonstration of 96kHz/24-bit audio, from a prototype DVD player.

At that 1996 event, Pioneer also played 96kHz master tapes on its D-9601 double-speed professional DAT tape machine, using a prototype processor.

MORE BITS NEEDED

As an enthusiast, *HFN*'s John Bamford, who'd joined Pioneer in 1991 for what would become a distinguished 13-year stint, felt that he was in the right place at the right time.

He recalled, 'Here was a Japanese company that was making mass-market electronics, and making CD players, which in those days none of us liked because we all thought CD wasn't good enough. And then the engineers at Pioneer were telling us the same thing!

'They were saying that we needed more bits and higher sampling rates. And later, putting their money where their mouth is, Pioneer developed HS-DAT,

the High-Speed DAT, which ran at 96kHz sampling instead of 48kHz.'

In fact, Pioneer couldn't wait for the arrival of real hi-res. Instead, the company introduced its Legato Linear CD players, which used a curve-fitting algorithm to produce the effect of an extended frequency response.

And although hi-fi people might look to a hi-res future, for the hard-boiled pro audio world the main benefit of Pioneer's HS DAT recorder was not its doubled-up sampling rate, but its ability to dub copies at twice the speed.

In analogue recording, doubling and redoubling the tape speed had been the natural way of improving quality. Conversely, when Philips introduced the Compact Cassette in the early 1960s, the speed was halved to allow LP-length playing time on one side of the tape.

Then, almost exactly 20 years before Pioneer's High-Speed DAT, there had been a spate of double-speed cassette machines decks.

At the forefront was the American

company BIC. BIC claimed that high-speed mode could give a response extending beyond 20kHz and with at least a 3dB improvement in signal-to-noise. Of course, playing time would be reduced to about 22.5mins instead of 45mins on each side of a C90 cassette.

But the double-speed option became a copying convenience rather than a quality enhancer. It led eventually to the era of two-transport dubbing decks, and in the UK to 'the Amstrad case' of 1988.

Amstrad's portable double-cassette machine was sold at £99 and advertised with the brilliantly simple slogan 'It tapes tapes!'. But in an action brought by CBS Songs Ltd, the court ruled that the manufacturer could not be held



ABOVE: Amstrad's Sir Alan Sugar (right) with *HFN* contributor Donald Aldous in the 1970s

responsible for breaches of copyright that might be perpetrated by users.

After this Amstrad went on to produce its Double Decker VCR, capable of playing a videocassette tape and recording from the TV at the same time.

HUGE BATTLE

In an analogue world, there hadn't been much that the record business could do to stop people copying material, but digital would be another story.

DAT itself had been the subject of a huge battle with the record labels, and a final agreement that prevented consumer DAT machines from making digital copies of CDs. Copy protection issues would delay DVD itself and stifle DVD-Audio.

If 1996 was the year UK enthusiasts first heard 96kHz/24-bit audio, it was also the year of two treaties of the World Intellectual Property Organisation, which formed the basis for the American Digital Millennium Copyright Act, passed two years later. By that time, of course, the online revolution had begun and, for the record companies as well as everyone else, nothing would be the same again. ☺

'The double-speed option led to the Amstrad case of 1988 in the UK'



ABOVE: 'Magic!' – football star Terry Venables endorses Amstrad's 7090 cassette recorder

YOUR VIEWS

Sound Off!

Correspondents express their own opinions, not those of *Hi-Fi News*. We reserve the right to edit letters for publication. Correspondents using e-mail are asked to give their full postal address (which won't be published). Letters seeking advice will be answered in print on our Sound Off pages, but due to time constraints we regret we're unable to answer questions on buying items of hi-fi or any other hi-fi queries by telephone, post or via e-mail.

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AUNTIE'S BUMPY RIDE BUT BBC STREAMING IS NOW WORTH THE FEE

I found Jim Lesurf's Opinion piece in your April issue concerning the BBC's radio streaming service very illuminating. It seems that the BBC knew what it was doing, but perhaps failed to communicate its intentions to the hi-fi industry as effectively as it might have.

Now that the dust has settled, I have just purchased NAD's Bluesound Node 2, which is a very neat streaming and network receiver with digital-to-analogue conversion. I can now pre-set the BBC channels I want and most of them are available at the high 320kbps data rate. My main target was BBC Radio 3, but BBC Radio 6 sounds very good. I think that this high data rate streaming service alone is worth the licence fee!

In my view the BBC has been unjustifiably attacked from various angles, but its commitment to quality in general and sound quality in particular remains a credit to the corporation.

Nick Villans, via email

Jim lesurf replies: In some ways, the last couple of years have illustrated how difficult it can be to make improvements when many parties are involved in the process. For years the BBC has wanted to provide all its radio streams as 320kbps AAC and handle the transfers via HTML5, which is an

open standard. That means that any commercial box maker or producer of user-software can adopt it and in doing so avoid the 'closed box' problems sometimes encountered using methods such as 'Flash'.

The BBC's original intention was to switch over directly from the start when it introduced the Audio Factory over a year ago. However, despite talking to many people about the changes early on, various elements – from web browsers to commercial network radios – were rather slow at making the change. Meanwhile, some existing internet radio hardware simply didn't have the ability to keep up with the quality improvements.

As a result, the whole process has required a lot of interim changes and temporary arrangements which have made things a lot more complex and prone to problems.

However the end-result is superb, and I'd say the destination was well worth the bumpy ride! If the BBC hadn't made any changes we might still be stuck with low-bitrate WMA or MP3 streams. As it is, we can now enjoy superb high-audio quality.

Overall, I think the BBC has done an outstanding job, though the process has illustrated why I've long cautioned people about buying 'net radio' boxes as these may fall silent when makers won't or are simply unable to provide 'upgrades' for them.



ABOVE: For more on the Bluesound Node 2 navigate to www.bluesound.com

Strange flute

WOODWIND COMPARISON LEADS TO NOTHING BUT TREBLE

I noticed in Adam Smith's review of the Music First Audio Classic preamp [see *HFN* May '16] that he compared the sound of his wife's flute with a recording. I do hope he left his wife to play the flute over the weekend so as to ensure she was fully run-in before doing the comparison.

Melvyn Dover, via email

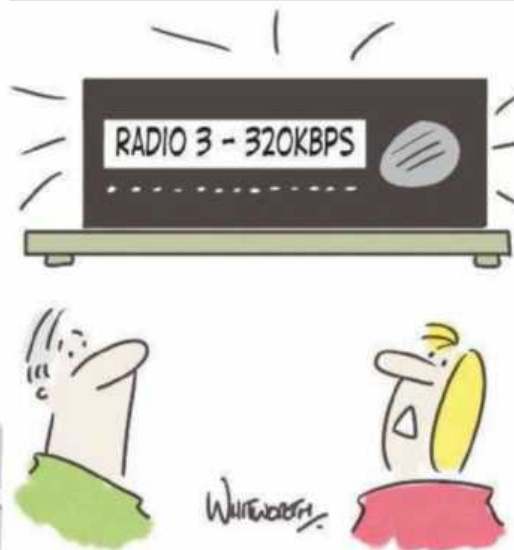
Adam Smith replies: Melvyn, you have raised a very important point. I can confirm that both wife and flute were given plenty of time to warm up prior to evaluation. In addition, I made sure that my wife's chair was securely spiked to the floorboards before she began playing. As a final thought, I can also confirm that flutes are most definitely directional.



ABOVE: Music First Audio Classic 632 – not short on chic

WhitWorld

OUR HI-FI WORLD THROUGH THE EYES OF WHITWORTH



"THE FOUR SEASONS HAS NEVER SOUNDED BETTER, BUT THIS VERSION IS MISSING THE PART WHERE SOMEONE SAYS, 'YOUR CALL IS IMPORTANT TO US'."

Question of balance

USE OF AN ADAPTER UNDERMINES HEADPHONE REVIEW SAYS READER

At last, a proper headphone review by Keith Howard in which he compares single-ended and balanced modes! That was my thought as, with a spring in my step and a song in my heart, I bought the May issue of *HFN* to read the review of the Sennheiser HD 800 S. Yet delight, bliss and happiness were none of the emotions I experienced on reading the piece.

A proper *HFN* review should be conducted in a manner that doesn't involve a homemade adapter lead (of any construction). Why? Because no reader can determine the degree to which this compromises the review.

While I have no personal knowledge of the TEAC amp/DAC used, I am completely bemused as to why Mr Howard could not have asked for the loan of a Sennheiser amp/DAC to accompany the HD 800 S headphones, thus allowing him to compare them fully and professionally and in a manner befitting *HFN*'s reputation.

If at that point he had found he still preferred single-ended to balanced operation then all well and good. Readers can add their own thoughts and experiences accordingly. That he chose not to do has rendered his conclusions unsubstantiated and therefore untenable.

I have compared the HD 800 and HD 800 S in both single-ended and balanced mode with a number of headphone amplifiers without having to use homemade adapters. I know which headphone I prefer and in which mode through specific amps.

Quite frankly, if I can do this, I don't understand why Mr Howard felt unable or unwilling to do the same. So while Mr Howard's review may stand, his conclusions cannot and I shall go back to my own listening despite my bitter disappointment with your magazine.

Ian Melville, via email

Keith Howard replies: Any dispassionate reading of my HD 800 S review will reveal that I didn't reach any conclusion about the relative merits of balanced and unbalanced connection. In fact I was at pains to describe my contradictory experiences, and the dangers of forming



ABOVE: Sennheiser's HD 800 S, which offers the option of balanced connection

opinions based on single experiences and when uncontrolled variables are a factor. Magazine schedules and some difficulty obtaining the HD 800 S meant that my time with it was relatively short. I made the decision in the circumstances that, rather than attempt to procure another, unknown headphone amplifier as well and thereby add further delay, I'd make up an adapter lead for the Teac UD-503, which was still in residence and which I'd already favourably reviewed.

Given the Teac's unusual use of ¼in jack sockets, obtaining a commercial adapter was an unlikely prospect and no more certain of a good result than constructing one. While it's true that headphone leads affect sound quality, the notion that my adapter – built, as I described, from high quality connectors and using about a 100mm length of PTFE-insulated silver-plated OFC wire per channel per phase – should have more effect than placing a second headphone amplifier in circuit for each channel is a little difficult to swallow.

None of which has the slightest bearing, of course, on my assessment of the HD 800 S via unbalanced connection, which formed the bulk of my listening impressions. I would expect anyone contemplating spending £1200 on this headphone to arrange to hear it before purchase, preferably in circumstances where they will be able to decide the balanced/unbalanced issue for themselves, as Mr Melville has apparently done. Not, I note, that he gives us the benefit of his experiences.

JITTERBUG

USB Filter



Can a £39 insect make all your CD files sound better than Hi-Res?

Yes and no: Using the same equipment and a quality DAC, a 24/96 file (for example) will always sound better than a CD 16/44.1 file ... but, even a single JitterBug will often allow a CD file to be more musical and more emotionally stimulating than a Hi-Res file without the benefit of a JitterBug.

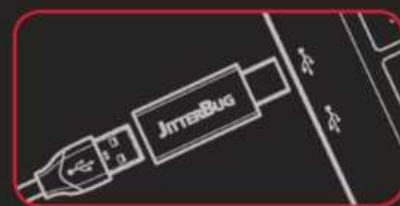
Noise is the problem. Real noise—the kind you can't hear directly. Most often, the word "noise" is used to describe tape hiss or a scratch on a record, but these sounds aren't noise; they are properly reproduced sounds that we wish weren't there.

Problem noise is essentially random, resonant or parasitic energy, which has no meaning. It can't be turned into discrete sounds, but it does compromise signal integrity and the performance of everything it touches.

JitterBug's dual-function line-conditioning circuitry greatly reduces the noise and ringing that plague *both* the data and power lines of USB ports, whether on a computer, streamer, home stereo or car audio front-panel USB input.

A single JitterBug is used in between devices (i.e., in series) as shown below. For an **additional "wow" experience**, try a second JitterBug into another USB port on the same device (such as a computer). Whether the second port is vacant, or is feeding a printer or charging a phone, JitterBug's noise-reduction ability is likely to surprise you. No, the printer won't be affected—only the audio!

While a JitterBug helps MP3s sound a lot more like music, high-sample-rate files have the most noise vulnerability. Try a JitterBug or two on all your equipment, but never more than two per USB bus. There is such a thing as too much of a good thing.



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Loudspeaker distortion

IS IT POSSIBLE TO PUBLISH SPEAKER DISTORTION PLOTS IN *HFN*?

As a returning reader to *Hi-Fi News* I'm impressed by your THD measurements of loudspeakers at three-spot frequencies. This is a great piece of information.

Distortion performance has never been at the forefront of measured loudspeaker characteristics. Rather, frequency response, SPL figures, sensitivity, and then sound dispersion patterns at different angles over frequency range, are the commonly measured characteristics. These certainly go a long way towards describing the performance of a loudspeaker, not forgetting cabinet resonance waterfall graphs. However, I still find the lack of loudspeaker distortion measurements, in general and everywhere, puzzling.

Distortion performance is, by definition, the measure of the linearity and general cleanliness of the reproduction. One rare historical reference to commercial loudspeaker distortion was made by late Peter Walker of Quad, who in the 1980s quoted a distortion figure for the ESL-63 as something like <0.1% over the given full frequency range, and power level – if my memory serves me correctly. And this was a declaration of one of the great merits of the ESL-63.

So, how good or bad are even the better loudspeakers today when it comes to distortion? Publishing THD performance is a good start, but THD is a relatively 'kind' characteristic, while there are certainly many other nastier non-harmonic distortion components and other anomalies in the audio spectrum, excitable even with a steady-state stimulus.

I know this is a big question, but is it possible to measure and publish graphs with, say 100Hz and 1kHz stimuli (separately), showing the resulting spectrum, the same way you publish jitter plots, for example? Or are there inescapable technical difficulties, such as the need for an anechoic chamber?

Lauri Lipasti, Finland

Keith Howard replies: Mr Lipasti is correct to impugn THD (total harmonic distortion) as a poor means of describing



ABOVE: Keith Howard does a near-field bass measurement during a *HFN* Lab Test

the subjective significance of nonlinear distortion, a subject I've written on in *HFN* on a number of occasions previously [see 'The Weighting Game', *HFN* Dec '01 and 'Weighting Up', *HFN* Mar '05].

In fact my loudspeaker distortion measurements do generate spectral analyses and the software utility I've written to analyse the results produces an N2-weighted distortion figure as well as THD (see the aforementioned *HFN* articles or www.stereophile.com/reference/406howard#h2DhH7DfJlkDEbJR.97 for an explanation of this).

The spectra are not published for reasons of space – we consider the on-axis response curves and CSD waterfall to be more important – and the N2-weighted distortion figure has not been quoted thus far because of its unfamiliarity, though its inclusion is currently under review.

Just how important nonlinear distortion is to the sound quality of typical loudspeakers replayed at typical sound pressure levels is not something that has been much investigated, on the basis that linear effects (frequency response, directivity, resonance behaviour) have historically been regarded as subjectively more significant. Recent research by Harman into the significance of nonlinear distortion in headphones tends to support this view but it has to be remembered that nonlinear distortion in headphones is normally lower than that in loudspeakers at equivalent SPLs.

Near-field measurement of loudspeaker distortion isn't entirely satisfactory but, lacking an anechoic chamber, we adopt this method to obviate room effects.



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SEMI-OPEN HEADPHONES



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Please give NightHawk a listen!

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All the best for the next 60 years!

READERS' REACTIONS TO THE *HI-FI NEWS* 60TH ANNIVERSARY ISSUE FROM AFAR – AND CLOSER TO HOME!

Having just finished reading all 156 pages of your 60th anniversary issue [see *HFN* Jun '16] I just wanted to congratulate the team on a fascinating read. With so much ill-informed nonsense regarding our hobby masquerading as fact on the net, it is good to 'come home' to a place where experience and hard lab-testing trump conjecture and hearsay.

The section that gave the 'behind the scenes' look at the development of the magazine was as illuminating as it was entertaining while it was refreshing to be reminded of the sheer amount of work that has gone into *HFN* over the past 60 years by writers both past and present.

Stuart Greer, Johannesburg

Can I add my congratulations on a remarkable publishing achievement: 60 years of *Hi-Fi News*. Tremendous! Reading your anniversary issue I realised how much history I share with your contributors and fellow readers.

I caught the hi-fi DIY bug from my father who, among other things, built his own Mullard 5-10 amplifier and later added an extra tuner to our TV set to get the new second TV channel, ITV! I soon took an active part myself, building his new 30W transistor Bailey amplifier from an article in *Wireless World* [May 1968], a Nelson Jones tuner [*WW* April 1971] and then a phase-locked stereo decoder [*WW* Sept 1970] to enjoy BBC's broadcast of stereo FM.

When later I could afford to start putting together my own hi-fi set-up I



ABOVE: Stereo Mullard 5-10 amplifier built using the Mullard circuit from 1954

also took the DIY route, building a kit 30W Linsley Hood MOSFET amplifier from a series of articles that began in the January 1980 issue of *HFN* and some kit loudspeakers based on the KEF 103.2 models from Wilmslow Audio. Both of which are still making music!

By comparison, there is very little in the way of hi-fi in kit form today but I have found an excellent source from Djuke Audio in Holland. His designs are now bringing my set-up up to date.

I also have my (and my father's) first and only hi-fi turntables: a Dual CS505 with a ULM 65E cartridge and Thorens TD150 MkII with an ADC 660. Having compared them, I realise both decks are now in need of new drive belts.

All the best for the next 60 years!

Peter Bellamy, via email

While reading Paul Miller's column in the 60th anniversary issue of *Hi-Fi News* I was pleased to see that he too went to Bromley Tech, as it was known in the days before its name was changed to Ravens Wood. As I'm sure Paul will be aware, Peter Frampton also went there. Peter's brother was in the year above me and his father, Owen (a lovely man), taught us art. I used to board the school bus at West Wickham to join my mates from what seemed like far flung places – Crystal Palace, Penge and Anerley. One of them was John Pienaar, now the BBC's

deputy political editor. We became good mates through our love of singing in the school choir and reggae! I remember buying my first album, *Deep Purple In Rock* around that time.

Unfortunately I didn't finish my schooling there as my father earned promotion at work and we moved to Windsor. Not all bad news, though, as just up the road was Slough, with several good live music venues, and at that time Windsor had its own free concerts in the Great Park. Happy, heady times indeed!

I now own a system that I am really happy with and can't see myself making any changes to in the near or distant future – apart from speakers. The system comprises a Project Xpack Experience turntable with Ortofon Rondo Red cartridge, Sonos Connect, Oppo BDP105D for Blu-ray and CD duties, a QNAP HS-251 + silent NAS running JRiver software to play my hi-res music files, Devialet 400 amps and ProAc Response D20R speakers.

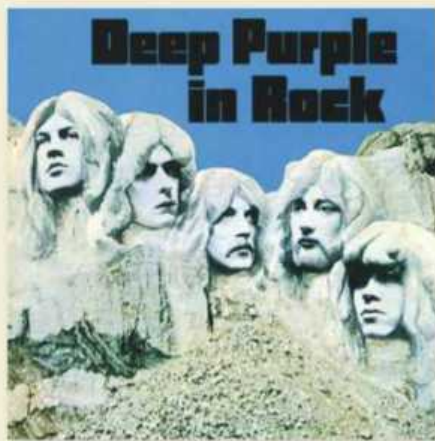
I also use an Intona High Speed USB 2.0 isolator (industrial version) between the NAS and Devialet. This provides galvanic isolation and prevents electrical nasties getting through from the potentially 'dirty' NAS drive.

Thanks for the great magazine. I wait eagerly each month for it to drop on to the doormat, and pounce upon it to read its contents from cover to cover. I do buy other hi-fi titles, but *Hi-Fi News* is by far my favourite. Keep 'em coming!

Alex Ferguson, via email

Paul Miller replies: I would like to thank all those readers who took the trouble to write to us about our special 60th Anniversary issue, and in particular those who either attended Bromley Tech/Ravens Wood school or passed through the same organic chemistry department at Imperial College! Your best wishes are hugely appreciated by myself and the small, but extremely dedicated and focused *HFN* editorial team.

We are keenly aware that hi-fi enthusiasts have a choice in their reading which is why we work very hard to offer the broad mix of investigative features, music reviews and celebrations and, of course, those uniquely in-depth technical reviews of both cutting-edge and vintage gear. As regards the free-to-access blurb on 'the net', I always say that you get what you pay for...



ABOVE: *Deep Purple In Rock* was the band's fourth studio album and hit the shops in 1970

Advice on rare vintage amp

READER WONDERS IF EARLY '80S ARMSTRONG PRE/POWER IS TRULY WORTH SEEKING OUT

I recently spotted an Armstrong 730/732 pre/power amp for sale on a well known online auction site. The pair eventually sold for over £1200. Would this combination make a good buy should I come across another set? I ask because while the seller described the amps in his listing as being 'ultra rare' he went on to call them 'museum pieces'!

Christopher Massey, via email

Jim Lesurf replies: As far as I know, there were only 40 sets of 730/732 amplifiers ever made and, aside from the one you spotted on the online auction site, I only know the whereabouts of four.

On the upside, the sets have proven themselves to be better built than I had thought. The aim was to have them working reliably for about 20 years. It's now well over that, and when I check my own samples of these amps, even the electrolytic capacitors are fine. Most people assume these should always be changed after about ten years' use. But I've found that good examples used within their limits can last a lot longer.

As for being a good buy, the snag is that the physical design of the power amp has much in common with the old Mini cars. By this I'm referring to the joke that in order to change the Mini's oil filter you had to take the engine out!

So with the 732 you have to take out the boards to be able to see the tracks on the circuit boards. You can open the lid of the box easily, but the bottom and sides are less easy to remove. In effect, you have to take everything apart, and undo all the wiring. And you can't see the underside of the boards from the top.



ABOVE: Inside shot of the 730 preamp. The 730/732 was reviewed in HFN Jul '82

The details of the wiring loom are critical, so this is a challenge if you have an amp you want to put back into working order after having scanned and examined the track-side of the boards. And as with the wiring loom, the details of the PCB track affect performance. Details that textbooks on amp design never cover.

So, if one already owned a 730/732 then buying a 'spare' set to have on hand would be useful. In fact I have been half-waiting for someone to contact me, seeking assistance because their 730/732 has failed. That way I could take the 732 apart, regenerate drawings of the PCB tracks, etc, and make the details available for anyone who might be interested in building their own.



ABOVE: Still in fine fettle – Jim Lesurf's Armstrong 730 preamp (top) and 732 power amp can be seen at www.audiomisc.co.uk/Armstrong/700/700page1.html

EXTREME?

IT IS NOW!

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Sony D-88 portable CD player

Designed as an exercise in miniaturisation, Sony's D-88 remains the smallest CD player ever made. How does this rather impractical 'portable' player measure up today?

Review: **Tim Jarman** Lab: **Paul Miller**

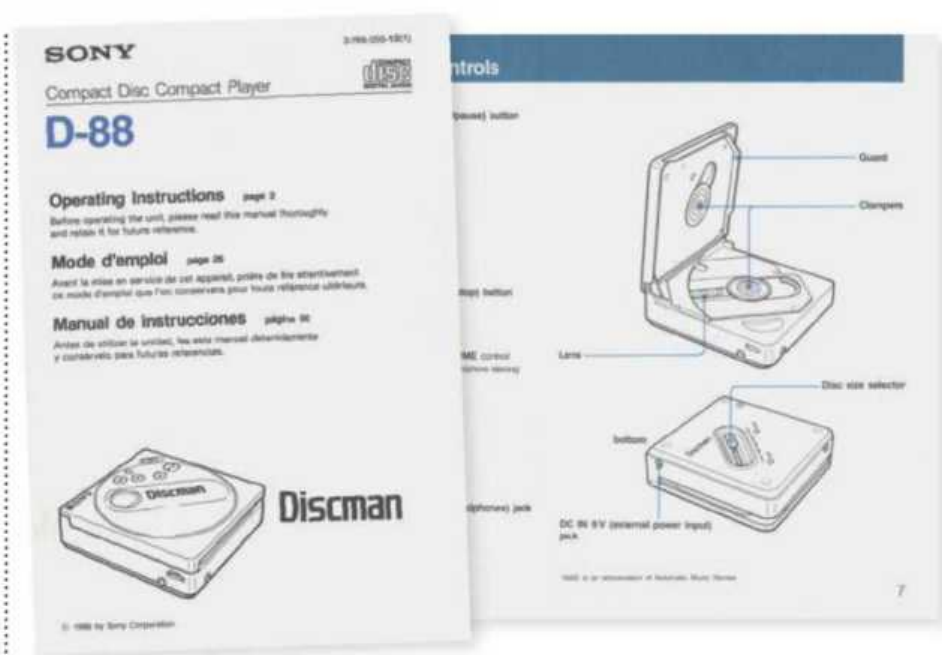
Anounced in 1988, the Sony D-88 was at the time of its introduction the smallest CD player in the world. Although slimmer machines were produced subsequently, the D-88's tiny footprint and minimal overall volume would never be challenged by other designs intended to rob it of the title of 'world's smallest'. This feat of engineering from the early days of the format was, in its own way, unequalled.

LOGICAL CONCLUSION

Having produced the original D-50 portable CD player [see *HFN* Jan '13] it was only natural that Sony would take the idea of miniaturisation to its logical conclusion.

The introduction of 8cm CD singles in the late 1980s brought with it the possibility of a range of smaller players, although at first the only impact of these smaller discs was to oblige manufacturers of front-loading machines to include a recess in the player's tray so that these discs would be correctly centred.

An expensive model which could only play 8cm discs would have been a certain commercial failure, so with typical flair



ABOVE: Despite the D-88's complexity, operating instructions were surprisingly straightforward. The diagram in the picture on the right shows the spindle positioned for 8cm CD single replay

Sony engineered the D-88 so that it could play the full-sized ones as well.

When playing an 8cm disc the spindle was located in the centre of the machine, meaning that the disc was completely enclosed by the lid. To play a 12cm disc, a sliding control underneath was used to move the entire spindle motor assembly out towards the front right-hand corner of the player. With the lid shut this moved the clamping puck as well, making the machine almost ready to accept regular media.

The final piece of preparation was to flip the blue edge of the lid inwards, revealing a slot through which the bulk of the disc would protrude.

This configuration recalled an unusual direct-drive turntable that Sony had marketed six years earlier. The PS-Q7's plinth was barely larger than the sleeve of a 45rpm single, but since its

hub-like platter and a weighty clamp in the lid were placed in one corner, it could play an LP – despite the fact that much of the record itself ended up outside the confines of the turntable's casework.

As with the D-50, the dimensions of the main unit were minimised by making the battery an external component, which was mounted in a detachable housing. This housing also contained the battery charging circuit, saving even more space inside the tiny D-88.

A CHALLENGE

Playing 12cm CDs on the move was always going to be a challenge as the slightest disturbance to the exposed disc would cause skipping or loss of sound. For 8cm discs, the problem was that because of the limited storage capacity available it was necessary to carry several to enable a good choice of listening.

Sony's answer was to include a soft pouch with the player that had a mounting bracket for the D-88 and its battery inside, along with a place for a spare battery



LEFT: The D-88 and its accessories could be carried together in this soft, pocket-sized pouch

RIGHT: While diminutive CD singles would tuck inside the D-88, full-sized CD discs would inevitably spin exposed, limiting the unit's practicality as a truly 'portable' player

(useful as the type used had a life of just two hours) and a pocket for extra discs. This ensemble was barely smaller than a portable player of conventional design, diluting the advantages of miniaturisation.

To operate the player without too much fuss a wired remote control could be used, the optional RM-DM2 being a suitable type.

SEPARATE DACS

When it came to the technology used, the D-88's circuitry was largely conventional for the period and used many of the parts that were used to make the rest of the company's Discman range.

The space required to accommodate the necessary printed circuit was made available by the simple (and in retrospect obvious) ploy of placing a second board inside the lid of the player. This also contained the bulk of the controls system, the keys and the display.

Although not a feature of all portable players in 1988, the D-88 even contained a separate 16-bit DAC for each of the stereo channels. A digital 2x oversampling filter was also shoehorned in, an improvement over the original D-50 but behind Sony's best practice of the era.

Models in the same range, such as the D-250, were already offering 4x oversampling and the soon-to-be-announced D-Z555 offered the technically impressive feat of 8x oversampling.

Just as 8cm CDs failed to make any real impact, so the D-88 didn't really catch on.



Seen more as a high-tech novelty than a useful solution to a real-world problem, it was a technical dead-end, although judging by the amount of players still in circulation it is clear that a surprisingly large number must have been sold.

Sony's focus later moved to ever slimmer players with circular casework having a diameter scarcely larger than a 12cm disc.

Like most portable players, the Sony D-88 can be used as part of a conventional hi-fi system as well. Originally the units were supplied with an AC adapter and a connecting cable terminated with RCA plugs so the

connections are easy to make. There is no dedicated line output connection, so the audio output has to be taken from the headphone socket. Lack of space is the probable reason for this compromise;

there is adequate level available with the volume control set between 6 and 8 [see Lab Report].

For static use the battery case can be removed, presenting the player in its smallest possible form. Once

loaded, a 12cm CD doesn't seem that compact at all, an illusion bolstered by the fact that the D-88's styling is similar to that of a full-sized Sony Discman, only presented in two-thirds scale.

'The sound of the electronic percussion was exhilarating'

PLAY 'N' DELAY

One quirk in the D-88's operation means that when the player is switched off the laser sled is parked towards the outer edge of the disc – rather than close to the centre as is normal practice – to allow for the user moving the spindle to the 8cm disc position. This arrangement imposes a delay when play is first selected as the laser moves slowly to the centre first, before the disc spins up and is read.

The display is located in a small round window and is very basic. Indeed, it shows only the track number and a few graphic symbols. In practice it is difficult to operate

LEFT: Sony's Discman range as illustrated in its 1989/90 brochure, including the 'World's smallest CD player' – the D-88 – between the D-250 and DZ-555 on the right hand page



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LEFT: View of the D-88 with lid open shows the player's lens and disc clampers
RIGHT: Sony ad from 1988 spotlights the player's portability and compact dimensions

As well as being able to produce sufficient level, the D-88's output was clean and well balanced when used with full-sized equipment. The bass sounded both powerful and pleasingly tubby, while the treble was bright and sparkly – as might be expected from a Japanese player from this period.

Seizing any opportunity for complete '80s immersion, I selected the first Frankie Goes To Hollywood album

Welcome To The Pleasure Dome [ZTT CID 101, original issue] as my first disc, the massive energy in the recordings being a natural match for what is ultimately a fairly hard-sounding player.

Neither my Cyrus amp nor Monitor Audio PL100 loudspeakers share this trait, yet the Sony's character made it through, the electronic percussion and effects on tracks such as 'Welcome To The Pleasure Dome' itself and 'Two Tribes' being exhilarating experiences in a manner that's sadly out of fashion these days.

The sounds were as edgy as the producers, no doubt, intended, if a bit splashy at times. Imaging was broad, if a tad smeared and indistinct compared to what is achievable in absolute terms. But overall the results were hard to fault given that they were the output of 25-year-old machinery measuring just 16cm².

More melodic, but still of the D-88's era, I also tried the album *Wonderful Life* by Black [A&M 395165-2]. Here the D-88 proved to be somewhat drier in its overall tone than the players I normally use, the title track in particular sounding a little cold and two-dimensional.

In particular the sax line sounded recessed, changing the overall character of the piece to a surprising extent.



Nevertheless, the vocal line was solidly placed in the soundstage and was smooth, being free from the gritty quality that some early Japanese players can bring to it.

Guests to the house during the review period could hardly believe that the sound they were hearing was originating from something so small. Swapping the connection to their own mobile 'phones had all agreeing that even today the D-88 really is something special.

A LITTLE BRITTLE

If I had to be critical of one area of the D-88's performance it would be the upper midrange which, like many of Sony's 16-bit 2x portables of this era, is a bit brittle and glassy-sounding. This is a trait of many a full-size player as well, of course, and so needn't necessarily be a consequence of everything being packed in so close.

It was most obvious when the D-88 was compared directly to a smoother-sounding player and didn't spoil the listening experience when heard in isolation.

At the lower end, the bass is perhaps a little truncated, a result perhaps of having

the keys without disturbing the rotation of the disc and a brief skip will be often be heard when changing the track. Meanwhile, the supplied audio cable has a bulky plug at the CD player end. Since the socket is at the front of the D-88, this makes it difficult to place the unit neatly with your other equipment. It would have been more user-friendly for this socket to have been located to the side.

TIM LISTENS

My Cyrus 6A reference amplifier is hardly what one would call a large piece of equipment, but it dwarfed the D-88, making it appear almost like a toy. That observation aside, it was time to hear what this miniature disc player was capable of today.

If you've ever connected a modern portable music player or a modern mobile 'phone to a hi-fi system through the headphone socket you will know how disappointing the results can be. Fortunately, the D-88 significantly pre-dates any current restrictions on headphone output levels and so the stage was surprisingly capable, driving the amplifier's input with ease.

Rated on paper at just 9mW/32ohm [see PM's Lab Report on p123] it can't produce the shattering levels of sound through headphones that many modern USB devices (often rated in excess of 100mW/32ohm), are capable of, but care should still be taken if you choose to listen this way for long periods.

'Despite its faults, it is hard not to admire this little Sony player'



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VINTAGE HI-FI



ABOVE: The volume control was positioned so that it could still be reached with a 12cm CD loaded while the blue 3.5mm jack socket accepted a wired remote control

to use the headphone socket as the output. AC coupling is a necessity in a correctly designed headphone stage so one cannot expect the low-end accuracy of a full-sized, fully DC-coupled DAC.

Despite its faults, it is hard not to admire this little Sony player. It works extremely well given that the design focus was clearly on size rather than ultimate sound quality.

BUYING SECONDHAND

Since they were never that practical for their intended purpose, it is unlikely that many D-88s have done enough hours to become completely worn out. However, there are still potential problems to keep a look out for, starting with the general scruffiness that seems to affect all kinds of portable equipment.

Assuming that the unit is complete and isn't too battered, be aware that the polarity of the power inlet is opposite to the current norm and the player will be damaged if the wrong connections are made.

To be on the safe side use only the original Sony power adapter, which for the UK is type AC-930A. On the subject of power sources, the BP-2 lead acid battery that runs the D-88 on the move is certain to

have expired and replacements are not generally available. This type of battery deteriorates rapidly if left discharged, so even new old-stock examples will now be useless.

Moving on to the main unit, experience has shown that long periods of disuse can allow the drive gears for the laser sled to seize up. In this condition the unit will not play, although the display will show some signs of life. A strip down and clean up will cure this one, but this isn't easy to accomplish as there is no room to work and all the parts are absolutely tiny.

WIRED FOR SOUND

One further problem to keep in mind is that the flexible PCB that joins the circuitry in the lid to that in the main part of the set can tear, typically leaving all the keys unresponsive. Bridging the defective sections with fine wire is one possible solution.

Due to its small size, the D-88 is more difficult to repair than most CD players but it *can* be done with a little care and persistence. ☺

HI-FI NEWS VERDICT

While ultimately not really practical as the portable player it was designed to be, the Sony D-88 still offers a fascinating study when it comes to the limits of miniaturisation and as such is a justifiably well recognised high point in 1980s digital audio design. Matching many full-sized players of the era for sound quality, its real appeal is its hard-to-resist 'cuteness' when encountered first-hand.

Sound Quality: 70%



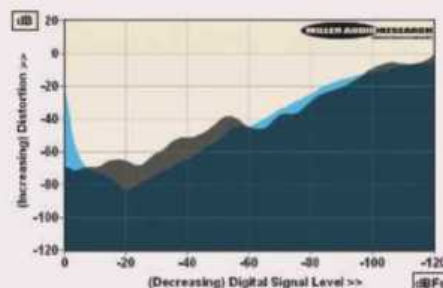
ABOVE: The original box, unlike the player itself, was surprisingly large!

LAB REPORT

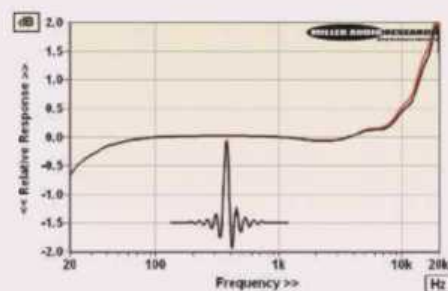
SONY D-88 (Vintage)

Unlike Sony's first portable CD player, the D-50 [HFN Jan '13], which behaved like a miniaturised version of its inaugural CDP-101 [HFN Jan '12], the super-mini D-88 employs a more evolved stereo 16-bit chipset with 2x oversampling. The maximum output before clipping is 1.04V – the dial [pictured, left] set to '6' when replaying a peak level 0dBfs digital signal. Treated as a headphone amplifier, this same output – rated at 9mW/32ohm – achieved 7mW/25ohm at <1% THD from a rather high 24ohm source impedance (increasing to 38ohm at 20Hz). Typical of products from its day, this performance is readily overwhelmed by today's hub-powered, plug-in USB DAC/headphone amps such as the AudioQuest DragonFly [HFN Mar '14].

Built for size and limited power consumption, the D-88's digital/analog performance is not especially illustrative of Sony's full-sized players from the era. The impulse response [inset, Graph 2 below] shows the pre-ringing associated with a basic FIR 2x oversampled digital filter (which offers some 40dB stopband rejection) while the reconstructed frequency response shows an uptilted treble of +0.5dB/10kHz reaching +1.9dB/18kHz. Stereo separation is >60dB and channel balance – a function of the analogue rotary – is ±0.5dB (re. 0dBV). The D-88's 89dB A-wtd S/N ratio is a few dB shy of that achieved by the older D-50 although its low-level resolution is improved as errors are suppressed (ie, -3.8dB at -90dBfs) rather than boosted. Aside from some peak overload at 20kHz, distortion hovers around 0.01-0.09% from 20Hz-20kHz over the top 30dB of its dynamic range [see Graph 1] while jitter lands at some 830psec – acceptable, given the design compromises. PM



ABOVE: Distortion versus digital signal level over a 120dB dynamic range (1kHz, black; 20kHz, blue)



ABOVE: Magnitude and time domain responses (left, black; right, red). Note pre- and post-ripple on the impulse response from FIR 2x oversampling filter

HI-FI NEWS SPECIFICATIONS

Maximum output level/impedance	1.04Vrms / 24-32ohm
A-wtd S/N ratio	89.0dB
Distortion (1kHz, 0dBfs/-30dBfs)	0.035% / 0.090%
Distortion & Noise (20kHz, 0dBfs/-30dBfs)	Clipped / 0.015%
Frequency response (20Hz-20kHz)	-0.65dB to +1.9dB
Digital jitter	830psec
Resolution @ -90dB/-100dB	-3.8dB / -6.9dB
Power consumption	4W
Dimensions (WHD, inc controls) / Weight	95x33x99mm / 300g

Making an audio valve

De-greasing, stoving, welding, bending... it's not just complex machinery that's needed to make a valve, but human dexterity too, as *HFN* reports...

*Hi-Fi
News
April
1957*

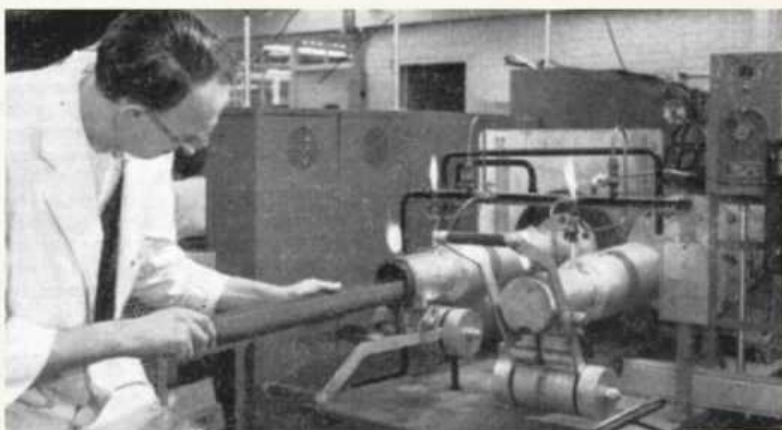
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features and
reviews from
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There are some of us – the 'long-beards' – who can well remember the days when the first valves appeared on the market (in the early 1920s), and were used as amplifiers in conjunction with galena or carborundum crystal detectors.

No two were alike, electrically, and it did not matter much. Their filaments were handsomely thick strands of wire, their grids simple spirals of thicker wire, and their plates were metal cylinders, an inch in length and as round as a pencil.

Given a six-volt accumulator to run their filaments, and a massive HT battery which lasted no time at all, one could light the room and listen to speech and music from the Hague and Paris – and, later, London – at one and the same time.

Comparing those early 'R-Type' bright-emitter valves with the present-day miniatures, makes food for interesting conversation around any hi-fi table: comparing the different manufacturing techniques



ABOVE: Fig 1 – metal parts for the internal structure of a valve are inserted into a stoving machine for cleaning

involved, would provide material for an encyclopaedia. To say that even the materials used are much the same, would invite the wrath of most valve manufacturers.

STRICT CLEANLINESS

One of the first noticeable things about valve manufacture is the strict cleanliness which is observed with all the parts. This is now considered as vitally important, and before the electrode cage is assembled, each part is subjected to extensive de-greasing, stoving and cleansing processes [see Fig 1, above].

For the purpose of this short description of the process of manufacture of an audio valve, it must be assumed that the basic parts are already made and ready, though the very fineness of some of the wire involved demands a picture [see Fig 2] to speak for that side of the process.

The grids of miniature and sub-miniature valves are wound on precision machines. Even when wound, their dimensions are so small as to require inspection by strong magnification [see Fig 3] where the enlarged silhouette of a tiny grid is projected on to a screen. After inspection, the sections of grid are cut up for use.

The valve filaments are produced, with exposed metal ends, on a specially designed machine which is capable of handling wire of 0.0003in in diameter [see Fig 4].

For sub-miniature valves, such as are used in hearing aids, the operator uses another ingenious machine for attaching the filaments to its supports [see Fig 5]. He/she

picks up a mica disc, a filament and support bracket, and inserts the latter into appropriate holes in the mica, and then places it on

the machine. It is then transferred automatically into position for a small air-operated hammer to bend the bracket into place.

When the machine handles the next assembly, the prior one is whisked back into the first position, and a blast of air carries it along a glass tube into a storage box.

MAKING THE CAGE

However, to return to the sequence of manufacture, the first stage is the assembly of the electrode 'cage' when the various electrodes – anode, grids, heater, and other

'The enlarged silhouette of a tiny grid is projected on to a screen'





LEFT: Fig 2 – here precision machines are used for winding the very fine grids needed for miniature and sub-miniature valves. These are then cut into sections



ABOVE RIGHT: Fig 5 – this machine transfers mica and filament to an air-hammer and then, with a puff of compressed air, to storage boxes



RIGHT: Fig 6 – valve electrodes are welded into position in the electrode cage

associated components – are assembled into a compact, rigid structure (the 'cage'), which is then welded directly on to the connecting wires in the glass base of the valve [see Fig 6].

Many clever machines are used in valve production, but some of the most effective devices employed are extremely simple – as for instance the use of magnets for holding very small components.

When valve components consist in part, or wholly of magnetic materials, it is found most useful to stick them on to magnets, where they stand up like the bristles on a hedgehog. The result is that they present themselves conveniently for the operator to pick up with a pair of non-magnetic tweezers.

Next comes the fabrication of the glass base. This is a flat glass disc, moulded into which are a number of connecting pins, in the pattern demanded by the valve being made.

A corresponding number of wires are joined to these pins, and these wires will in turn be connected to the various electrodes in due course. The pins and wires are joined together via a short length of metal which has the same coefficient of expansion as glass. This ensures a good airtight seal where they pass through the glass.

CUTTING AND BENDING

When the internal connecting wires are in position, the base is placed in a machine which cuts the connectors to the required lengths, and another machine automatically bends them into the exact positions necessary to meet the lower ends of the electrodes, so that they can then be welded directly on to them.

Fig. 7 shows unprocessed valve bases in the left-hand trays. The operator picks up a base, inserts it into the pin-cutting machine, and then into the bending machine,

BELOW LEFT: Fig 3 – sections of sub-miniature valve grids are inspected before being cut up for use. An enlarged silhouette is projected onto a screen

BELOW: Fig 4 – machine used to make valve filaments for welding

BELOW RIGHT: Fig 7 – left and right trays in which valve bases are stored, correctly positioned

after which the base is placed in the right-hand trays.

Great speed of operation is achieved because the shape of the holes in the storage trays is such that the bases are picked up by the operator in the correct position for insertion into the machine. This means that there is no time wasted through having to turn each base for correct location.

MORE COMPONENTS

After the cage has been welded on to the base connecting wires, a few more components are added. These include (a) the heater, which is threaded through the cathode tube, (b) a small plate which serves to keep the control grid cool, thus reducing the risk of grid emission, and (c) the 'getter', which will perfect the vacuum after the glass envelope has been evacuated.

The glass envelopes, or 'bulbs', now have to be placed over the





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electrode cages and joined to the glass bases. This is done automatically by a rotary machine, on which a series of jets of flame, of increasing heat, play upon the circles of junction as the rotary table revolves, bringing each valve past jet after jet until the seal is completed – after which the cooling-down process is progressively controlled. Next comes the evacuation.

EVACUATED AND AGED

Another rotary machine is used for this [see Fig 8], and the valves are sealed on to this pumping machine. First, the air and other gases are exhausted from the valves, in order to obtain the high vacuum required. Next, the valves pass through a heated tunnel conveyor, which assists in the removal of the gases.

Finally, still sealed to the pumping machine, each valve is subjected to an externally induced high-frequency current. This heats the internal metal structures, and still further aids the removal of gases. The cathode is heated, in order to activate its emission coating, and a further application of high frequency current fires the chemical 'getter', thus removing the last traces of gas that are present inside the envelope.

The valve is then sealed off from the pumping machine and 'aged'. This process consists of operating the valve for a certain period under

controlled conditions, so as to stabilise its characteristics, and to develop the emission properties of the cathode to the fullest extent.

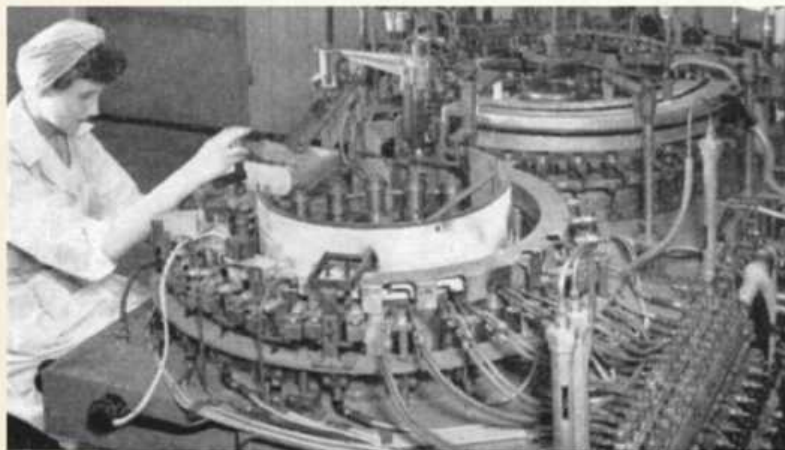
TESTING TIME

With the manufacturing processes completed, the valves are subjected to a series of rigorous tests, for

emission, vacuum, insulation, operating characteristics, and so on. And, as a final check to ensure that the continuous

output from the factory measures up to published specifications, valves are taken at random from the production line, before being packed, and subjected to further tests in the laboratory. ⚡

'Valves are taken at random from the production line for lab tests'



LEFT: Fig 8 – one of the rotary machines used for pumping and sealing valves. Once the valves have been sealed on, air and other gases are exhausted. After passing through a heated tunnel conveyor, each valve is subjected to an externally induced high-frequency current



ABOVE: Original pages from the April 1957 issue of *Hi-Fi News* which described the main processes of making a valve with photographs taken at the Whyteleafe factory of the Mullard Valve Company. The cover image shows BBC mobile recording engineer Robert Wade using a battery-driven Leavers-Rich tape recorder able to hold up to 2400ft of tape



Also in HFN this month in 1957

EDITORIAL

Miles Henslow on why the magic words 'hi-fi' on both leaflets and price tags is no longer the guarantee it should be.

AUDIO FAIR

The highlights as seen through the eyes and ears of *Hi-Fi News*.

TESTING TAPE RECORDERS

By James Moir.

MICROPHONES

Stanley Kelly takes a look at their history and development.

THE SPEAKER IN YOUR HOME

In part 11 of this series, Ralph West considers loudspeaker crossover units.

BBC RECORDINGS

D Winget listens in while taking notes about the equipment used by the corporation's Natural History and Effects Unit.

AUDIO NEWS

More details of recorded TV.

STEREOPHONIC SOUND

A survey of an IEE Lecture from James Moir.

EQUIPMENT REVIEWED

New components come under the critical ear of R S Roberts and Ralph West.

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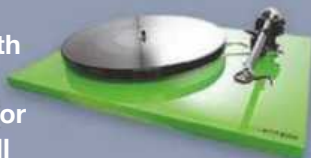
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LAST WORD

OFF THE LEASH!

KEN KESSLER TELLS IT LIKE IT IS...

Ken Kessler examines the significance of a new add-on for a classic, but long gone, loudspeaker



With the recent announcement of a new subwoofer for a long out-of-production loudspeaker, my thoughts turned to the continuing appeal of obsolete hi-fi equipment. 'Obsolete' is a matter of opinion, of course, and I would take, for example, most 1950s wristwatches over their current equivalents, but that is certainly pure nostalgia: showing the time to fractions of a second was perfected a couple of centuries ago. All else related to watches is subjective, while technical developments deal solely with costs, reliability or efficiency.

Continuing progress, however, is a perpetual condition of audio. The simple act of marking linear time is far less involved than reproducing the dynamic complexity of music, so the evolution of watches is relatively static. Not so hi-fi, or for that matter, cars, photography, computing or anything with an electronic element. Nobody wants to work on a PC from 1992.

As evinced by the Audiojumble in Tonbridge in late February, the number of those embracing old equipment is increasing. LS3/5A prices, for the rarest, most-coveted models, are now in the £5000-£10,000 region. Given the return of the LP, used turntable prices have gone up. Dealers with stashes of Garrards and Thorenses are having a ball.

As for the new subwoofer, no less than Dr Andrew Watson, late of KEF and now of Stonegate Acoustics, has designed his B3 for both 11 and 15ohm versions of the LS3/5A. Regardless of what Watson has done, the point I'm making has nothing to do with how it may sound. Instead, the intriguing aspect is that he could be bothered to develop an all-new adjunct to an out-of-production item.

PASSION FOR VINTAGE

As I never got past Psychology 101, I don't know how much of the passion for vintage is based on nostalgia, how much on performance and how much on styling. But there must be some objective criteria at play. *HFN* is the only mag I know that actually lab-tests these survivors, but even then, and despite Editor PM going to great lengths to ensure a product's provenance and service

history, I suppose we'll never really know if, say, a pair of Spondor BC1s sounds exactly as it did when new.

That, though, is irrelevant, because those who prefer to use old hardware are

not naïve enough to expect performance identical to 'as new' from, say, a 50-year-old valve amp. We do not have a time machine that will take us back to the Tottenham Court Road circa-1966 for some Radford monoblocks, and even a new-old-stock pair, never taken out of the boxes, will have aged.

'BC1s in good working order will slaughter them – and for less money'

Thus, that aforementioned pair of BC1s can only be compared to current alternatives to determine their relative performance.

But does it matter? Those who champion old gear – whatever their claims about performance – can show that the cost of a pair of used BC1s would barely pay for a pair of current, entry-level bookshelf speakers with half the wooferage. With all due respect to those making small speakers with £299-per-pair price tags, in all likelihood a pair of BC1s in good working order will slaughter them – and for less money.

DECIDED BY EMOTION

Or will they? Andrew Jones' ELAC B5 and B6 [*HFN* May '16] have so changed the game (as his budget speakers for Pioneer did a few years ago) that maybe it is possible for new speakers to best legendary vintage classics of far greater bulk. I've been playing with KEF's £799 LS50 and have a gut feeling that they might also embarrass much larger standmounts from the 'golden age' of hi-fi.

That, however, is trying to apply rational thought to a question which is decided by emotion. No-one in their right mind could argue, for example, that a mint 1960 Triumph TR3 (circa £25k) is a 'better' small two-seater than a Mazda MX-5, of which a brand-new one with a few extras costs the same. But which is more fun? One is a vintage car, the other so modern and faultless that it's almost an appliance.

Aah, there's the rub: logic plays no part in this. The Mazda will serve you faithfully, reliably, not breaking down on the M25 as you rush toward Heathrow. The Triumph, by virtue of its age, will only be viable on sunny Sundays, within a short distance from home. But it is so much more of an adventure...

Dr Watson's website addresses the incongruity of a brand-new subwoofer for a long-gone speaker with, 'Stonegate Acoustics Ltd chooses to take a conservative approach with the B3 system power rating to ensure that users are not encouraged to overdrive their LS3/5As, of which many pairs will be over 20 years old and possibly becoming a little fragile.' Which pretty much describes the way you'd regard your TR3: old hi-fi possesses a frisson of danger, and for some, that's irresistible. ☺

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