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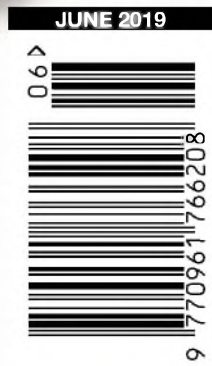
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David Tutt.



The LP and the CD after it assembled music tracks onto a disc in pre-packaged form. You might only end up wanting or enjoying half of the content – but too bad. You paid for the lot. It all seemed logical at the time, since the alternative to the LP was the bulky single and changing these every 5 minutes to hear tracks rather than albums would have been an evening's marathon.

Prepackaged music went out of the window when MP3 players arrived, epitomised by Apple's once-dominant iPod. Now, we had individual tracks rather than albums – and track listings. The difficulty here is sorting and accessing thousands of tracks. We could all remember album names like Hotel California, Abbey Road and such like, since albums not only carried songs but also an underlying message of the time: a story, a view, their own rhetoric even. They were easy to remember. But individual tracks? It's like remembering the names of ants.

Enter meta-data, that list of info appended to digital files with Artist, Title, Date, Genre and what have you. Even more data – and to use it you must be able to read it, necessitating a screen. But small screens on a piece of hi-fi equipment are illegible at a distance, so that's a bad idea. The obvious solution is a screen in the hand – and what more obvious a choice than a mobile 'phone. It's already been paid for, so doesn't add to equipment cost.

In effect when a manufacturer uses a control app on a 'phone or iPad he is relieved of that cost elsewhere, on the product itself or as a remote control possibly. No wonder then that now, as we listen to tracks stored on Flash Drives, computers or on the 'net by a music provider such as Spotify, Tidal or iTunes, the use of an app on 'phone or tablet is becoming ever more popular. And Leema's Elements Streamer we review on p41 exemplifies this approach. Blindingly simple in construction – just a case with a light – it acts as a do-it-all digital player. Don't miss our review where you can read about the trials and tribulations of such a source, but also the benefits.

At the other end of the scale comes SME's new Synergy turntable. A fabulous construction in typical no-compromise style, this source offers a fabulous if expensive way to hear what lies in the latest vinyl. Our in-depth review on p83 peers into the issues behind disc spinning at the highest quality levels possible.

I hope you enjoy our breadth of coverage in this latest great issue, with informed views on all the latest in high quality audio.

Noel Keywood
Editor



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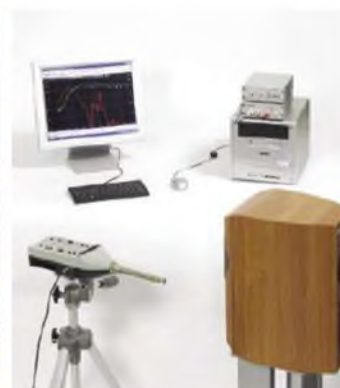
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To ensure the upmost accuracy in our product reviews, *Hi-Fi World* has extremely comprehensive in-house test facilities, and our test equipment - from big names like Rohde & Schwarz and Hewlett Packard - is amongst the most advanced in the world.

Loudspeakers are measured using a calibrated Bruel & Kjaer microphone feeding a Clio-based computer

analyser, using pulsed and gated sinewaves, in a large room to eliminate the room's influence. Pickup arm vibration is measured with a Bruel & Kjaer accelerometer.

No other UK hi-fi magazine has in-house testing, and none has access to such advanced tests across all types of equipment. That's why you can depend on *Hi-Fi World* reviews.



Distributed by Select Publisher Services Ltd. P.O. Box 6337, Bournemouth, BH1 9EH UK Tel +44 (0) 1202 586848

Printed by Precision Colour Printing Halesfield 1, Stirchley, Telford TF7 4QQ, United Kingdom Tel: +44 (0) 1952 585585

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NOW THAT'S WHAT YOU CALL A SYSTEM!



The 1871-vintage Royal Albert Hall, famous to many readers as the venue for the annual BBC Proms, has just completed a £2m acoustic makeover – the most significant change to its auditorium since acoustic ‘mush-rooms’ were installed back in 1969.

The project is claimed to be “the world’s largest loudspeaker install in a single room”. It swallowed 693 days of labour including 28 weeks of night-shifts, no less than 15,291m of cable, 211 microphones, 73 4-channel amplifiers, 465 individual speakers and the “most detailed acoustic surveys and modelling ever undertaken in the Hall”. Four firms – acoustic consultants Sandy Brown Associates, digital engineering experts DiGiCo, AV supplier SFL and German sound reinforcement specialists d&b audiotechnik – contributed to a carefully co-ordinated effort that took place “during the Hall’s busiest-ever year. None of the 327 shows that took place during the installation period were reputedly affected, ensuring that fans of acts as diverse as Nine Inch Nails, the LSO, Eric Clapton and Rudimental didn’t notice a thing”.

Royal Albert Hall, www.royalalberthall.com



ROCKET QUEEN FROM PRO-JECT

As the Austrian turntable manufacturer has done so much to revitalise interest in analogue discs, it was perhaps inevitable that the firm would launch ‘special editions’ branded with the groups we first listened to on vinyl – The Beatles and the Rolling Stones, for example. But Pro-ject’s latest collaboration is with a band that enjoyed success in the CD era – hard-rockers Guns N’ Roses, the recorded debut of which was of course 1987’s classic *Appetite for Destruction*. The £429 ‘Guns N’ Roses Record Player’ is based on the Essential IIIA turntable, a belt-drive two-speed design with precision diamond-cut pulley and an 8.6in. aluminium tonearm fitted with Ortofon OM10 MM cartridge. On this one, though, the G N’ R artwork has been directly-printed onto the 12in. Acryl-IT E platter. This casts a yellow ‘glow’ on the gloss-black MDF plinth, adding to its visual appeal. There’s even a small logo, underneath the tonearm’s rest position. But above all, this is a functional turntable; Pro-ject claims that the “sound delivered can easily put more expensive systems to shame”.

Contact: Henley Audio, (01235) 511166. www.henleyaudio.co.uk



ROON IS READY FOR MCINTOSH

The multi-room, multi-user networked-audio platform Roon reckons the iconic American audio brand McIntosh, is a “rich and engaging way to browse, organize and listen to music”. McIntosh goes on to remind us that “artist photos, credits, bios, reviews, lyrics, tour dates and composers are located...and linked to build a surfable digital magazine”. McIntosh’s desire to push this platform might have something to do with the fact that some of its newest products – among them the C47, C52, C2600 and D1100 preamplifiers, MA5300, MA7200, MA8900 and MA9000 integrated amps, MAC7200 receiver, MHA150 headphone amp and MXA80 integrated audio system have just been designated “Roon Tested”. McIntosh is also aware that its hardware will exploit Roon’s “bit-perfect playback, DSD and PCM upsampling and multichannel support”.

Contact: McIntosh, www.mcintoshlabs.com

AKG FOR REAL?

Buyers of upmarket Samsung smartphones might have noticed that the in-the-earphones supplied with their latest slabs of high-tech delight are claimed to be "Tuned by AKG". There's a good reason for that. Samsung now owns the Harman Group, which bought the respected Austrian headphone manufacturer in 1994. AKG is however little more than a brand today, operations in Vienna having ceased a couple of years ago. None of this has stopped AKG (specifically 'AKG Professional by HARMAN') and UK distributor Sound Technology Ltd from announcing a trio of foldable studio headphones. First is the K175, a £109 closed-back design with 40mm drivers. Next is the £129 K245 semi-open design, while the range is topped by the closed-back £149 K275. Both of the latter feature "largest-in-class" 50mm drivers for "greater low-frequency extension and detailed bass reproduction". To withstand the rigours of professional use, much use of metal has been made – Harman has also subjected these 'phones to drop-tests, an 80,000-bend-cycle for the (replaceable) cables and rigorous driver-stressing to ensure they will last.

Contact: Sound Technology (distributor) 01462 480000. www.soundtech.co.uk/akg



DIN...WITHOUT DIN

Tellurium Q, which won a Queens Award for Enterprise last year, now has tonearms in its sights. If your turntable has an SME, Linn, Jelco or similar high-grade arm with a 5-pin DIN connector, you may be interested to learn that its Statement interconnect, the design of which aims to minimise phase distortion, is now available in DIN-to-RCA form. Turntables, acknowledges Tellurium Q, are not an ideal 'burn-in' environment as the signals involved are "so small and not continuous". To address the problem, the firm has developed kit that "pre-burns every single one...for 2-3 days, before they leave the factory". Even though a 1m variant will set you back a not-insignificant £3,600, Tellurium Q is warning potential customers of a "bottleneck to supply".

Tellurium Q: (01458) 251997, telluriumq.com



HEADS UP

New from German operator Lehmannaudio are the Linear D II and Linear USB II, both retailing for £1700. These are the bigger brothers of the Linear – a respected headphone-amp stalwart that has been available since 2004. The new models are said to have the Linear's basic proven design and implementation, but with "wholesale changes" to the analogue circuitry. These include an uprated Class-A headphone output stage and specially-selected components – among them silver-mica capacitors and an internal power supply with juice to spare. The Linear D II is aimed at users reliant on conventional optical/coaxial digital sources, while the Linear USB II is instead designed to appeal to those using PCs as playback devices. They can also act as preamps (with phono outputs) when headphones aren't connected. Other features include two 6.3mm (unbalanced) headphone jacks, (phono) analogue inputs, gain-switching and hi-res DAC circuitry based around the ESS Sabre 9018K2M (the full potential of which – 32-bit/384kHz playback and DSD-over-PCM – is exploited by the Linear USB II). Characteristics are said to include "an open and natural sound...physical, punchy lows, startling resolution...and a open and natural soundstage", allowing headphones to "fulfil their highest potential".

Contact: Henley Audio, (01235) 511166. www.henleyaudio.co.uk





SEAMLESS 3D SOUND

New from Onkyo is their TX-NR696, a £700 THX Select-certified 7.2 AV receiver, which will decode Dolby Atmos and DTS:X sound tracks to “wrap viewers in a seamless 3D sound environment”. The Wi-Fi connectable TX-NR696’s onboard quad-core processor-powered tech provides “evolved network functionalities” as well as support for most audio formats (hi-res FLAC/DSD among them) and services like Amazon Music, Spotify, TIDAL, Deezer and Tunes. Multi-room audio is also catered for, with Sonos compatibility, as well as on-board multi-zone ability. There’s voice control, plenty of connectivity (the 7-in/2-out HDMI hardware handles all current standards, including 4k and HDR), a ‘music optimiser’,

384kHz/32-bit DACs across the board, 175W per channel of amplification (1 channel driven, 6 ohms, 10% THD), Bluetooth, AccuEQ/AccuReflex room-calibration and an ambient mode that redirects stereo listening to the Atmos height channels. And that’s just scratching the surface...whew!

Mercifully, Onkyo hasn’t forgotten those who opine that feature-laden products like the TX-NR696 are just that little bit intimidating. To this end, the firm has also announced home-cinema ‘packages’ – the £500 3.1.2 HT-S3910 and as-yet unpriced 5.1.2 HT-S5915 – which are intended as ‘hassle-free’ routes to Atmos and DTS-X. Simply add source and screen...

Contact: Onkyo, www.eu.onkyo.com

THE GREAT ESCAPE

A new name to us here at HFW is Escape. Since 2015, when it was formed by a husband-and-wife team, the Belgian firm beavered away on its debut product – the P9, described as a “versatile full-range high-fidelity portable speaker system” with “360-degree omni-directional sound”. The latter claim is interesting, as most wireless speakers are mono – two, working together, are usually required for stereo listening. The P9’s weather-resistant casing enables it to be used safely outdoors, making it a contender for music-loving gardeners or those who optimistically plan to regularly sun-lounge or barbeque during the British summer. Its four full-range drivers are powered by 100 watts of amplification, and yet a single charge of the internal LiFePo4 battery is said to deliver up to 8 hours of listening. A sensible spread of features includes Bluetooth 4.2 (with aptXHD, ACC, SBC and A2DP 1.3.1 support), USB connectivity for music from Flash Drives, a 3.5mm analogue input and the ability to be controlled via an app (Android/iOS). Escape’s “24-bit DSP” wizardry can evidently only go so far; if a “wider stereo sound field” is desired, two P9s can be “linked together”. Haven’t we seen that somewhere before? Launched in Europe last year, the P9 is now available in the UK – in black, white or tan finish – for £999.

Contact: Escape, www.escapespeakers.com



CLASSIC AMERICANA REVISITED

Those who lived through the 1970s – the golden age of hi-fi, certainly as a mass-market proposition – may remember the big and beautiful L100 from JBL. Said 3-way speaker was based on the American firm’s 4310, a professional studio monitor, and its distinctive foam grille could be seen in the following decade’s memorable Maxell tape TV ads – but only in the US. In the UK, we had to make do with Bauhaus frontman Peter Murphy! The L100 also happens to be the biggest-selling JBL speaker of all time. No wonder, then, that JBL – now a Samsung-owned Harman brand responsible for a wide range of audio products – has revived it. As per the original, the £4,000-per-pair JBL L100 Classic boasts a 300mm pulp-cone woofer, 130mm midrange and 25mm dome tweeter. As per the original (and dozens of knock-offs!) attenuators for mids and highs are fitted. Technology has enabled ‘21st-century’ improvements – the tweeters are titanium-domed, for example – although the gold-plated binding-posts won’t accommodate bi-wiring. The ‘retro’ L100 Classic is claimed by JBL to deliver “exceptional dynamic range, effortlessly crystal-clear highs and high-impact bass”. Those familiar grilles are available in black, blue or orange, while the cabinets they’re attached to are finished in a ‘genuine walnut veneer’.

Contact: JBL, www.jblsynthesis.com



PMC STABLES MUSIC TALENT

PMC, who have equipped numerous recording studios and broadcasters with monitor ‘speakers, is demonstrating “commitment to nurturing music talent and live music” through its sponsorship of The Stables, a music and education venue on the outskirts of Milton Keynes. Established in 1970, The Stables’ educational programme includes workshops, masterclasses, residential courses and National Youth Music Camps. The late Sir George Martin was a patron of the organisation, of which co-founder Cleo Laine is life president. Among the diverse range of acts who have performed there are Dave Brubeck, Joan Armatrading, Courtney Pine, 10cc, Uriah Heep, Nigel Kennedy, Steve Hackett and James Galway. Some of the gigs were broadcast live on Radio 2. As well as providing monitors for the studios, PMC have installed its wafer2 on-wall speakers throughout the theatre to ensure a high standard of music playback, and sponsored tickets for the venue’s upcoming events. PMC’s founder and owner, Peter Thomas, says: “I’ve long been a regular visitor to The Stables and value the tremendous variety of artists they present and the hugely-important education work they do”.

Contacts: www.pmc-speakers.com; <https://stables.org>

Value Of Vena

An affordable amplifier with a quality digital section, Bluetooth and LP. Noel Keywood looks and listens.

Quad's Vena II is purported to give you Quad traditional quality at a price you can afford. And it does it well. The new Vena II amplifier now comes with a Phono input for LP and Bluetooth for mobile phone connection, in addition to an ESS Sabre32 based digital section that is as smooth and advanced as they come. It's a great all-in-one package that gives true hi-fi – without hassle.

And it is small. The Vena II takes up little space and is not heavy, even though it uses a solid linear power supply rather than a noisy switch-mode. No modern tomfoolery here! No external boxes either: the mains cable plugs straight into a well built chassis weighing 5kgs and measuring just 300mm wide and 300mm deep. Height is 92mm, the Bluetooth aerial increasing this to 155mm when upright, but it can be swivelled down to horizontal.

Inside there is a 55 Watt amplifier. It might not sound much

against the 100 Watts that is all but obligatory nowadays, but it is more than enough to go extremely loud; few of us will ever use 100 Watts in real life – it's a specs requirement.

Although Vena II harks back to the styling of Quad's 33 preamplifier of 1967 – a classic I once owned and loved – it is disappointingly sombre in style to my eyes. The legends are a dull grey on a dark background where the original was more strongly defined visually with orange against brown – and legible legends.

The horizontal line of push-buttons on the Vena II are not mechanical switches as of yore, but electrical ones that select things not known in the days of the 33. One is Bluetooth short range radio reception from mobile phone or iPad (or similar) and the obvious others

are digital inputs in the form of S/PDIF that will accept the digital output of any CD player – optical (2) or electrical (1) – or the many other contraptions that

output digital in this form, such as portable digital players (DAPs).

A USB B (printer style) input connects to a computer, allowing the Vena II's sophisticated ESS chip to process digital audio either for headphone listening via a front panel 6.3mm (1/4in) headphone outlet, or through the loudspeakers; plugging in 'phones mutes the 'speakers. The USB spec has been improved from 24/192 to 32/384kHz sample rate for PCM and it also accepts DSD256 (double rate DSD).

Vena II also has a Phono stage for a turntable with moving magnet (MM) cartridge, unlike original Vena.

There are two analogue line inputs (Aux 1 & 2) and even a preamplifier output for those who may want to hook up a bigger power amplifier at a later date.

Whilst there are two digital outputs, optical and electrical, they are feed-throughs; there is no on-board ADC to generate digital from analogue sources such as LP. Digital inputs can be routed to a recording



device through them.

In all then, Vena II comes packed with ability, lacking only streaming from a home network. However, in that its USB connection links into a computer that will in effect (push)stream to it, this isn't such a big issue other than you must have a computer and it must be switched on.

There's no app to act as controller, instead a small lightweight remote control is provided – arguably a better way of doing things. And it was superbly easy and intuitive to use. Altering volume actuates an Alps high quality motor driven potentiometer, so the volume control turns as if moved by a ghost. Trouble is you can't see this because there is no visible marking, so the led of the selected input flashes. And the horizontal select bar of the remote mimics the input select pattern: press left and the select sequence moves left, right and it moves right along the horizontal row. The only blip here being dull grey illegible legends on the fascia.

SOUND QUALITY

I connected Vena II to our Martin Logan ESL-X hybrid electrostatic loudspeakers through Chord Signature XL loudspeaker cables. CD was spun by our Oppo BDP-205D Universal player acting as a transport, feeding the Vena's optical input (S/PDIF) through a QED Quartz glass optical cable. I now use only preened hi-res high dynamic range CD recordings because too much on CD is awful in quality terms and misleading to me for review purposes. Good hi-fi products like this one expose quality issues in the recordings.

Hi-res came from an Astell&Kern AK120 portable player running on battery power, to input clean digital from S/PDIF rather than noisy from a USB computer source.

Bluetooth was used from an iPhone 6S playing DSD files from the slick Onkyo hi-fi player that translates down to 24/48 PCM for BT work.

And LP was input from a Timestep Evo Technics SL-1210 Mk2 Direct Drive upgraded turntable, with SME309 arm carrying an Audio Technica VM750SH Shibata tipped MM cartridge.

And what a lovely sound! Very Quad. Vena II gives that big, fulsome sound you get from a well developed Class A/B amplifier backed up by a quality linear power supply: no



A toroidal mains transformer at left of the Quad's linear power supply. At middle sits the amplifier's finned alloy heat sink and at bottom right the Alps motor driven volume control.

scratchy switch-mode sound here!

Spinning Jan Akerman's *Am I Losing You* (CD) Vena II was immediately and obviously easy in its delivery – relaxed yet pure. The bass line was firm but full, the drum kit fleshed out with detail rather than being an outline, a simple simulacrum that is not uncommon with digital. This quality of insight and rich timbral revelation played through both Rock from CD and also classical, where Nigel Kennedy's *Meditation* (Massenet) glided past my ears with a lulling naturalness that was absolutely right for it: think richly patterned. This is the characteristic signature of the ES9018 DAC chip – in Quad's excellent support circuitry.

Moving from CD to hi-res from our Astell&Kern AK120 portable player, the thundering kettle drum that insinuates power behind Mars made itself known in full and strong fashion in the LSO's rendition of Holst's *The Planets* (24/48).

Benjamin Grosvenor's light touch on the keys playing Chopin's *Nocturne No5* was subtly but clearly conveyed.

With Fleetwood Mac's *Dreams* (24/96) Mick Fleetwood's drumming stood out as solid and powerful, moving along with muscular confidence. Stevie Nicks vocals were easily clear centre-stage and backing harmonies nicely delineated in their own space. Again a full and powerful performance graced by an easy confidence of delivery.

With Bluetooth connection my iPhone was seen and connected swiftly, delivering David Bowie's *Suffragette City* with pace and power (DSD 2.8MHz from an Onkyo player, sent as 24/48 PCM). As usual with Bluetooth there is a flattening of depth perspective, obvious with Cyndee Peter's singing *House of the Rising Sun* (DSD 2.8MHz), but overall Vena II came over as strong and svelte.

With our turntable, turning volume to maximum produced slight hum. Moving earth from the terminal fitted to a phono socket ground produced silence, so it appears case ground (the terminal) and signal ground (phono socket) are different (as they can be); this



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It may look bare and the 'speaker terminals basic, but there are a lot of inputs on the rear panel, from analogue turntable (MM) at left through to digital USB at right, plus an aerial for Bluetooth.

is a wrinkle that needs attention. Spinning Dire Straits So Far Away (Mobile Fidelity Master Recording, 45rpm) again delivered strong, firm drum rolls and the laconic vocals of Mark Knopfler centre stage in clear fashion. Big Band Spectacular from The Syd Lawrence Orchestra (LP No2 from 30ips master tape) fairly shook our listening room playing Sing Sing Sing, fast drumming being made obvious by Vena II's bass power.

I just sat back and was impressed! OK, this is a special LP but with more ordinary cuts the Vena always managed well, retaining its sense of ease underpinned by bass power.

CONCLUSION

Quad's new Vena II is a wonderfully easy to use all-in-one amplifier that offers superb sound quality: think easy going – and deeply insightful with digital from its ESS

Sabre32 DAC. Offering a performance up with the best at a price of £649 it strikes me as the quintessence of high fidelity – a great sound at a great price. Utterly superb!

A small and simple remote control, intuitive and easy to use.



MEASURED PERFORMANCE

Quad's Vena II produced 55 Watts into 8 Ohms and 72 Watts into 4 Ohms, identical results to the first Vena – and enough to go very loud in most systems.

Output rolled down slowly above 20kHz (-1dB at 30kHz) in Quad fashion, ensuring easy treble; low frequency output rolled down below 10Hz.

Gain from the analogue line inputs (Aux1,2) is low at 500mV (0.5V) for full output – enough for silver disc players (2V).

The optical S/PDIF digital input worked to 192kHz sample rate, again frequency response rolled down early, to 26kHz (-1dB). The electrical input gave identical results. Vena II has an ESS9018 Sabre32 Series digital-to-analogue convertor (DAC) that gave a very high 117dB EIAJ Dynamic Range value from the loudspeaker outputs and 118dB from the Pre-out – excellent figures, well above original Vena.

USB topped out at 24/384kHz and frequency response with 24/192 PCM was flat to 41kHz (-1dB), a tad higher than S/PDIF. EIAJ Dynamic Range remained a high 118dB, USB adding no noise – and distortion measured 0.02%,

like S/PDIF. Bluetooth had a respectable 99dB Dynamic Range – similar to CD.

The MM phono stage needed a normal 4.5mV for full output and overload was high at 53mV. Quad roll gain down below 20Hz to lessen loudspeaker cone flap from LP warps Noise was low at -79dB.

The Vena II amp measures like the original but the digital inputs have stepped up to high current standards. The MM phono stage measures well too, as does Bluetooth. A fine all-round performance. NK

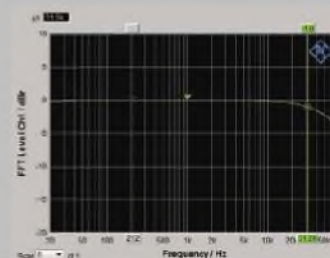
Power	55W
Frequency response	10Hz-31kHz
Distortion (10kHz, 1W)	0.02%
Separation (1kHz)	91dB
Noise (IEC A)	-112dB
Sensitivity	500mV

DIGITAL	
Frequency response	4Hz-26kHz
Distortion (-60dB, 24bit)	0.02%
Dynamic range	118dB

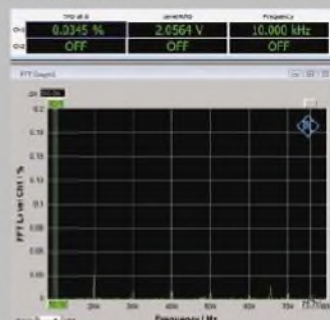
PHONO (MM)	
Frequency response	20Hz-20kHz

Distortion (1kHz, 5mV in)	0.03%
Separation (1kHz)	68dB
Noise (IEC A)	-79dB
Sensitivity	4.5mV
Overload	53mV

FREQUENCY RESPONSE



DISTORTION



QUAD VENA II
£649



OUTSTANDING - amongst the best.

VERDICT

A super smooth amplifier and digital section, plus LP and Bluetooth. Marvellous.

FOR

- easy powerful sound
- facilities
- slick remote control
- small

AGAINST

- slight hum with LP
- illegible legends
- dull styling

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Here's your chance to win the superb Pro-ject Phono Box S2 Ultra that we reviewed in our April 2019 issue. Read the review excerpt below and answer the questions.

"The input of your phono stage is matched to the specific characteristics of your cartridge. On the base of the unit are two rows of DIP switches – one per channel – that alter the electrical characteristics of the inputs, so that full compatibility with any cartridge can be achieved.

The instruction sheet supplied

with the unit gives the various switch permutations needed to achieve a specific resistance (10 Ohms to 47k Ohms for MM) or capacitance (100 pF to 420 pF), but falls short of providing user-friendly tables for commonly-used cartridges. The gain is also switchable between 40dB (MM) and 60dB (MC).

On top of this, a further 3dB of gain can be added at the flick of another tiny switch. This can be useful for lower-output cartridges, or when digitising 'quiet' compilation LPs with numerous tracks.

The third valuable feature is a subsonic filter, which is particularly

useful when it comes to dealing with warped records. It's switchable, meaning that your low-end can be left unimpeded if desired to get that sense of deep subsonics LP can provide. If your woofer cones are flapping alarmingly, then best to turn on the filter. All of this is achieved without an op-amp in sight, Project instead relying on discrete transistors – this was standard practice, back in vinyl's golden age".

For a chance to win this great prize, just answer the four easy questions at right. Send your entries on a postcard only, by 7th June 2019 to:

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QUESTIONS

[1] What is on the base?

- [a] spring feet
- [b] DIP switches
- [c] led display
- [d] emergency cut-off

[2] What further gain can be added?

- [a] 18dB
- [b] x20
- [c] lots
- [d] 3dB

[3] The subsonic filter is for –

- [a] warped records
- [b] minor earthquakes
- [c] building vibration
- [d] aircraft noise

[4] It relies on –

- [a] op amps
- [b] thermionic valves
- [c] discrete transistors
- [d] opto-electronics



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Hi-Fi News, March 2019 Issue

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For just £299 PSB's new Alpha 5 standmounts represent a true bargain, says Jon Myles.

PSB Shines!

When some loud-speaker cables and interconnects can run into the thousands of pounds range, the chances of finding a bookshelf-sized/standmount loud-speaker for just £299 might seem hard to believe. Which is just what

I thought when I unboxed the PSB Alpha 5s and plugged them in.

First off, these 'speakers are unusual in design. They place a small 19mm aluminium dome tweeter housed in a horn flare ('proprietary waveguide') beneath a 133mm mid/bass main driver. Mission produced a similar tweeter below woofer

arrangement long ago, arguing it made more sense by giving better dispersion of sound at the listening position – and that is what we found when measuring the PSBs.

The cabinet measures 305mm high, 178mm wide and 230mm deep. On the rear there is a small reflex port to augment the bass response,

plus a single pair of gold-plated 'speaker terminals.

SOUND QUALITY

Pairing the PSBs with a Creek Evolution 100A integrated transistor amplifier and then an Icon Audio Stereo 30SE single-ended valve amplifier came as a bit of a surprise.

Yes, they are small but they have a punch and depth that belies their size I felt. Most impressive was the smoothness of their response and the overall sense of scale they manage.

Placed close to a rear wall to allow the reflex port to do its work the bass response was impressive. With New Order's 'Bizarre Love

brings the best out of high registers.

John Coltrane's 'Live At The Village Vanguard' kicked off with Elvin Jones's drums sounding deep and punchy, yet when Coltrane's saxophone came in there was wide separation between the instruments. Best of all, the band sounded as one, the players hanging in their own space.

The only downside to the package is that those who desire huge bass response will find these PSBs a tad lacking. With King Tubby's 'Dub Fever' their low-end lacked deep bass power. But that's only to be



PSB's proprietary tweeter with phase plate and wave guide provide good high-frequency performance.

"a room-filling sound – not something you commonly get with a loudspeaker of this size."

Triangle' (24/96) I was instantly brought into the punch and passion of this track. The bass line came across with depth and vibrancy while higher registers sounded smooth without being harsh. Best of all the

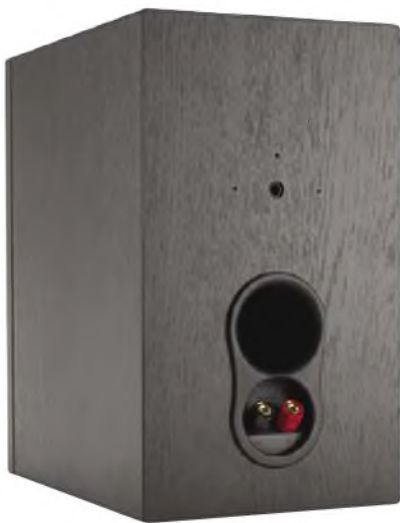
expected. A small mid/bass driver will simply not give you a bone-shaking experience. What you get instead is a sense of ease and fluidity that – allied to their small size – makes the Alpha 5s a joy to listen to.

Place PSB's Alpha 5s in a

medium-sized or small room, couple them to a good amplifier and the sound quality is special I found.

CONCLUSION

For their price of just £299 PSB's Alpha 5s are exceptional loudspeakers. They are well-balanced overall and have the ability to bring the best out of various amplifiers. Yes, they may be small but they have a room-filling ability. In my opinion they are a bargain buy.



A single pair of loudspeaker posts and a reflex port adorn the rear of the PSBs.

PSBs managed a room-filling sound – not something you commonly get with a loudspeaker of this size.

Playing Pink Floyd's 'Dark Side Of The Moon' the cash register opening to the track 'Money' was sharp and bright – but not harsh. PSB seemed to have judged the tweeter just right. It is expansive but well-controlled and has a sense of ease to it that

MEASURED PERFORMANCE

Our third-octave analysis of frequency response, using pink noise, shows a basically flat characteristic over a wide band, stretching from 60Hz up to 20kHz within 3dB limits. Due to wide dispersion and excellent phase matching between the drive units there was little variation with height or lateral position

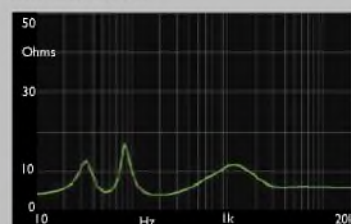
FREQUENCY RESPONSE

Green - driver output

Red - port output



IMPEDANCE



– the Alpha 5 will have consistent sound balance irrespective of listening position.

Whilst the 'speaker isn't as smooth as some, it is tonally accurate and well balanced at low frequencies for use close to rear a wall, to strengthen low output. The port (red trace) is tuned to 55Hz, as the impedance curve confirms by its dip at the same frequency. The port gives broad acoustic output, damping the cone well – as the impedance trace confirms as low residual side peaks. The Alpha 5 has useful output down to 40Hz but with small 'speakers you never get much bass power.

The bass unit is a low impedance device with a 3.5 Ohm d.c.r., overall impedance measuring 6 Ohms with pink noise. Sensitivity of 85dB sound pressure level (SPL) from one nominal Watt of input (2.8V) was mediocre but much as expected for a small loudspeaker; amplifiers of 60 Watts or more best suit.

The PSB Alpha 5 has an accurate measured sound balance, free from emphasised treble. Bass runs quite deep and is well damped, suiting near-wall placement. This loudspeaker is well engineered all round. **NK**

PSB ALPHA 5 £299



OUTSTANDING - amongst the best.

VALUE - keenly priced.

VERDICT

In terms of price and sound quality these small standmounts are hard to beat. They have a detailed sound yet contain punch and vibrancy.

FOR

- punchy sound
- detail
- smooth delivery

AGAINST

- bass doesn't dig too deep

PSB Loudspeakers
www.psbspeakers.com

Loss and gain

Martin Pipe checks out the latest version of NAD's historic 3020 budget amplifier, the new digital D 3020 V2.



Many of our esteemed must have started their hi-fi journeys with a system built around the NAD 3020 integrated amplifier. It may have sold for £80, but the 3020's performance was audibly superior to that of much else; when transistor amplifiers sounded scratchy up top NAD's classic 3020 was smooth and easy. Sonic virtues didn't come at the expense of features, appearance or reliability either. To celebrate NAD's 40th anniversary in 2012, a completely new version of its classic amplifier was announced. The £450 'hybrid digital' D 3020 came with efficient Hypex UcD102 Class-D modules, but missing was the 3020's MM phono stage.

The new D 3020 V2 reviewed here now has a phono stage and costs just £399! This comes at the expense of the USB port and the 3.5mm line/optical input. Thankfully, the phono-socketed line input, remaining digital S/PDIF connectivity – electrical and optical – and 3.5mm headphone socket are retained. As before, the V2 employs an eight-channel 24/192 DAC chip – a Cirrus CS42528. There are no tone controls but you still get a 6dB bass-boost function and output for an active subwoofer.

There are other changes. The Bluetooth receiver now supports apt-X (but not apt-X HD) and although a remote is supplied there's also a 'TV connect' function. This allows you to train the V2 so it responds to specific commands issued by one of your existing handsets.

There's more. A 3.5mm line-level

'pre out' socket enables external power amps and other gear to be driven by the V2. NAD has taken on board criticism of the D 3020 by giving the front-panel volume control a better feel and making the user interface more responsive.

SOUND QUALITY

This little amp did not disgrace itself when hooked up to my Quadral Aurum Wotan VIII 'speakers, Cambridge CXN streamer, Technomate TV set-top box and Technics SL-1210 Mk3/Audio-Technica AT-440MLb turntable set-up. The material played included a selection of LPs, 320kbps AAC streams of BBC Radios 3 and 4, various lossless CD rips and hi-res FLACs.

The first thing I noted was just how gutsy yet taut the low-end is. As a result, the basslines and rhythm section of 1980 – the Gil Scott-Heron and Brian Jackson album (lossless CD rip) – were given plenty of body. Tracks like anti-nuclear Shut 'Em Down and Alien (Hold On To Your Dreams) were a real treat in this respect. The guitar lines of the latter track, an account of illegal Mexican immigrants in California, upper percussion being free of the 'splashiness' that can betray many a cheap amp. Scott-Heron's unmistakable contribution, meanwhile, never lost impact.

A better-known politically-charged song, Stevie Wonder's Living For The City (Innervisions, lossless CD rip) also worked here, for much the same reasons. The massive bassline (Wonder made use of the famous T.O.N.T.O. synthesiser for his album – as did Scott-Heron and

Jackson for theirs a few years later) never runs out of steam; plenty of room being given to this and the accompanying elements. No grit, no confusion – even at surprisingly-high volume levels, in a 10' x 12' room.

In this respect then, the V2 is complementary to the original 3020 – which sounded significantly 'bigger' than an amp claimed to deliver 20 Watts per channel. Out of interest, the V2 is 'on paper' specified as 30 Watts. But push this amp too far, and you will hear it!



NAD supply a handset that's small, but easy enough to use. Control via a smartphone app, of the sort available for bigger BluOS NAD amps, isn't possible. However, you can train the D 3020 V2 so that certain functions – volume, mute and standby – can be operated with a remote you already own.



At left are a pair of phono sockets for turntable connection, accompanied as always by a screw earth terminal – harking back to the original 3020. The USB socket for computer connection has gone but connection can still be made by S/PDIF, through both optical and electrical inputs at centre. Loudspeaker terminals cater for bare wires, 4mm banana plugs and spades.



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The clean lines of the D 3020 V2, showing its LED function indicators. Horizontal placement isn't recommended as it will block cooling vents.

Another fairly angry song is Black Belt, from John Grant's 2013 solo album (Pale Green Ghosts, lossless CD rip). Some great put-downs are delivered with venom to an ex-partner over an electronic groove that shows off the V2's deftness with rhythm, as well as low frequencies. Pacing and delivery were both as satisfying as they should be, an observation reinforced with a listen to Kraftwerk's Tour de France Soundtracks (lossless CD rip).

The V2 is equally-capable of drawing you into classical material, such as the LSO's 24-bit recording of Britten's War Requiem under Noseda (another personal reference) dynamics and precision both being evident here. A switch between the line input (fed with the CXN's analogue output) and a 'direct digital' connection between the two demonstrated no obvious deficiencies.

NAD should also be proud of the phono stage – the cost of which evidently amounts to, more or less, that of a USB interface. My woofer cones weren't visibly 'flapping', since there is some infrasonic warp filtering (as was the case with the original 3020). But you still get a

very good bass delivery; the gutsy rhythm of Flash and The Pan's unique 1983 single Waiting for a Train (12in. version) being defined by punch and slam. The vocal and synths also sounded as they should – respectively nasal and reedy, but within a well-defined stereo image! A late-1980s double-LP compilation of classic house tracks (The House Sound of Chicago Vol II) showcases the amp's rhythmic prowess; furthermore, those familiar 808 snares and hi-hats were clean and cutting. Low-end was a little recessed here, but that's more down to the limitations of the source material than any NAD shortcomings.

CONCLUSION

For this sort of money, NAD's bravely-different approach to amplification can't be faulted. The D 3020 V2 delivers music in a fulfilling matter that is sometimes hard not to attribute to a bigger box. NAD has also done its best to accommodate the amp into lifestyles that are very different to those of 1978; Bluetooth, fed with lossless tracks stored on a Samsung phone, gives a good account of itself. And for those used to tinny TV speakers, the stereo soundtracks of your favourite programmes are transformed when routed through the V2 and a good pair of speakers.

MEASURED PERFORMANCE

Power from NAD's D 3020 V2 Class D amplifier was, considering size, high at 66 Watts into 8 Ohms and 90 Watts into 4 Ohms – levels delivered with ease. No protection circuits tripped, nothing buzzed. And crucially for Class D, distortion levels remained low even at 10kHz, just 0.008% at 1 Watt output and 0.03% just below full output, into 4 or 8 Ohm loads. NAD have an impressive evolution of the Hypex module here. It is, as they claim, able to cope with even the most difficult conditions.

Frequency response (Aux in) was flat from below 3Hz up to a very high 44kHz and as claimed was insensitive to load, unlike some Class Ds, due to their output networks and absence of nested feedback.

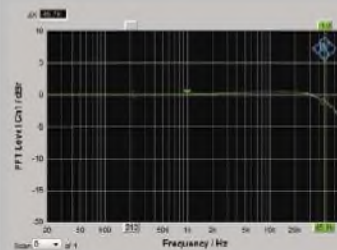
Although their more expensive amplifiers are fundamentally digital,

analogue only entering via an ADC, the D3020 uses a Crystal Semiconductors DAC) in a traditional architecture, NAD say. All the same it gave a high EIAJ Dynamic Range value of 116dB from digital, and low distortion at 0.03% at -60dB from 24bit, CD measuring 0.21% as usual due to quantisation noise inherent in 16bit. Frequency response with 192kHz sample rate PCM reached 32kHz before rolling down slowly to the upper theoretical limit of 96kHz.

The MM phono stage needed a normal 5mV for full output and overload was very high at 90mV. There is no warp filter as such, but NAD roll gain down below 12Hz to lessen loudspeaker cone flap from LP warps. Noise was very low at -85dB.

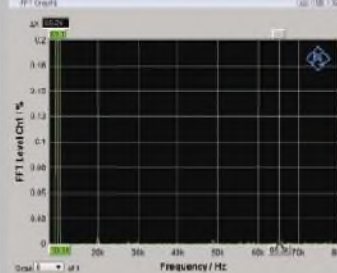
The D 3020 V2 measured well in all areas, giving better than budget results as an analogue amplifier and in its digital sections. Impressive. NK

FREQUENCY RESPONSE



DISTORTION

THD @ 100%	Level (dB)	Frequency (Hz)
0.0005 %	2.115 V	10.000 kHz
OFF	OFF	OFF



Power	66W
Frequency response (-1dB)	3Hz-42kHz
Distortion (10kHz, 1W)	0.003%
Separation (1kHz)	90dB
Noise (IEC A)	-112dB
Sensitivity	500mV

DIGITAL	
Frequency response (-1dB)	4Hz-26kHz
Distortion (-60dB, 24bit)	0.03%
Dynamic range	116dB

PHONO (MM)	
Frequency response (-1dB)	12Hz-20kHz
Distortion (1kHz, 5mV in)	0.02%
Separation (1kHz)	69dB
Noise (IEC A)	-86dB
Sensitivity	5mV
Overload	90mV

NAD D 3020 V2
£399



OUTSTANDING - amongst the best

VALUE - keenly priced

VERDICT

The V2 shows its heritage in terms of its ability to deliver music at an affordable level.

FOR

- punch and rhythm
- clean digital
- phono stage
- Bluetooth

AGAINST

- No USB port
- drive it too hard, and the strain will show

NAD
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Pocket Wizard

A tiny player at a great price, with wizard performance, Noel Keywood finds.

Cowon's Plenue D2 portable digital player is a tiny pocket wizard. It is small enough to be stashed anywhere, has a claimed 30 hour playback life with hi-res and – Cowon claim – packs a performance not bettered elsewhere. I hardly believed their figures – but they're true.

However, there are some points to consider. The D2 is purposed as a very high quality portable for headphone use; it has no digital output for connection to a hi-fi DAC, nor a digital input for use as a computer's headphone amplifier. Price is a modest £250. You get small

size allied to high performance but – and here's a wrinkle – the claimed performance is only available from the unit's tiny 2.5mm balanced headphone jack. OK, the unbalanced 3.5mm jack isn't far off, also offering a great result.

Weighing 98gms on our scales, the D2 feels solid but not overly heavy. Measuring 79.2mm high, 53.1mm wide and 15mm deep it will even fit a shirt's top pocket and – happily – Cowon put both headphone outputs on the top face, not the bottom like some. However, there's no rotary volume control at top, only a circular power button that looks like one. Volume is set by

a small side rocker – inconvenient – and volume level readout is numerical only, positioned beside the battery level indicator at top right. Beneath the volume control lies a Play/pause button and forward/back track skip.

The D2 comes with 64GB of internal storage for music and this can be boosted by using a micro-SD card of up to 128GB. Plenty enough for MP3 and CD files, but DSD comes in at 100MB a track or more remember – and the Plenue D2 plays DSD if you so wish.

The user interface has been kept reasonably simple and obvious, making the D2 easy enough to use, but the graphics are inevitably a bit on the small side. Since this is a touch screen you have to peck at small active areas, but sensitivity was good, making for a reasonably assured response. Startup was almost instantaneous, at around 5 seconds and the screen is bright and clear; I had no trouble reading it, unlike some. An info screen gives bit depth, sample rate, data rate and type encoding.

Cowon supply the D2 with a 120cm long cable with a micro-USB to USB A plugs for charging or computer connection. The unit will play whilst on a charger and is compatible with both Mac and PC, updating automatically when loaded with new music files I found – a nice touch.





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At top a 3.5mm headphone socket (right) and a smaller 2.5mm socket that provides balanced output. The circular control is a power button only.

Music file formats are Wav, Flac, WMA, MP3, AIFF, ALAC, Ape and Ogg, plus DSD of dff, dsf and Iso headers. DSD64 and 128 are supported. A five band equaliser is fitted, plus no end of special effects. Buried in the Music settings menu are fast and slow digital filters but they have only subtle sonic effect, especially with hi-res.

is more than it looks.

However, whilst the balanced output socket gives massive volume and extraordinary dynamic range, I find 2.5mm jack plugs virtually unusable – they snap. Suitable for driving a hi-fi system perhaps where the plug will not be stressed – if you can find a 2.5mm 4-pole plug to XLR male plug adaptor lead and your hi-fi

The prominent violin of Marianne Thorsen playing Mozart's Violin Concerto in G Major, backed by the Trondheim Soloists (2L Noway, 24/96) was both vivacious and deeply detailed, yet free from that rasp digital adds. There was strong separation of instruments in the backing Trondheim Soloists, and from her lead violin. The delicacy of her playing was conveyed strongly, especially in solos, making for a sound that drew me in.

With Marta Gomez singing Maria (24/96) her vocals sounded close and detailed, surrounded by a sense of cossetting smoothness. No hardness here either, with accordion and blocks nicely defined. With Fleetwood Mac's classic rock Go Your Own Way (24/96), replete with sizzling 70s pace set by Mick Fleetwood's frantic drumming, the D2 fairly flew along. Interestingly, where I hear rasp from this track in cymbal crashes via Chord Electronic's revealing Hugo TT2, the Plenuer D2 seemed able to gloss over the issue. All was smooth



A host of sound effects are provided, Normal being the straight-through option.

Portable player manufacturers make much of their technologies, a trend set by Astell&Kern, also of Korea like Cowon. This has spawned an arms race between companies in Korea and China, one that Cowon seem determined to win with the D2. They equip it with a CS43131 dual DAC chip from Cirrus Logic, that has built in headphone amplifiers – hence the optimised figures. Our measurements confirmed Cowon's claims (see Measured performance). They're right up with the best hi-fi DACs. Under the skin, this tiny player



A micro-SD slot on the left side of the player accepts up to 128GB of extra memory storage.

has XLR balanced inputs. Not suitable for the rough and tumble of portable use, where the stronger 3.5mm plug is needed. These comments apply to all players with 2.5mm balanced 4-pole jacks of course, not just to the D2. All the same, the D2's 3.5mm unbalanced headphone output still gave superb results under measurement.

SOUND QUALITY

My overwhelming impression of this player from the 3.5mm jack was a sense of silky smoothness that took the digital out of digital. But that's how modern DAC chips are evolving sound quality wise – and the new (Oct 17) CS43131 DAC chip designed for portable use is an impressive newcomer to the field.



The main play screen with transport controls and cover artwork.



Come Together
The Beatles
FLAC 192 kHz 24 Bit

4/5

4:16

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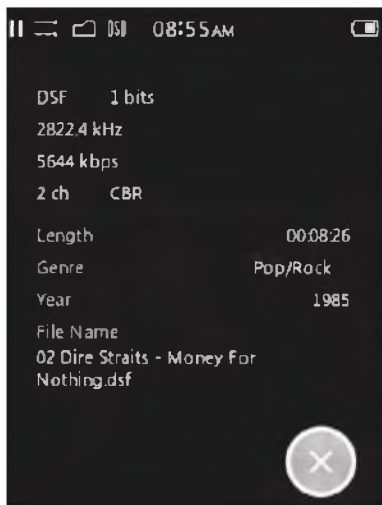
LUMiN



An options screen shows ability to alter play speed!

and easy, yet lively all the same, Stevie Nick's vocals rising out from the rock melee behind her.

Popping in a micro-SD card loaded with DSD, rather than my card of selected PCM review tracks, I was greeted by better DSD rendition than usual; Cirrus Logic have nailed this one. The CS43131 smooths PCM to DSD presentation in this player, but Diana Krall's Narrow Daylight (DSD64) edged it out as easier, clearer and more fluid in progress. Cyndee Peter's singing House of New Orleans (.dsf, DSD 128) had strikes against a triangle ringing sweetly in one of my ears, and cymbal strokes with a brush obvious in the other. This track has hard left and right images and the D2 reproduced them strongly, perhaps



The track data screen identifies data format type – DSD here as '1bits' with a .dsf file header.

due to its on-chip dual DACs. Easy going yet with nice dynamic push, Cyndee Peter's warbling slightly too far back in my view, due to the mixing, not this player; Eric Burdon's original was grittier.

I couldn't resist connecting the 2.5mm balanced output jack direct to the balanced inputs of our Creek Evolution 100A amplifier and thence on to Martin Logan ESL-X hybrid electrostatic loudspeakers to see how it fared acting as a high quality balanced analogue source. It retained its sense of creamy smoothness, if with the soft bass digital players usually exhibit from their battery power supplies; digital connection into a mains powered DAC is

punchier but not an option with the D2.

CONCLUSION

Cwon's pocketable Plenu D2 sets performance standards in digital – remarkable for such as small, unassuming device. I found it fast to start, fast in response to screen inputs and easy to use. It lacks digital output or input, being a basic player for headphones, although both headphone jacks will drive a hi-fi system via analogue connection via adaptor leads, with the player working from 5V USB power supply. In this fashion it can be seen as an alternative to a CD player – one also able to play hi-res digital. A fine player then, well worth its price.



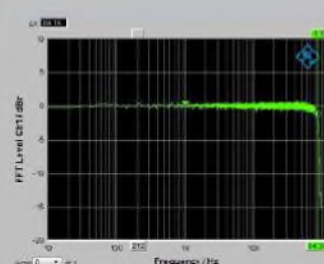
The 2.5mm 4pole balanced output jack can drive a balanced amplifier input through XLR plugs. This is our test adaptor.

MEASURED PERFORMANCE

Output measured 2V from the 3.5mm unbalanced headphone jack, and 4V from the 2.5mm balanced headphone

jack. This is enough to go loud with all headphones, even high impedance types. It is also correct for driving a hi-fi amplifier's line input: the D2 can be used as a 'CD player' in effect.

FREQUENCY RESPONSE

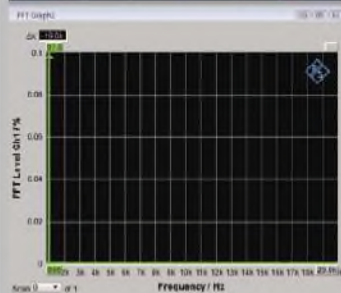


Distortion values (24bit, -60dB) were exceptionally low, just 0.008% from 3.5mm out, and 0.005% from the 2.5mm out (balanced). As a result EIAJ Dynamic Range values were 128dB and 133dB respectively, a stringent way of confirming Cwon's claimed SNR value of 130dB. These are exceptional figures, ahead of all hi-fi DACs.

DISTORTION

THD (%)	Level (mV)	Frequency (Hz)
0.0053	4.1109	99700

Frequency response (192kHz sample rate) measured flat from 5Hz to 84kHz with the Fast filters and just slightly less with the Slow filters; there was little difference to the amplitude response.



The Plenu D2 delivers impressive measured performance, ahead of all other players – and most hi-fi DACs too.

Frequency response (-1dB)	
4Hz-84kHz	
Distortion (-60dB)	0.005%
Dynamic range	133dB
Output (unbalanced/bal)	2V / 4V

COWON PLENU D2 £259.00



OUTSTANDING - amongst the best.

VALUE - keenly priced.

VERDICT

Advanced digital performance and smooth sound from a tiny player. Recommended.

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Answers by: **NK** - Noel Keywood; **JM** - Jon Myles; **PR** - Paul Rigby; **MP** - Martin Pipe.



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For more advice see Letters from earlier issues at www.hi-fiworld.co.uk/letters

A KEF EGG WIRELESS DIGITAL MUSIC SYSTEM is on its way to DAVE ODDIE, Letter of the Month winner in our May 2019 issue.

Letter of the Month

HI-RES DOWNLOADS

I am shortly going to be moving abroad and reluctantly am looking at alternatives to my vast vinyl collection – namely hi-res downloads. Looking at some of the sites available, I don't see the point in paying for a 'CD quality' download that is far cheaper as a CD! I was looking at the usual suspects (Beatles, Bowie, Floyd, etc) and some of the prices for basically what are only music files are outrageous!

I also saw an advert in your magazine showing a LUMIX streamer playing a FLAC 192/24 download of "Come Together" off Abbey Road. However, as far as I can see in my internet searches, this album is not available in this form!

Can you please help me with regards to the equipment I will require to enjoy the albums I love using this format, thus saving lots of space (and finally making the other half much happier!).

Regards

David Prior

Hi David. Hi-res downloads are meant to be high quality digital versions of an original recording, at least with 24bit resolution rather

than CD's 16bit. So hi-res is not CD quality – but better. Or at least that's is how it is supposed to be. The world is awash with digital transfers to CD quality from the past few decades, when CD was seen as offering 'perfect' quality. But time and technology move on and today's hi-res, typically of 24bit resolution at 96kHz sample rate (24/96) offers better insight into analogue recordings of the past.

A good modern transfer to hi-res digital is made – hopefully – via an analogue-to-digital convertor of much higher quality than those that provided CD quality long ago. I use them for reviewing, albeit after making technical checks of bandwidth and dynamic range to ensure good provenance – and listening of course. Sadly, there are a lot of poor recordings out there, made in the past on old 16bit equipment and carelessly re-sampled to hi-res files with no improvement on quality. You just have to accept this, as you must also accept some hi-res recordings of old material – especially from the 1960s – doesn't sound good because the originals were poor.

With regard to hardware to play them, the most obvious choice is a portable player – FiiO are a reliable



Portable players like the FiiO M11 are an inexpensive way to play hi-res. digital. You get a screen with a track list and can connect easily through S/PDIF digital link on most. Bluetooth allows use from the settee.



Arcam's CDS50 CD/SACD player can read hi-res files from a Flash Drive, as well as play silver discs. You have to use an iPad or similar, on a computer network, to see track listings.

choice – together with a collection of microSD cards. Portable screens provide a track listing, the players can be externally powered so as not to rely on batteries – and are small and light, in case that's a help on your travels. They can be connected via S/PDIF digital (PCM) very easily to play up to 24/192 PCM.

Otherwise you need a device with a screen to give you a track list and this is most convenient as an iPhone or iPad, or Android equivalent. Which means use of a computer network and an app. For this consider a player such as Arcam's CDS50 (£699) that we reviewed in the January 2019 issue: it reads hi-res files from a Flash Memory drive and passes them through an ESS ES9038Pro DAC, under app control. Technically impressive and not expensive either, it seems to suit your needs if you don't mind the faffing around. I hope this helps. **NK**

TECHNICS SL-1500C

I'm hoping that you will produce an in-depth review of the all-new Technics SL-1500C when it becomes available. I presently alternate between a venerable belt-drive Systemdek IIX with Linn Basik Plus tonearm and an even more venerable Direct-Drive unmodified Technics SL-Q2. I like them both and while I hear differences I'm unable to conclude that one is better than the other.

The rest of the system is an Icon Audio Stereo 40i valve amplifier and ATC SCM11 loudspeakers.

Having decided to buy one final 'turntable for life' I would very much appreciate your judgement on the SL-1500c.

Regards

John Beverley

Hi John. The forthcoming SL-1500C is proving elusive. I spotted one at The Bristol Hi-Fi Show, February 2019, and learnt something about it, but this particular unit was an early demonstrator that Technics took away after the show – and before we could grab it! I'm unsure when they will release samples for review, even though press shots are on the 'net.

It's a starter turntable aimed at young people – 'early adopters' in PR parlance – rather than seasoned audiophiles. Hold on to your seat.

To get price right down Technics have removed all fripperies. There is no stroboscope, an integral arm that is not removable, three speeds, no cue light and a budget Ortofon 2M Red MM cartridge. However, there is a built-in phono stage and end-of-side auto-lift surprisingly.

With uber-budget (£150 from Amazon) Direct Drives like the Lenco L-3808 on the market (Reviewed June 17 issue) I suspect Technics are worried about losing

their visibility in a market being fought for by Chinese OEM's. Their look-alikes also work-alike: they are rock stable in speed and consistent too. Not bad at all, if without Technics cachet and quality.

The Technics for you is the SL-1200GR we reviewed in our August 2017 issue, in Timestep Evo form. This is a budget version of the new SL-1200G, reviewed in our September 2016 issue as Timestep Technics Evoke SL1200GAE, but it is a step above Technic's many competitors. Underneath is their new motor and the arm can be changed to Rega or SME if you so wish. It's the lowest cost version of the new SL-1200G that lacks compromise. From what I have been told the SL-1500C will come in at around £800 which isn't so far off the SL-1200GR. **NK**

BELT DRIVE TURNTABLES

As I was reading Dave Topliss 'Listen To Linn' letter I was playing The King James Version by the Harry James Orchestra on Sheffield Lab. This was being played on my Garrard 4011 SMEIV/Denon DL304, I just thought to myself, Dave, you're wrong! I haven't heard the Technics, but I would imagine that it's equally enjoyable.

Regards

Mike Bickley.

Hi Mike. Linn Sondexs have their own sound – and beguiling in its own way too. I can perfectly understand where David is coming from here: a Linn is worth hearing.

But having heard and to some extent suffered xenophobic Linn adoration from the UK hi-fi press



Technics new SL-1500C turntable lacks stroboscope and cue light, but comes with phono stage and Ortofon 2M Red budget MM cartridge.



Linn Sondek with Ittok arm has its own unique sound. Nowadays the use of a suspended sub-chassis is falling out of fashion.

in the past I don't want to fall into the same trap. Anyone looking for a high-end turntable should 'take a view' about the differing sound of turntables. If you decide to buy an expensive turntable its best to listen first at a dealer or perhaps ask if home demo is possible, using your own cartridge.

Linn's have a good balance of properties including stage depth due to a quiet background, strong dynamics from the steel platter and thin mat and, with the Ittok arm, a broad and propulsive sound stage – although with some colour from the Ittok. It all added up to an impressive sound and I don't think either David or my fellow journos were wrong to think highly of it, so much as not to see its limitations and give alternatives consideration.

A Technics never was as viscerally engaging as a Linn shall I say, and certainly not as dynamite dynamic as the dear old Garrard 401 that you and I use. However, the Garrard isn't perfect; it does in standard form have some metallic colour from the platter, something violinist and reviewer Rafael Todes was quick to point out after encountering one (he wasn't so impressed!). Not perfect then – just exciting.

Technics turntables are cool of demeanour, more technologically correct than viscerally exciting. They're of the head rather than the heart and I understand where David Topliss is coming from here. No matter how wonderful they are,

the sound lacks soul you could say. I suspect this is due to the sonic signature of materials used in its all-metal construction conspiring with rigid speed stability to give a surgically pure sound. The issue of Direct Drive cogging always was a red herring in this scenario.

But 'soul' here then means the character imposed by imperfection does it not? I would suggest that David Topliss, representing Linnies, and you and I representing Garrard gits are equally in error!

Belt drives always had the benefit of isolation on their side – isolation from the outside world and motor

now speed stable and very lovely to hear, whilst Technics are technically correct – arguably blemish free. All different. Our letter from Jon Beverly links in to this subject nicely. **NK**

CD RIPPING

My CD player has finally died, just as I was starting to rip them using db poweramp software to a NAS hard drive. I have more than a 1000 CDs to rip and I don't really want to buy a new CD player. My first thought was to use a laptop but very few seem to come with a disc drive. So what is an appropriate setup to rip all these CDs?

My thought is to buy a disc drive, connect it to my laptop which in turn is connected to my NAS drive: but what disc drive? I was thinking a mains powered one instead of a USB powered one. Is it enough just to buy a CD/DVD drive or does Blu-ray capability mean that it will be of a higher quality? So is there a particular drive that you would recommend?

Also, is there any advantage in considering jitter when ripping and putting something like an Audioquest Jitterbug both into and out of the laptop?

This is hopefully the first and only time I will carry out this ripping process and I would like it to be as accurate as possible; I hope you can help me.

Regards

Gary Marinko
Perth
Australia



"What disc drive for ripping CD?" asks Gary Marinko. "I was thinking a mains powered one". There are few dedicated CD transports now available. Cambridge Audio's CXC stands out as one of the best.

by a suspended sub-chassis – but they wander in speed and give a temporally vague sound – delivering a sonic picture soft in timing. Romantic rather than right. Belt-drive turntable manufacturers are curiously oblivious to this problem and both Linn's and Regas have never shone here.

Your Garrard 401/SME IV is going to blow the socks off all else: a match made in heaven and nothing else comes close for power, pace and punch. However, modern Linn's are

Hi Gary. This issue now crops up regularly and our recommendation is Cambridge Audio's dedicated CXC CD transport. As they say 'multi-purpose drives simply can't compete. It gives minimal disc jitter and excellent error correction for the most precise and accurate playback of CDs'.

A left-field alternative is an Oppo BDP-105 or 205D Blu-ray Universal player bought second-hand or old

stock, now that Oppo have ceased production. This is a fine player in itself, well worth having for superb sound quality, but it will also act as a transport. And I believe both are available in Oz.

We don't have experience of the Jitterbug but you may be interested in the next letter. **NK**

DON'T BLAME THE ADC

In his "Opinion" column in the May issue Martin Pipe comments that 24bit converters are rarely fitted to "USB turntables" and the benefits of such units being kept away from the noisy environment of a PC.

I have recently experienced this myself. I convert my LPs to 24/96 digital using a battery powered Genera preamp, from Graham Slee, driving a Focusrite Scarlett 2i2 (2nd Gen) converter. I used an HP Pavillion laptop with Audacity to de-click and edit the conversions.

Disaster struck last year when the Pavilion stopped working. I've got a Dell Inspiron desktop that could take over, though not quite as convenient as it is a shared resource. I assumed conversions via a desk top, with better power supplies and components spread about, would be as good, if not better, than with a laptop – but no way. The conversions now sounded really "digital", harsh and nowhere near as good as via the laptop.

I tried a "jitterbug" between the converter and the PC but with no noticeable improvement.

In a bit of a panic I decided to go for another laptop, hoping that it would perform as well as the old one. As it would be used almost exclusively for LP conversions and downloads I decided to go for a relatively low power machine. I went for an HP 14s with a low power Pentium Silver processor, 4GB of RAM and 128GB of Solid State Drive. No fan needed, as it is so low powered, and no hard drives whirling around.

The resulting conversions are bliss – much better than with the old "high powered" Pavillion. More space and depth to the conversions and somehow quieter – I can play things louder, but they remain totally listenable, as opposed to becoming too loud – odd.

So if anyone out there has dabbled in converting LPs to digital and gone off the idea because they sound awful, don't always blame the ADC, or digital, but try a different PC – preferably a quiet one. Regards,

Denis Holliday

Hi Dennis. You say "I can play things louder, but they remain totally



With a Focusrite Scarlett 2i2 (2nd Gen) converter. conversions are bliss says Denis Holliday – but only with a silent PC.

listenable, as opposed to becoming too loud – odd". That's a classic sign of distortion, or in this case lack-of distortion. The human brain uses distortion as an indicator of loudness at the ear. If a signal is pre-distorted then it will sound loud even if, in sound pressure level terms, it is not. Somewhere in your Pavillion such distortion was creeping in it seems.

A battery powered laptop has a quieter environment than a big PC driven by a massive switch-mode power supply generating noise and RF radiation. Interesting but not surprising that a laptop provides better sound. Thanks for reinforcing this point with your experiences. **NK**

PHONO TO BNC

In your May edition, you advise connecting a phono cable to a BNC socket by the purchase of a special phono-to-BNC digital cable. Cannot

terminated cable from a Mark Levison transport with the BNC input of a Chord Qutest DAC without (to my ears) any degradation in performance. Furthermore, I am delighted with the sound of this combination produces.

**Stan Abrahams,
Ditchling,
Sussex.**

Hi Stan. Yes, you are right, a simple convertor can be used, rather than a phono-to-BNC cable. **NK**

K5881 AMPLIFIER

Thanks for the reply to my query regarding HT fuse for the K5881 amplifier. These are now fitted together with the 220k bleed resistor. I used block fuse holders mounted on insulating pillars onto the power supply tag board. While doing this I took the opportunity to measure the HT current to one channel with my trusty AVO8



World Audio Design K5881 amplifier from 1993 – made more durable by use of transformer primary fuses.

the same result be obtained by use of a simple phono to BNC connector available on-line from £1 upwards?

I have used such a connector made by Van den Hul, to enable me to couple my Van den Hul digital/phono

Mk111 (21st birthday present 1969) and it was 115 mA, all voltages being as they should be. The 120 mA fuses are working fine.

For interest's sake, the rest of the system is – KLPP1 preamp, NAD 402

tuner, Marantz CD6000 KI Signature CD player, Garrard 301 turntable (circa 1957), Acos lustre tonearm with AT110E cartridge, all feeding World Design WD25Tx1 speakers, built using the DIY cabinet kits. All cables are home made using cable and connectors from Maplin.

I have been a reader since 1992 and enjoyed all the DIY articles, keep up the good work with the magazine.

Roger Chesher.

Hi Roger. Good to hear that you have the fuses in place, to protect the output transformer primary if a valve collapses, as they sometimes do. The fuse will blow before the primary winding. Bleed resistors ensure there'll be no lethal voltages remaining on the reservoir capacitors with power off; I once picked up a capacitor charged to 450V after unsoldering it – and it was like being hit by a truck! They should always be there, like the fuses, but are often missing in circuits I see.

A kit can always be better than commercial product due to the care and diligence you have used. And of course it can be continually tuned and upgraded with quality valves and components too expensive for commercial product, just one £15 Jensen capacitor, for example, adding around £75 to retail cost. DIY has some unique benefits, especially with valves – providing you have an AVO8 Mk111 (lucky man!) to ensure all is working to perfection. **NK**

MISLEADING REVIEW

I have to take issue with your May 2019 review of the World Design Pre4 pre-amplifier. You show a price of £725 (at the end of the review, as always - this is an issue in itself; you seem always to gloss over the price of kit, barely mentioning it.

But in the body of the review you indicate that a separate PSU (kit) is also required, costing £299! As the Pre4 would be useless without a PSU, the total cost of a Pre4 + PSU, as a kit, is £1024. To show the price as £725 is misleading and inaccurate.

You also give the extra charge for a ready built Pre4 as £200, but do not mention a build charge for the PSU. As the total cost of a ready built Pre4 and PSU is stated as £1304 there must be a build charge for the PSU of £80. (£725 Pre4, £299 PSU, £200 build charge for Pre4, £80 build charge for PSU = £1304).

As a long-time subscriber, I find this disappointing and sloppy from Hi-Fi World. The kit price should be given as



World Design Pre4 needs PSU3, unless you already have one to drive a World Design phono stage. Both can be bought as a kit – or in built form at extra cost.

£1024, the ready built price £1304 (as you did state). The PSU is an essential part of the whole.

I doubt I will be buying one; I use a Conrad Johnson PV10A, which has a superb phono stage. And a built-in PSU! It's also built to last.

On another subject, the Roon Nucleus+ costs £2500, but they only fit a 64GB SSD! That is unbelievably mean. I have just bought a new 480GB Western Digital SSD for £45 and I have seen Sandisk 128GB SSDs for under £20. Roon could (and should) fit a decent sized SSD for a very small extra cost.

Not that I will be paying £2500 for a glorified PC. I don't even like streaming and downloading music; I'm one of those luddites who likes to get a physical object for my money! I'm a retired IT professional of 40 years experience – so I'm not frightened of technology. I've lost count of the number of failed hard drives I've seen.

But I have LPs dating back to the 1950s onwards (32 shillings and 6 pence then!) and cassette tapes from the 70's, all still playing just fine. I also have CD-R backup copies and original CDs that won't play.

**Rod Theobald,
Rochdale.**

Hi Rod. The Pre4 price alone, without power supply, is relevant to those that already have a PSU, since the PSU is multi-purpose. We were careful to list the total price of the kit in built form, as you note – so hardly misleading. Issues of price presentation don't detract from the fact that it is a great product, available as a kit or built.

And kits – rare these days – have their own value for educational purposes in the broadest sense. Pre4

uses a variety of modern techniques found in commercial product and is a great way to see what lies behind the fascia, as it were.

Roon's Nucleus+ server is custom built around an Intel NUC using a small compact chassis that conducts heat away from the main board to provide fan-less silent operation. The cast alloy case and assured durability contribute to cost, as does that fact that it comes with Roon server software loaded. You can run Roon software on an Intel NUC but then have other noisy and current chewing services running. Admittedly the use of a low capacity 64GB SSD does look mean as current PCs go. An alternative is to run Roon on a NAS drive, but it must have the power to handle Roon software – and most don't. Lots of ins-and-outs then.

I remember buying LPs for 32 shillings as well – a fortune at the time when as a student I could barely afford a pint of beer at 1 shilling. Now, let's see – if a pint of beer costs £4 now that means an LP would cost £128 now! This translates to Nucleus+ being the cost of 20 LPs back then. Not so bad seen in these terms methinks. **NK**

NEW VALVES

I have not changed my EL34 valves in my KAT34 with upgrades since April 2011. I find that my Svetlana Winged C Cryos are now sold out at Watford Valves. I chose the Svetlana Winged C as they were reported as having a very smooth sounding mid/top which was evident on listening tests. I now get the impression that the bass seems slightly reduced and the mid range a little harder.

In the March issue of Hi-Fi World

a new valve EL34D is mentioned in the article on the new KT150D. Would the EL34D be an excellent replacement for my Svetlana Winged C Cryo valves and if so would I need to change any components in the circuit? Also what output watts may I expect and what would be your thoughts on the sound I may hear?



Icon Audio's new EL34D triode valve – a plug-in replacement for the classic EL34 pentode.

All my listening is from full resolution AIFF copies from both LPs and CDs via a Mac Mini with a 1 terabyte solid state drive sent optically to a Teddy DAC. Speakers are modified Wilmslow Audio Excellence with external mounted X-overs. The KAT34 has also been upgraded with a remote control board and a Panasonic pot. Interconnects are VDH Ultimate the First, speaker leads are Russ Andrews Kimber 8TC and all power leads are Russ Andrews other than the Mac Mini.

Regards,
Colin Alford.

Hi Colin. The World Audio Design KAT34 power amplifier, with EL34 pentodes in push-pull (DIY Supplement 57/58, April/June 2001), developed 32 Watts per channel. Expect this to drop to around 20 Watts per channel with the new EL34Ds (£175.95) from Icon Audio since they triodes, not pentodes. The EL34D is a plug-in replacement for the EL34 so no circuit mods necessary.

I did not get to hear the EL34D but if it sounds as firm, clean and punchy as the KT150D – likely – then they would be an excellent upgrade. Technically, you lose power, but it doesn't sound like it. Our

Icon Audio Stereo 30SE now runs KT150D triodes and manages fine with Martin Logan's ESL-X hybrid electrostatics. **NK**

CORRECTION CORNER

In your review of the Vincent CD-S7 you write that the valves used in the output stage are 12AX7 (6922) double triode. Unfortunately 6922 is the American designation for E88CC whereas 12AX7 is the American designation for ECC83. These are very different valves: the ECC83 has high voltage amplification and low transconductance whereas the E88CC has high transconductance and moderate voltage amplification. It's hard to tell from the photo which valves they are but an E88CC would be much more suitable as a line driver particularly if configured as a White cathode follower which would have an output impedance in the low tens of ohms.

Best wishes and a happy new year,
David Mansell

Hi David. OK, thanks for picking up my blooper! You are of course absolutely right. They use the 12AX7 and 6922 was an incorrect addition.

Nice to know that there are others who like to ensure the notion of thermionic purity is preserved. But please change your e-mail prefix from pentode to triode! **NK**

B&W P2H

I've loved audio for over 50 years and I've loved trivia of many kinds even longer. And I recall some information about the B&W P2H speakers from the dawn of my audio awakenings. So I thought I'd throw in just a few of my B&W, hopefully accurate, memories from way back when, to add just a bit more to Dave Tutt's May article.

I believe the speaker was named

P2H because it was the 2nd B&W speaker. The first was the P1 which was similar, as I recall, to the P2H except for the tweeter section which I remember as a vertical pair of the famous Celestion HF1300 tweeter used in many great speakers decades ago like the Spondor BC1, the Rogers LS3/6, many BBC speakers, etc. Perhaps the Celestions would have been a more historical replacement for the Fane ionic tweeter, maybe with a super tweeter as was mentioned in the article.

I believe the woofer really was an EMI, as was only alluded to. It was an interesting driver for the time, being oval in shape, with a metal cone central section and paper outer cone, quite sophisticated for the era. I'm guessing the stiffer center was meant to be the main output source as the driver frequency increased, with the softer outer portion decoupling from the center. EMI used it in their 429 model they called the Dangerous Loudspeaker – claiming fidelity dangerous to poor recordings. EMI crossed it over at 4500 Hz to a couple of cone tweeters mounted in front of the main driver.

The bass loading in the article was reflex. I believe this was half true. B&W also included a panel to block the port to convert the loading to closed box. This was a time before Thiel/Small when reflex design was more of an art form so the option of closed box loading probably provided superior bass control in rooms where it was needed at the cost of some bass output.

Hopefully my long term recall was pretty good and I got these extra facts correct on a very interesting and, as an early product of what became a very important speaker manufacturer, correct.

Allen Edelstein
New Jersey,
USA



The output valves in Vincent's CD-S7 CD player, reviewed in our February 2019 issue, are 12AX7s. These are not 6922s David Mansell points out.



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Simple Stream

Noel Keywood and Jon Myles get their hands on Leema Acoustics Elements streamer and both come away very impressed.

A piece of hi-fi equipment with no knobs. Hmm... difficult I thought. And I was right – and wrong. Difficult to set up and get used to, like all network-only products, but at the same time easy to use and powerful once done. Leema's Elements streamer with on-board digital-to-analogue convertor (DAC) was fascinating and impressive in its own way.

No knobs on front because Leema's streamer is app controlled

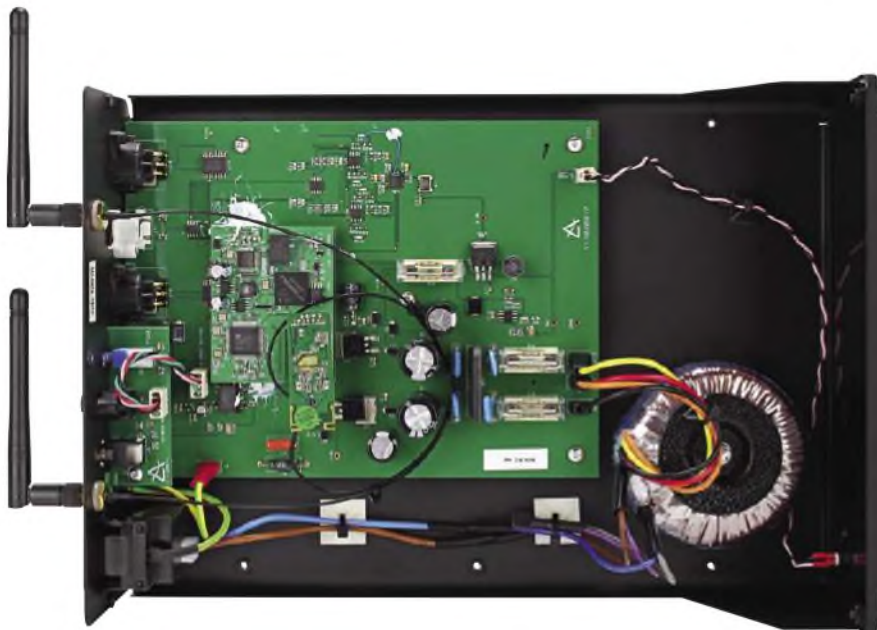
only. Yes, you need an i-device to control it, meaning an iPhone or iPad – or Android equivalent. And it only functions within a computer network, but this can be as simple as being plugged into the back of a BT home router; if you have a computer with internet connection then you can likely connect in Leema's streamer. And it is worth considering. Here's why.

The Elements streamer can see and play all music files on your computer, providing it is a PC – not

a Mac (Macs need a UPnP server to be visible). It can also see files on a network drive (NAS) or external drives from music providers like Spotify, Qobuz, Tidal (and others) whom you have to pay to supply music of course – ignoring Spotify's free service with advertising.

Additionally, a rear USB socket reads 'mass storage' from a Flash Memory drive (Memory Stick), or an external hard disc drive (HDD) or solid-state equivalent (SSD). Convenient if you want an





A linear power supply is fed by a large toroidal transformer via two fuses – unusual since cheaper switch-modes are more common. A daughter board carries large surface mount ICs to handle the digital signal processing.

autonomous music player, able to play your music collection, with the computer switched off. Seen like this the Elements streamer acts as a 'CD player' in effect, one that can play a wide range of digital files.

Since the on-board ESS ES9108 Sabre32 series DAC used natively accepts up to 384kHz sample rate PCM – as I recall – it would accept this from the USB storage of Elements – and it did. However, a 32/384kHz pink noise WAV test file produced no sound, but 24/192 played without bother, plus lower bit depths/sample rates. Other test file formats played were Flac, MP3, WMA, and DSD64 (only), plus Apple ALAC, AAC and AIFF. Also claimed are OGG, Ape, and WMA.

Spotify Connect, Tidal, Deezer, vTuner are supported and there is MQA for Tidal Masters ConversDigital say. DLNA 1.5 is supported and UPnP AV1. It will play from Drop Box, OneDrive and iCloud drive too.

Leema have made the Elements compact and simple. It measures 345mm deep including aerials, 218mm wide and 90mm case height, or 162mm with aerials vertical (they swivel). Weight was 2.3kgs (5lbs) on our scales. No knobs on front but one power switch

at rear as the Leema is meant to stay on (rated at 30 Watts); a small but intense blue led on the front glows when on.

The rear panel carries balanced XLR and unbalanced phono-socket analogue outputs, a pair of wi-fi aerials, electrical and optical outputs (for recording), USB and LAN (ethernet, RJ45 socket) inputs, plus a WPS wi-fi set-up button. Leema advise that the wired connection is used – and that is how I tested it. Wi-fi data rates can be limited by distance, obstruction etc, as well as transmitter power and aerial effectiveness – transmit and receive.

However, with wi-fi you get wireless connection to the hi-fi and the Leema offers this.

The control app is from ConversDigital of Korea (www.conversdigital.com) and is their white faced mcontrol app, not the dark grey mconnect apps (lite and paid), which work but don't possess a set-up menu (I found!). It was easy to use and of impressive ability, able to access on-line music providers as expected, Flash Memory connected to USB and also my

PC's music files. And from PC I could (push)play through the Elements whilst typing away at my desk, not using the iPhone for control.

There were some occasional glitches. Whilst the Leema always popped up on the router's client list, it didn't always appear on the iPhone; a 'phone re-boot was the cure. And I became familiar with pressing the reload button of the Browser and Play To client lists as items would mysteriously disappear from them, possibly a network issue, although I use a vanilla network review setup to avoid internal funnies.

Finally, playing large (e.g. 24/192) files in succession would trigger a 'file format unsupported' message that would only clear by re-loading the primary Browser list of sources.

Balancing these little ups and



The rear panel carries balanced three-pin XLR outputs, as well as unbalanced phono sockets, plus RJ45 socket for ethernet (LAN) and a USB 'mass storage' socket.

downs was the sheer convenience of being able to access vast amounts of music from iPhone or iPad, directing it easily through the hi-fi. No need to get physically involved – just lay back and play. I was intrigued by the Leema's sense of nothingness: you sort-of plug it in and walk away; it has no presence of its own, past its small box dimensions.

SOUND QUALITY

While the Leema Elements may have a few quirks in its control system, it makes up for it in terms of sound quality: there is a sense of ease and a rather luxurious sound,

Playing Fleetwood Mac's 'The Chain' via the balanced outputs into our Creek Evolution 100A integrated amplifier there was a palpable presence to the sound. In the second half of the track bass had tremendous force. I ran the Creek

"With the Leema there is a sense of ease and a rather luxurious sound"

through both PSB's rather good little standmount PS Alpha P5s (see review in this issue) and our resident Martin Logan ESL-X hybrid electrostatics.

Both 'speakers conveyed a dynamism and sense of life that had a toe-tapping effect on me. The Leema has a smooth but rich and fluid delivery that is quite infectious. Play something with beat and depth – and the Elements propels it along.

Listening to Burning Spear's 'Black Wah-Da-Dah' (24/96) the track has speed and dynamite bass – especially through our Martin Logans.

One thing to note though is that dynamic range through the Leema can seem a little lacking. Arvo Parts' 'Tabula Rasa' sounded a little shaded – not having the overall thrust and detail I'm used to through the likes of a Naim streamer. Violins seemed a little muted and there was not the overall atmosphere I'm used to on this recording.

That said, though, what does come across very obviously – and impressively – is the Leema's propulsiveness. This is a streamer that can drive a track along without sounding muddy or getting in the way of the signal, it has such insight.

With Led Zeppelin's 'When The Levee Breaks' (24/96) the Leema managed to alleviate muddle

LEEMA SAY –

The compact-chassis Elements Streamer is based upon the high-quality streaming module used in our Quasar streaming amp/DAC, with the addition of an advanced ESS Sabre DAC, enabling the device to be used as a standalone unit in a wide range of audio systems.

The Elements Streamer has built-in support for a number of high-performance streaming services including Tidal, Deezer, Qobuz and vTuner radio. Spotify connect is also supported, along with file playback from Dropbox and Microsoft Onedrive. Local playback from USB drives is also supported.

The device can 'pull' music and effortlessly stream audio from any suitable DLNA/UPnP device on the same network, including: smartphones, tablets, laptops, computers, NAS drives and music servers, including our Sirius music server.

– a characteristic of the Sabre32 DAC – and make it jump from the loudspeakers.

The same went for Johnny Thunders And The Heartbreakers' 'LAMF'. Again, this isn't the best recorded album you'll ever hear – with a decidedly thick overall balance.

But it possesses some killer tracks and the Leema brings out the best

couldn't help but feel this little Leema Elements was getting the best out of what was on offer from my CD rip.

CONCLUSION

Overall the Leema Elements is something of a mixed bag. Give it something big, meaty and bouncy to play and it sounds superb, giving more expensive streamers a run for their money. Perhaps its because of the generous linear power supply.

In terms of depth it lacks the resolution some may be looking for – especially on classical tracks.

That said, for its price tag of £1300 the Leema makes a strong case for itself – especially if you are looking to add streaming capability to an existing system from a product that has minimal intrusion – no knobs!

MEASURED PERFORMANCE

With a 192kHz sample rate PCM digital input, frequency response measured flat to 45kHz our analysis shows, before a

FREQUENCY RESPONSE

DISTORTION

THD (%)	LEVEL (mV)	FREQUENCY (Hz)
0.2477 %	4.8152 mV	996.96 Hz
OFF	OFF	OFF

DISTORTION

slow roll away to the 96kHz upper theoretical limit.

Output was high at 4.8V from the balanced XLR output and 2.2V from unbalanced phono socket outputs. Reading from a USB flash drive to avoid network noise, distortion from 24/96 hi-res digital (-60dB) measured a high 0.24% our analysis shows, due to noise and distortion harmonics; around 0.04% is hoped for and 0.02% possible from the ES9018 DAC. The EIAJ Dynamic Range value was in consequence low at 105dB – little better than CD – well below the 120dB+ expected from the ESS DAC.

The Leema Elements streamer turned in a mediocre set of performance figures by current standards, below what is expected from an ESS ES9018 DAC.

NK

Frequency response	4Hz-45kHz
Distortion (-60dB, 24bit)	0.25%
Dynamic range (EIAJ)	105dB
Output (unbal / bal)	2.2 / 4.8V
Noise	-103dB

LEEMA ELEMENTS STREAMER £1300

EXCELLENT - worth considering.

VERDICT
Network DAC of broad ability, but not perfect.

FOR

- reads most sources
- easy to use
- small and simple

AGAINST

- lacks dynamic range
- software glitches
- app control only

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SHELTER

Life In Balance

Balanced cables using XLR connectors are becoming common in hi-fi. Here are the reasons why, explained by Noel Keywood.



Balanced XLR outputs and inputs are becoming more common in domestic audio products. They offer better quality, especially with long cable runs. Here's a run down on how they work and what to consider from both plugs and cables to get the best from them. First, simple practicalities, later a bit more depth.

Balanced interconnect cables are distinguished by their use of three-pin XLR connectors, male and female. These are professional connectors designed for heavy usage in studios, on stage in theatres and what have

you, to avoid hum and interference in long cable runs. There are in practice four pins, not three, something missed in most internet talk/diagrams – and this raises issues – see our boxout 'Wiring an XLR'.

As hi-fi equipment gets more sensitive the benefits of balanced working become apparent even in short cable runs within the home. Instead of relatively light and flexible stereo interconnect cables with a phono plug at either end (unbalanced), you now have bigger plugs and thicker cables – especially with some of the more exotic arrangements like star-quad cable

that I'll cover later.

Apart from slightly higher cost and greater bulk there is no reason not to use balanced cables if you either have products with balanced outputs and inputs, or wonder about buying products with them. Nearly always in real life they offer at least slightly better sound: cleaner and better defined, with less fuzz around images and hash between them. And because manufacturers mostly use standard commercial silicon-chip based balanced line drivers and receivers from Texas Instruments (Burr Brown), That Corporation and Analog Devices, they will match each other perfectly well.

Balanced cables separate the delicate audio signal from all else, keeping it away from noisy earth currents – as our diagram shows – and also better screening it from outside interference by two mechanisms: the use of an independent screen and rejection of what are termed 'common mode' signals – RF interference that hits both lines equally – such as that from a nearby transmitter which could be your wi-fi equipped BT router or Crystal Palace transmitter next door (South London inhabitants only!).



The balanced output sockets of Audiolab's M-DAC+ – male chassis sockets with three pins and a not-obvious ground connection to the metal case.

Balanced working also gets rid of mains hum or buzz.

Balanced is better, which is why you should go balanced if possible. But there are those who say, with some justification, that if an amplifier's internal circuits are unbalanced – which most are – there can't be any advantage in using a balanced cable to connect them. This isn't the point: using balanced cables sorts out problems that don't relate to the



The silver plated pins of XLRs tarnish and need regular cleaning but Neutrik – famous for XLRs – now offer gold plated pins. Definitely a better option.

amplifier so much as its working environment by separating noisy ground currents from carefully preened audio currents.

Balanced cables can and often do use heavy screening along the length of the cable itself, whilst the size and build of XLR connectors provides lower contact resistance than phono plugs. Belden (USA) say that it is the tightly-twisted balanced pair that best rejects external noise, not the screen (that works above 50MHz).

A valid objection is that balanced outputs and inputs require extra circuitry in the background, usually a silicon chip at either end. Extra silicon chips potentially offer more degradation of the audio signal.

From a manufacturer's point of view the objection is it adds to cost – around £2 per chip and £2 per XLR socket, per channel, £8 total, adding £40 or so to the final selling price after distributor and retail mark-ups.

The chips themselves have impressive specs and no major weaknesses, making them audibly transparent in use. This only fails if one audio line is grounded by an unbalanced input, as That Corporation point out (best to read their data sheet about this – www.thatcorp.com).

Then early overload can occur. Also, XLR chips have an output limit of 17V or so.

Better than silicon chips are specialised transformers from companies like Jensen or Sowter, but they are far more expensive at around £100 each and bulky too, so rare in hi-fi equipment; World Designs Pre4 valve preamplifier we reviewed last month used transformers to great effect. Transformers do not overload, have massive common mode rejection, can feed unbalanced inputs with no problem and noise is minimal.

If galvanic isolation is wanted – total electrical isolation between products – only a transformer can provide it, providing one secondary is left fully floating, not centre-tap earthed. Also, screen and earth must be connected at one end only. If, then, Product A rose to 240V on its casework, Product B to which it was connected would not rise to 240V (should it not be earthed etc). This is an extreme and unlikely example used just to illustrate the principle of galvanic isolation, a term I see creeping into hi-fi. Galvanic isolation is used in medical electronics where leakage currents are unacceptable.

TECHNICAL

The hidden miscreant in hi-fi products is the mains transformer. This energises the steel chassis on which it sits by electromagnetic induction and ground leakage

SEX & XLR

XLR cables are always male-to-female – meaning there's a plug at one end and a socket at the other. Phono cables are male both ends.

Why the difference? You can grab a bunch of XLR cables and mate them up (as it were; unfortunately you won't get more XLR cables for free), to make a longer one – great when you are under pressure on a stage, perhaps trying to set up Led Zeppelin's sound system (to put XLR into its historical context). Phono terminated cables need an adaptor.



XLR sockets are also sexed – outputs are male, inputs are female. In that outputs are active, carry-

ing voltages, and inputs are passive carrying no voltage, basic safety logic would suggest the other way around was more sensible – but this arrangement made biological sense to roadies.

The sexing of cables can catch you out; I've ordered female connectors when I should have ordered males. So watch out for the peculiar problem of XLR gender issues.

currents – a seemingly invisible force. The electrical loop formed by an unbalanced earth line and mains earth then allows ground currents to flow – even though there's no apparent voltage source. Balanced connection separates the audio from such ground currents.

The use of balanced lines raises the possibility of employing Star Quad cable. This has two conductors per balanced line, twisted together, to increase immunity to interference in, say, a microphone cable laid next to a mains cable across a stage. Not common in hi-fi (yet!) and arguably unnecessary – see our boxout Wiring an XLR.

Balanced lines should always be used for turntables, as they are for microphones, but this is rare – unfortunate when moving coil pickup cartridges cost thousands and are balanced sources waiting to be



Aqvox (Germany) make a solid-state phono stage with balanced XLR inputs. Arms need re-wiring to suit. Phono inputs are female sockets at centre; outputs are male chassis plugs at right – an XLR convention.

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Description

Hi-Fi World brings you the best hi-fi... from around the world!

- We listen and measure products in depth, at our London offices.
- Expert opinion from a team of renowned writers, musicians and engineers.
- International standard measurement using Rehebe & Schwarz test equipment...

Information

Developer: audio web publishing ltd
Category: Entertainment
Updated: 7 Dec, 2014
Version: 1.0
Size: 9 MB
Rating: Rated 4+
Family Sharing: Yes
Compatibility: Requires iOS 5.0 or later. Compatible with iPhone, iPad, and iPod touch.
Languages: English

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GOING LOOPY

The induction loop – simply a loop of wire – is weird and worrying. Michael Faraday nailed it long ago. A loop of wire picks up electromagnetic radiation – stuff that whizzes around the universe – and our homes too. Loops pick up everything from low frequency hum to high frequency radio waves, giving them the potential to inject nasties into amplifiers. To minimise this wires in long cable runs are twisted together. Loops in a hi-fi system exist because electrical bonding for safety purposes takes precedence. Balanced lines offer a way to remove audio from noisy loops without affecting safety.

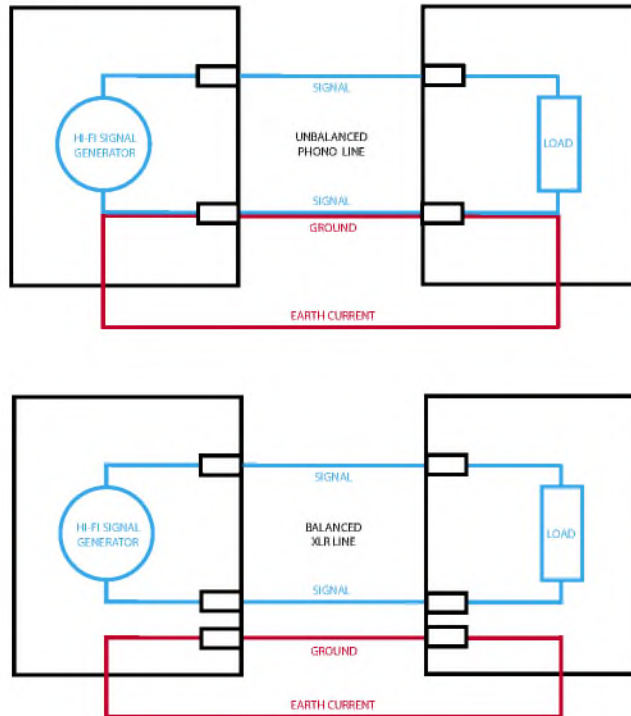
exploited as such. Aqvox of Germany make an all-balanced phono stage and SME can provide a balanced cable for their arms.

Usually the screen of a balanced cable is connected to pin 1 (ground) at both ends. This is a default arrangement, even though it forms another induction loop – far from ideal. If pin 1 in the amplifier goes to circuit earth, which may be different



Neutrik XLR plugs come with four pins. Yet balanced cables with both screen and earth to match are not made. Usually, screen goes to Pin 1 and the case pin is unused. This is arguably incorrect.

to case earth, especially where a ground lift resistor is used, the screen is best connected to case earth, so as not to inject RF currents into the circuit earth point – long cables being effective aerials. There seems to be no agreement over how to use the two earth pins of XLR. All this is only of interest to those who



A conventional two-pin phono cable (top) passes signal and ground currents through its outer screen. A balanced XLR three-pin cable (bottom) separates signal from ground.

WIRING AN XLR

The ground pin of an XLR is numbered 1. The balanced audio signal is carried by pins 2 & 3. Commonly ignored is a fourth chassis connection that is also at ground, like pin 1. But pin 1 may not be at chassis ground – and this is an unresolved issue with balanced cables. Most connect their screen to pin 1 but arguably it is best connected to chassis ground and not pin 1, to avoid injecting hum and radio into signal earth – that can be different to chassis earth. Pin 1 at both ends should then connect to a separate earth line, external because balanced cables do not come with an independent earth.

Star Quad cable is made by Belden of the USA and Van Damme of the UK (London). Each balanced line is a twisted pair, making for a very complex cable. Hi-fi has yet to see such cables – but they will surely appear!

want to construct their own cables since commercial cable will come with screen attached to pin 1 at both ends.

There are mini XLRs and multi-pin XLRs that better suit hi-fi usage, but being non-standard are rarely used – at present. One single five

pin XLR plug and matching five core cable could however carry two balanced stereo channels, taking up less panel space than current 'pro' XLRs, costing less and being easier to use. This is the way hi-fi could go.



A Star Quad balanced cable has two pairs of cables twisted together to give greater rejection of electromagnetic interference due to its symmetry relative to outside sources.

Audio Innovation



Audiolab's new 8300CDQ combines a CD player with digital inputs plus a pre-amp facility. Impressive? Jon Myles thinks so.

HOW the humble CD player has changed. It was once a device that span silver discs and delivered 'perfect' digital to your hi-fi. Times have moved on – and for the better. Example: the new 8300CDQ player from Audiolab. A CD player that is far more than just that.

What you get is a fully-fledged digital processor with volume control, MQA decoding via its USB input

and the ability to plug in external digital sources via two coaxial or two optical S/PDIF inputs. Also, there are three analogue inputs with a gain of 8dB to the outputs, useful for connecting an external silver disc player or phono stage perhaps. The volume control works here too, so the Audiolab can be used as a preamp driving a power amplifier.

The design is based around an ESS Sabre32 reference chip that has been implemented by digital

guru John Westlake. It has 512 DAC elements (256 per channel) each operating at 84.672MHz – so all digital audio sources, whatever their sample rate, are upsampled or oversampled to this frequency.

Also included are seven user-selectable digital filters for PCM audio (more of which later) and impressive build quality. The 8300CDQ is housed in a slim steel chassis measuring 80mm x 444mm x 317mm (H/W/D) which is tightly

constructed and weighs in at 6kg.

Inside there's a linear power supply with low-noise toroidal transformer, reservoir/smoothing capacitors and – surprisingly – discrete transistor analogue output stages instead of off-the-shelf op-amps favoured by most manufacturers.

On the outside, five small buttons on the right of the case give access to all functions while the

and decayed.

However, switching to Optimal Transient gave a broader and much more melodious feel to the whole track. This now sounded like a band playing live and totally in the groove. There was not so much detail on offer but a better fluidity.

Which was better? Well that depends upon your taste and what you are looking for from your music collection.

With the Bournemouth

creamy feel.

Using the Audiolab as a standalone DAC with an Astell&Kern digital audio player connected through QED Quartz glass optical cable I played Fleetwood Mac's classic 'Rumours' album in 24bit/96kHz resolution: the rim-shots from the drums all but shook the room! Impressive was the way individual instruments stood out - guitars, bass, drums and vocals all having their own space in the overall mix.



slot-loading CD mechanism is on the left with a well-lit blue display in the middle. There's also a supplied remote control.

In use I was impressed at just how quickly the Audiolab read a standard CD. Slotting a number of discs into the mechanism it took an average of 20 seconds to bring up the number of tracks – and a further five seconds to access each individual one.

SOUND QUALITY

One thing to bear in mind with the 8300CDQ is the extent to which its digital filters affect the sound. On many CD players/DACs the filter options make little difference – not so here.

Starting out with The Stone Roses' 'Fools Gold' via CD, Optimal Spectrum gave a smooth, assured sound with taut bass and good upper registers on the guitar. John Squires' fretwork had immense presence, his playing coming alive as notes rose

Symphony Orchestra's rendition of David Bowie's 'Heroes' the Optimal Spectrum setting sounded fine. However, switching in the Optimal Transient filter improved things even further, violins taking on a brilliantly

Stevie Nicks's vocals on 'Dreams' also came across splendidly. On both a bargain set of PSB Alpha 5 loudspeakers and the rather more refined Martin Logan ESL-X hybrid electrostatics we use as a reference, I could hear sharp intakes of breath between phrases. Even better was the way the Audiolab managed to sparkle with its



The Audiolab uses a linear power supply with toroidal transformer (top left) plus a slot-loading CD drive (bottom left). Both these are isolated from the main circuit board to avoid interference. Note all the smoothing capacitors (bottom right!).

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The rear has both phono-socket and XLR outputs (left). Digital inputs are co-axial and optical, plus USB (right). There are three analogue line inputs too (centre).

upper registers, perhaps due to its discrete transistor output stages.

Nicks' vocals – which are both delicate yet powerful in delivery – had a presence about them few other digital sources can match. Listening to this track through the Martin Logan loudspeakers with their well-damped bass and open-sounding panels gave a complete and natural aural experience.

Dynamically, the Audiolab has few rivals at its price. Spend a little bit more and you may derive an extra bit of detail from dedicated CD players – but you won't get the flexibility of both digital and analogue inputs and volume control.

Sticking with the Astell&Kern I played a high-resolution file ripped from an LP of The Jesus And Mary

Chain's debut 'Psychocandy' LP – starting with the track 'You Tripped Me Up'. This is a song dripping with feedback and a good test of any digital-to-analogue converter; the Audiolab took to the task wonderfully. Even through the small PSBs there was solid bass and a tight grip on the music. Also on offer was thrust and pace – bringing the best out of this fast piece – keeping my feet pumping. Little details such as the leading edge of the main guitar and the decay in the notes, were superbly revealed I found. Listening closely to the individual instruments I could make out every single one – but if I wanted the music to simply wash over me then that was there too.

Which, in essence, is the magic

in this latest offering from Audiolab. If you desire detail then it has it in spades, with the Optimal Spectrum filter. For those who prefer a big, fat and meaty sound then it can do that too with the Optimal Transient filter and its variants.

The 8300CDQ filters mean you can tweak the player to your personal preference. Who could ask for more?

CONCLUSION

The new Audiolab 8300CDQ player is a stellar performer. Along with an impressive CD player you also get a full range of digital inputs, allied to a selection of filters that allow fine-tuning of the sound. With analogue inputs also it can make the heart of a superb system – for just £1099.



MEASURED PERFORMANCE

Acting as a CD player Audiolab's 8300 CDQ can bring into play no fewer than seven digital filters of very obvious aural impact and sonic purpose (designed by John Westlake).

With CD Optimal Spectrum gives the broadest bandwidth figure of 4Hz-21kHz and this is what CD players offer as standard. Sharp Roll Off and Minimum Phase are alike and similar to Optimal Spectrum in bandwidth.

Optimal Transient (with CD) rolls off upper treble (above 10kHz) and improves time domain behaviour by lessening filter ringing – a softer but more assured sound. Optimal Transient XD and DD are subtle variations (improvements). Then there is the radical Slow Roll Off that with CD chops output above a low 7kHz, much like analogue filters of the past. This removes all upper treble and distortion harmonics from CD – and is not seen elsewhere.

With hi-res these filters scale up in frequency, having less aural impact, but Optimal Transient (plus XD & DD) and Slow still smooth the sound.

These results apply to S/PDIF and USB digital inputs, the optical input reaching 192kHz.

Maximum output from the balanced

XLR socket outputs measured a conventional 4V at 0dB volume setting, rising to a high 6V at +3dB. The unbalanced phono-socket outputs gave half – 2V and 3V respectively.

With a hi-res 24bit input EIAJ Dynamic Range measured a high 119dB from the balanced XLR outputs and distortion a low 0.02%. USB gave the same results as S/PDIF.

The analogue Aux1/2/3 inputs accepted up to 2.3V before overload so will accept the output of silver disc players. Gain was x2.6 (8dB) and frequency response flat from 3Hz to 100kHz. Noise was a low -112dB from both XLR and phono-socket outputs, distortion just 0.006%.

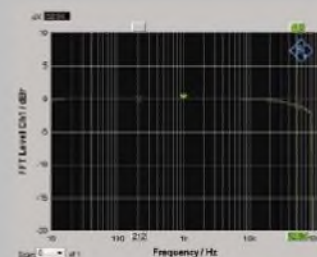
The 8300CDQ measured well in all areas. It is a sophisticated design, with advanced filters and top quality DAC performance. NK

DIGITAL
Frequency response 4Hz-53kHz
Distortion (-60dB, 24bit) 0.02%
Dynamic range 119dB
Output (Phono/XLR) 3V / 6V

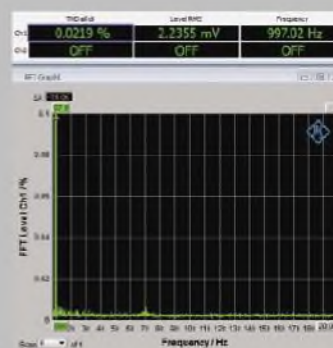
PREAMP
Gain x2.6 (8dB)

Frequency response	3Hz-100kHz
Distortion (1kHz, 1V out)	0.03%
Separation (1kHz)	90dB
Noise (IEC A)	-112dB
Overload (in/out)	2.3V / 6V

FREQUENCY RESPONSE



DISTORTION



AUDIOLAB 8300CDQ £1099



OUTSTANDING - amongst the best.

VALUE - keenly priced.

VERDICT
 Audiolab have excelled here. There's nothing to fault in terms of sound quality and operational performance.

FOR
 - various digital filters
 - overall sound quality
 - price
 - build quality

AGAINST
 - nothing at the price

Audiolab
 www.audiolab.co.uk

Wheels of steel

Martin Pipe revisits a true icon – the Technics SL-1200 turntable.



Ask someone in the street to name a turntable and chances are that 'Technics Twelve Hundred' (or 'Tec Twelves') will crop up more frequently than any other. The completely manual SL-1200 and its darker-hued, but otherwise-identical SL-1210 relative are dance-music legends. These 'wheels of steel' were standard fitments in discos and nightclubs for many years, and played a pivotal role in the rise of hip-hop culture and 'turntablism' – the deftly-rhythmic manipulation of records using techniques like 'scratching' and 'cutting', to create fresh and imaginative musical backdrops. In the 1970s and 1980s, lest we forget, decks were cheaper than samplers; hip-hop began

in New York's poorest areas...

Technics – the hi-fi arm of Japanese industrial giant Matsushita (Panasonic) returned the compliment by sponsoring the DMC (Disco Mix Club) World DJ Championships.

Trends may come and go, but this Technics deck never lost its appeal to the public. You'll even find a SL-1210 in the Science Museum, categorised as something that 'shaped the world we live in'. And in 2010, when Matsushita announced on the DMC website that the turntable would be 'dropped', a public outcry ensued. A petition for resumption of their

manufacture attracted nearly 30,000 signatures. Fortunately for SL-1200 lovers, a timely surge of interest in vinyl ultimately helped to change Technics' minds – and the 2016 Las Vegas Consumer Electronics Show saw the SL-1200 reborn.

But there's more to the SL-1200 story – for a start it's a series, as opposed to just one deck. It began in 1972 with the first product to bear that famous number. Sold purely on its merits as a hi-fi turntable, the \$350 SL-1200 was itself a development of a previous model – an early Direct-Drive, the substantial spinner that was the SL-1100 (SL-110, without arm). This deck proved to be quite popular – notably in the US – despite its expense, setting standards for what was to come. The original SL-1200 it spawned, introduced by Technics the following year, was a more affordable proposition; tellingly, it was marketed as 'The Middle-Class Player System'.

The new deck was available with or without tonearm and sold very well, explaining why Technics kept it on the books until 1978. That year, it was replaced by the radically-different Mk2 version – which is the



Beneath the SL1200 Mk2's platter are control and heatsinked drive chips, plus mains transformer shielded to reduce hum.

'Tec Twelve' most associated with club culture. Although the SL-1200 Mk2 couldn't be bought without a tonearm, the high-torque Direct Drive motor was now quartz-referenced. Technics, in a homage to the original SL-1200 slogan, described the SL-1200 Mk2 as 'the Middle-Class Quartz Direct-Drive'. At the time (late 1970s-early 1980s) UK buyers could be expected to shell out approximately £250 for one.

A key feature that made the Mk2 stand out was its pitch control. This allowed DJs with two decks and a mixer to easily match the tempos of rhythms. DJs working in darkened

clubs also appreciated a cue light alongside the platter that would pop up and glow at the press of a button. Also liked by DJs was a single large button that both quickly-started and stopped the platter.

control's central detent, giving the DJ smoother control over speed. By 1995, two million SL-1200s had been made – prompting Technics to sell the piano-black SL-1200LTD, a limited-edition \$1200 version of the Mk3D. 5,000 of these were built. In the UK, 'stock' SL-1200s were selling for £400 or thereabouts around this time.

Another Japanese-only release, the Mk4, arrived in 1996 with additional 78rpm speed. Furthermore, the S-shaped arm was made from titanium tubing.

The first post-millennial SL-1200 was the Mk5. Launched in 2000, this



An SL-1200 Mk2 circuit board, the connections to the Direct-Drive motor's coils can clearly be seen. Technics used the same basic design, which has stood the test of time, for many years.

The Mk2's fixed S-shaped tonearm had a SME-type headshell fitting. Sniffed at by hi-fi purists but robust enough to deal with the rigours of DJ mishandling, the Technics arm was compatible with the sorts of carts that professional jocks favoured – heavy-duty Stantons with chunky cantilevers and spherical tips.

1989 saw the appearance of a new version, with only minor differences relative to the Mk2. You're unlikely to find one of these Mk3 decks in the UK, though; they were only available in Japan. Elsewhere in the world, 1997 saw the arrival of the SL-1200 M3D. This left out the pitch-

control's central detent, giving the DJ smoother control over speed. By 1995, two million SL-1200s had been made – prompting Technics to sell the piano-black SL-1200LTD, a limited-edition \$1200 version of the Mk3D. 5,000 of these were built. In the UK, 'stock' SL-1200s were selling for £400 or thereabouts around this time.



A mains selector, accessible with the platter removed, allows this S-1200 Mk2 to accommodate a range of mains voltages. Japanese models, like the MK3, are 'fixed' to 110V - you'll need a step-down transformer to use them in the UK.

version sported only minor changes. The tiny incandescent bulb of the cue light – tricky to replace – became a long-life white LED, and side thrust (bias) was doubled to suit up to 6g VTF.

The Mk5G – launched towards the end of 2002 – proved to be more radical. Thanks to new electronics within the deck, its speed – preset or pitch-shifted – is always quartz-locked. There's also a 'double-pitch' mode that yields +/- 16% of speed adjustment to more adventurous DJs! The deck also featured a glossy finish, blingy-blue target lighting and the ability to tweak the braking. In 2004, Technics made 3000 of a Mk5G with 24k gold-plated metalwork to



The arm can be raised or lowered by a lockable rotating collar. This feature and an anti-skating range and counterweight that can accommodate playing weights up to 3g (more with some modern versions), allow the arm to be used with a wide range of cartridges.

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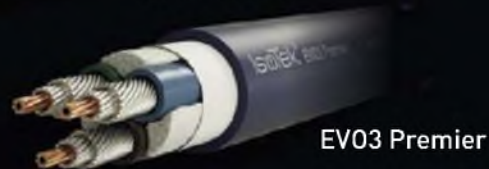
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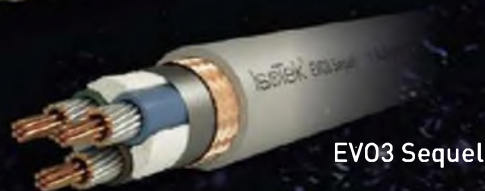
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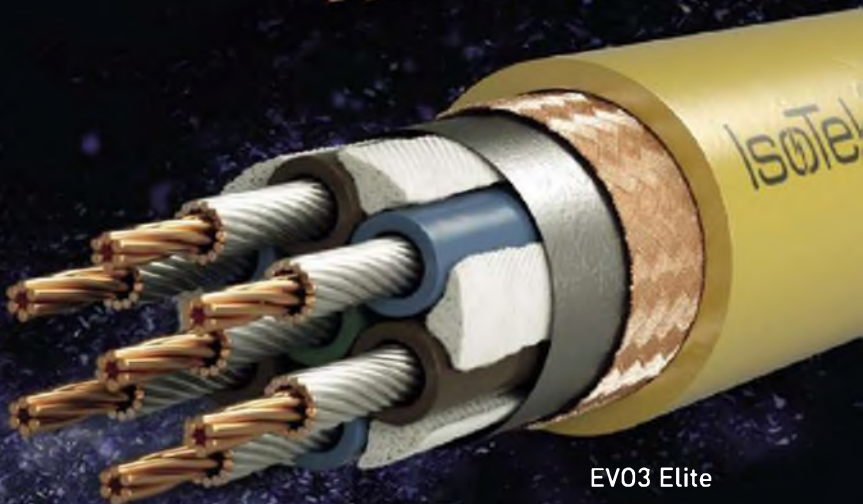
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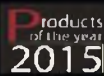
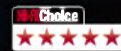
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The 'stock' tonearm of the SL-1200 was designed for punishing DJ use, rather than to be the ultimate statement of audio fidelity. A great feature is its ability to accept SME-type bayonet headshells.



Technics QUARTZ
Direct Drive Turntable System SL-1210MK2

The main bearing from an SL-1200 Mk2. It can be replaced with an 'aftermarket' type with clearly audible benefits.

celebrate 'three million turntables sold by Technics over the past thirty years'.

The Mk6, which appeared in 2008, added minor improvements. This was the last SL-1200 to be

produced before Technics decided to revive the line with the SL-1200G, which started shipping in the autumn of 2016. Despite what appearances may suggest, this all-new 'Grand Class' model is a very different beast to what had gone before – as its £3,000 price suggests. The SL-1200G, aimed at hi-fi enthusiasts rather than DJs, is microprocessor-controlled.

There's a refined tonearm designed to meet the expectations of audiophiles, an advanced plinth and a new coreless direct-drive motor that has been designed to eliminate 'cogging'. A cost-reduced £1,300 version (the SL-1200GR) followed in 2017. DJs will have to wait until the summer for the £900 SL-1200 Mk7, a deck that adds to the Mk6 some of the ideas explored in the 1200G. If you don't want to wait until then – and the pricey hi-fi variants don't appeal – there are plenty of second-hand SL-1200s in circulation on account of their popularity.

I have been using SL-1200s for

years, back to my days of college radio, and have never tired of them. The reputation lumped on them by the press during the 1980s was in many respects undeserved – but this, remember, was the era of anti-Japanese snobbery and Linn-worship. And yes, it's not perfect. What turntable is? If you want ultimate sonic performance you're probably advised to look elsewhere – and pay more. But on the whole there's little to touch the SL-1200 Mk2 when it comes to striking a compromise between audio performance, longevity, robustness and practicality.

Replacement platters and bearings, as well as armboards that enable tubery like the evergreen Rega RB300 and SME Series IV to be fitted give the deck a new lease of life.

And if you'd like to give one a try? If you choose to take the second-hand route, the one you're most likely to come across is the Mk2 version. Prices of these decks tend to be rather high – £200 to £300 a throw – on account of their cult status. I once found a tatty Mk2 by the side of the road – things were living in it! This one didn't take much to coax life back into it. Target-light failures are common, while pitch control sliders can wear out – be wary of decks that have been through constant club use, or have been subjected to liquid accidents! An occasional tendency for the platter to spin out of control can be usually be traced to dry joints; if you're unlucky, one of the speed control chips might have failed. Fortunately, spares aren't a problem. Popularity has its privileges...



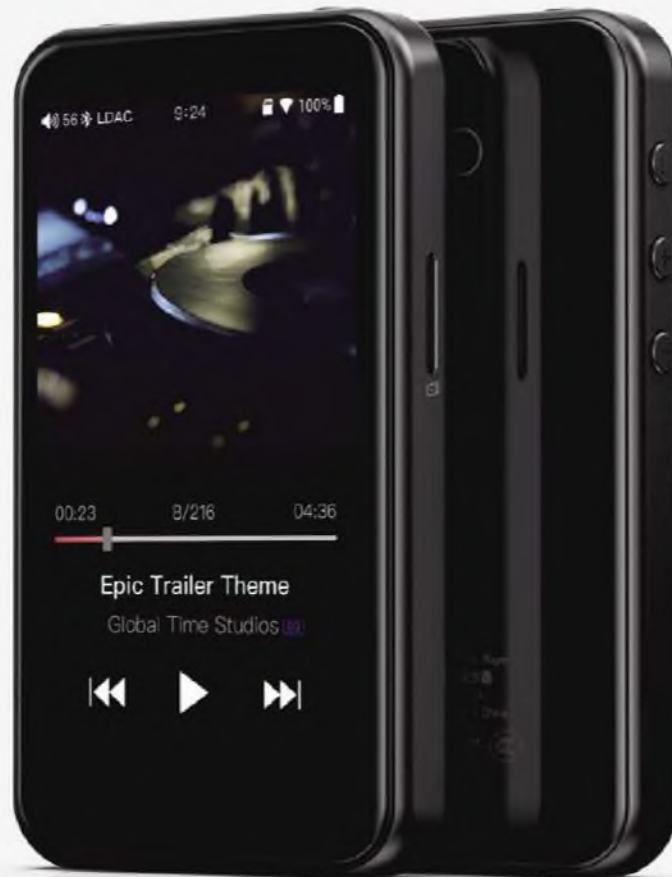
A Timestep Technics Evo modified Technics SL-1200 Mk2 with SME309 arm, improved main bearing, plinth and platter, and with puck and external power linear supply. Used by Hi-Fi World for measurement and listening purposes.

FiiO



M6

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- 26 Days Deep Sleep
- 2GB + 2TB

Specifications			
USB DAC	Asynchronous 192kHz/32bit	Out put power 1	≥110mW (16Ω / THD+N<1%)
USB	TYPE C Two-way USB2.0	Output power 2	≥70mW (32Ω /THD+N<1%)
WiFi	2.4G, WiFi transmission supported	Frequency response	10Hz~80 kHz (-3dB)
Size	53.3mm × 92.5mm × 11.5mm	SNR	≥118dB (A-weighted)
Weight	About 83g	Output impedance	<2Ω
Charging time	<2.5h (DC5V/2A)	THD+N	<0.002% (1kHz/32Ω)
Battery life	3.5mm headphone output : >13h	Peak output voltage	4.245 Vp-p
Battery capacity	2350mAh Li-polymer Battery	Noise floor	<3uV

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FiiO M6



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Head for iBasso

iBasso's new IT01S in-ear monitors offer excellent value, says Jon Myles.

In-ear monitors (IEMs) can take many shapes and forms – and their performance also varies immensely. My personal preference as a reference is Noble Audio's K10s – clean, clear

with exceptionally deep bass. But they come at a price - think £900 and above.

However, if you are looking for something a little more affordable then the iBasso range is interesting.

This company makes a variety of products, including high-resolution digital audio players (DAPs), cables, interconnects and a range of headphones. The latest to join their line-up is the new IT01S, an IEM



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that retails for £89.99 but contains some interesting features.

Unboxing the IT01S I found they have a sturdy feel, using a well-designed metal shell that fits well into the ear – thanks to a supplied range of various tips.

The dynamic driver uses a customised magnet to drive

the diaphragm while there are Dual Helmholtz resonator drivers to provide clear bass. The multi-layered main diaphragm is made of Graphene – a form of carbon consisting of planar sheets with the atoms arranged in a honeycomb shaped lattice. This is a recent innovation and an advanced materials technology.

iBasso says Graphene has a breaking strength 100 times greater than steel – and adds that its other benefits include ultra thinness (one atom!), extreme speed and low distortion of sound waves – all of which work well for audio reproduction.

Connection to the 'phones is via a standard MMCX cable which is supplied but you can always swap it out if desired. Being a handy 1.25 metres long, whatever player you are using can sit in a pocket, bag or handbag and be accessible.

SOUND QUALITY

After a period of experimentation with the various ear buds – eventually deciding on the middle size – I plugged the iBassos into a variety of players including an Astell&Kern AK-120, FiiO X5 and an iPhone 8.

The sound quality on offer was immediately striking. These are IEMs (in-ear monitors) that manage to deliver a great amount of detail whilst sounding natural and smooth at the same time.

Playing Bob Marley's 'No Woman No Cry' on 'Live' via the FiiO, his voice sounded pristine and full of emotion. Behind him the Wailers were all of a part – organ, guitar and drums falling into their own space. The only thing I missed was some bass presence. But this album isn't



The iBasso IT01S has a study steel headshell plus an array of accessories.

the best recording in the world and does lack a little in terms of absolute bass resolution.

So I switched to something a little more testing with The Chemical Brothers' 'Block Rockin' Beats'. Now I could hear a deep and weighty low-end; it was agile enough to push the music along with real pace.

Most impressive was how balanced the IT01S sounded. They have the ability to show the

an obvious difference, the Nobles bringing greater presence and a more 'live' feel to the performance, but the iBassos were not that far behind overall.

The more I listened the more I became enamoured with the iBassos. On REM's 'Losing My Religion' they punched out the rhythm with a strikingly good sense of timing. Michael Stipe's vocals – that on other headphones can sound a little bright

"With Bob Marley's 'No Woman No Cry' from the FiiO, his voice sounded pristine and full of emotion"

difference between players. For example, playing the same Chemical Brothers' track on the Astell&Kern AK-120 brought out extra punch and power – something this player is famous for. Whilst there was a solid low-end from the iBassos, they retained a sense of smoothness. The track drove into my ears but even with the volume turned up never sounded out of control.

There is an innate rightness about iBasso's new graphite driver. You do not get strikingly bright high frequencies nor an overwhelming thump, thump, thump from the bass. Instead they come over as integrated and all of a whole.

Listening to Arvo Part's 'Tabula Rasa' (24/96) the violin had excellent leading edges and decay while Keith Jarrett's piano was strikingly vibrant. When I played the track through my reference Noble 10s there was

and jarring – were in this case refined and melodic. Not once did I get the impression that the iBassos were forcing the music at me, more that they were letting the music flow in a natural way.

Those who prefer their in-ear monitors provide sparkling high frequencies or a pumped-up bass may not initially be impressed by the IT01S. But for others who want subtly accurate reproduction of music they are just the thing. Very little is added and very little taken away – which is the way things should be.

CONCLUSION

It's impossible not to like iBasso's IT01S. They are crisp but ally that to good sense of scale and clear low-end presence – plus a sense of subtle smoothness. For just under £90 these IEMs are excellent value.

iBASSO IT01S
£89.99



OUTSTANDING - amongst the best

VALUE - keenly priced

VERDICT

A superb pair of in-ear monitors that boast great construction allied to a smooth sound.

FOR

- smooth sounding
- build quality
- detachable MMCX cable

AGAINST

- Won't appeal to fans of bass-heavy music

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NEIL SEDAKA

Breaking Up is Hard To Do
Jasmine

A multi-talented guy, you can't deny it. He sang, he played piano, he wrote songs for himself and for others – and he even had two careers.

Even before Sadaka enjoyed his own hit singles, he was penning hits for others. For example, he co-wrote 'Stupid Cupid' for Connie Francis. Not bad for a nineteen year old. He would go on to write for the likes of Patsy Cline, Rosemary Clooney, Bobby Darin, Neil Diamond, the Monkees, Cliff Richard, Wilson Pickett, Vic Damone, Glen Campbell, the Carpenters, Cher, Sheryl Crow, Elvis Presley and Andy Williams. And that's a severely edited list, let me tell you.

In 1958, Sedaka was busy writing songs from an office in the famous Brill Building in Manhattan with his friend Howard Greenfield when he decided to audition for RCA/Victor. He had a hit with the single 'The Diary' (co-written

with Greenfield and present on this CD, reaching No.14 in the charts) but failed with 'I Go Ape' (also on this CD, it did well in the UK though) and 'Crying My Heart Out for You' which died a death (but lived to appear on this CD).

Then he hit pay dirt with 'Oh! Carol', the result of what can only be termed as scientific study. Sedaka at that time took the top three hit singles in the charts, researched the hell out of them and constructed his own song based upon their templates and...bingo! Who says pop is not manufactured?

This quality compilation is subtitled 'The Singles 1957-1962' and so covers this fascinating period, tracking Sedaka as he faltered and reached solo stardom.

Mastering is varied because these are singles, after all, and compression is a regular visitor but the CD remains perfectly listenable.

AUDIOPHILE CD



BREXIT ROCKERS

Gonna Make it Alone
Atomicat

If there is one organisation to take advantage of a fad, fashion or controversy then it's a record label. They've been doing it for years. And they're doing it now. Although I wondered what took them so long?

With two currently familiar UK political figures on the front sleeve, this compilation of classic music is a heady theme to political torment, tantrums and tears. So you get Jerry Bryan and the Houndogs with 'I'm Walking Out On You', Big John Greer and 'Your Cash Ain't Nothing But Trash' and Norman Bullock with the Southerneers and 'Lies, Lies, Lies'. You get the picture don't you?

If not, then I'm sure you will with Skeets McDonald and 'Don't Push Me Too Far', The Ramblers 'I Don't Need You No More' and Sheree Scott with 'Easy Payments'.

You can tell the quality of the production, the mastering and the

content because the music stems back to talents of the Bear Family in Germany, so this is a disc to trust on those terms.

The music is top notch though, with plenty of rarities (twenty-four tracks populate this disc) and little known or little heard rock'n'roll and R'n'B goodies. Energy exudes on this CD with plenty of aggression, passion and guts flowing through the speakers, blending little known artists with larger star names such as Tommy Steele, George Jones, Humphrey Lyttleton, Billy Fury and Dion.

Mastering has obviously received some thought because I was often impressed by the breadth of the soundstage from these tracks. Compression could be fairly aggressive but this is the nature of the time and the singles format. That said, the mastering retains an admirable level of air and space so that detail is available in spades.

Krause was a former manager of the Weavers folk group and producer at

Elektra; he teamed up with Beaver who was a noted jazz musician. Their experiments with electronics included using the things at all, to begin with. Not that many people were at the time. Which is probably why they acted as sales representatives for Moog at one time (Krause sold the first Moogs present in the UK to Beatles' producer, George Martin as well as George Harrison, and introduced the Moog to artists as diverse as Stevie Woodier and Frank Zappa).

This CD collects the duo's second, third and fourth albums onto a 2CD set. 'In A Wild Sanctuary' (1970) features those unique, early synth sounds combined with noodle jazz rhythms, Eastern instruments and blues rock freak outs. Oh and check out the track 'Spaced', an early ambient venture.

'Gandharva' (1971) was recorded in San Francisco's Grace

Cathedral, so you can imagine the reverb naturally flowing all around. Jazz legend Gerry Mulligan is present on this one while the organic instruments of cathedral pipe organ, Gail Laughton playing two harps at once and Mulligan himself tends to steal the limelight.

'All Good Men' (1972) was the pair's final collaboration. The stand-out track is 'Legend Days Are Over' which begins with a lamenting Native American Indian, transforms the voice into a heavily treated synth effect and tribal drums that add an insistent rhythm only to return once more to spoken voice.

This is an interesting and varied collection of music. Possibly not as innovative as you might expect but certainly worthy of attention and of a place in a grand synth history mural.

As for the mastering? Very nice indeed. Restrained, open, informative with plenty of clarity to add a rich palette of tonal information to the soundstage.



BEAVER & KRAUSE

In A Wild Sanctuary/Gandharva/All Good Men
Righteous

AUDIOPHILE CD

As the subtitle says, this is a selection of 'Rock'n'Glam (and a Flavour of Bubblegum) from the '70s'. Spread over three discs, it features a host of rarities. As compiler Phil King explains these were "...assorted - and, for the small part, effete - losers and bruisers [who] fell between the grooves of the self-same vinyl they created. They probably recognised themselves in fellow Denmark Street duckers and divers like David Bowie, Marc Boban and Elton John, reasoning that if they decorated their songs in tinsel and tat they might become pop stars too".

That's all you need to know about this set except that it's spread over three discs. Apart from Iggy & The Stooges, Mott The Hoople and Be-Bop Deluxe, most artists are obscure or have a fame association such as ex-Spider From Mars Woody Woodmansey's U-Boat and 'Star Machine'. My old Record Collector

editor, Alan Lewis, then editor of music mag, Sounds, said they looked like "...the Glitter Band in mourning".

Actually, what was left of the Spiders From Mars (after Bowie sacked them) appear here too with 'White Man, Black Man'.

Then there were Bay City Roller wannabees, Bilbo Baggins from Edinburgh with 'Saturday Night' - but they shared a manager with the Rollers so it never really worked out. The band turned punk in 1978 then tried to reform in 2004 but the Tolkein estate put a stop to that.

Mastering takes note of the original compression but manages to ride the punches so the music doesn't sound too aggressive in sonic terms. Only musically.

Packed with great songs, better stories and the sort of crazy optimistic innocence previously only conceived by a young Judy Garland and Mickey Rooney in the 'Andy Hardy' films, this is a stunning box set.



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"Hiss – obvious hiss. It comes from the MM cartridge hissing away"



Noel Keywood

The pickup cartridge is an archaic device that works on very simple principles: no laser scanned discs with pits here, nor a Flash Memory drive loaded with ones and zeros. Just a magnet and some wire.

But I think the pickup cartridge is slightly more cosmic than most people realise. It has extraordinary ability – but getting the best from it is a bit of a wrestling match, especially when we're talking about expensive moving coil cartridges. As we review ever more sophisticated record decks like SME's Synergy that I cover this month, here are some of the issues that confound even the hi-fi business.

Mainly: noise. Cosmic noise, noise that affects digital and limits its dynamic range. Noise also affects analogue and pickup cartridges in exactly the same way. And never explained or appreciated is that cartridges produce noise.

You won't find cartridge manufacturers quoting Dynamic Range for their cartridges for example, in the way that nowadays all DAC manufacturers must do: I'm talking Texas Instruments, ESS, Crystal Semi et al here. Because pickup cartridges are seemingly archaic – funny things with needles little different to what grandad used – nobody thinks about them as simple electrical generators for modelling purposes; they have dynamic range – just like a silicon chip.

Two things alerted me, long ago, to this. One was a small book called *Pickups: the Key to Hi-Fi*, by Walton. It quoted the amplitudes and accelerations involved and all the intricacies of what was going on at a fundamental engineering level in the pickup cartridge.

The other to stay in my head was the assertion that cartridges produce

noise, in an article within an Audio Engineering Society (AES) magazine. This seemed odd: wire doesn't produce noise does it? So surely a pickup cartridge can't produce noise, like a valve, transistor or silicon chip?

Turns out it can and does. Wire produces electrical noise, all on its own without any help or outside intervention. And here's where we get a tad cosmic. The noise is heard as hiss and it is generated by atomic movement. But, being related only to the d.c. resistance of a piece of wire you get little noise from a moving coil cartridge, because there's little wire inside. But you get lots of it from a moving magnet cartridge because it has lots of wire in big signal coils. Yep – they are distinctly different to each other in this important regard, yet the subject remains unspoken about.

Here's the rub. Turning up volume on your amplifier with a budget turntable fitted with an MM cartridge you will hear hiss, quite obvious hiss. But it doesn't come from your amplifier, it comes from the MM cartridge hissing away. A moving magnet cartridge produces more hiss than today's low noise silicon chips so no point in even trying to get noise down in the amplifier.

With moving coils the situation is reversed: they produce so little hiss it's a struggle to get any electronic circuit quiet enough not to impose itself.

If you want to look at the figures go to www.sengpielaudio.com/calculator-noise where you can plug in the values: 10 Ohms for moving coil and 1000 Ohms for moving magnet. The dBV figure is against a 1V reference; I have used 5mV for MM and 0.5mV for MC as reference outputs to adjust the figures. When you compensate for 20dB difference in output it turns out both have a 79dB dynamic range.

But at least we've now got a dynamic range value and can see that it is high if apparently not as high as CD at 103dB or thereabouts – and nowhere near an ESS ES9018 DAC chip, nor a Chord Electronics WTA DAC, both of which manage 120dB minimum. Wrong!

Yes, I am wrong and we can upgrade our archaic device quite easily, to probably around 90-95dB or better. The reason is that industry standard dynamic range values are IEC A weighted and the calculated hiss values are not. Adding weighting would substantially lower hiss and raise dynamic range close to that of CD.

Interesting huh? What grandad was using, it turns out, is close to digital in modern day terms: meaning dynamic range. This is purely the dynamic range of a cartridge as a transducer: vinyl is noisy, but then so are analogue and digital recordings, if for differing reasons.

But I have a card up my sleeve in favour of the moving coil. It's output can be increased by the use of an output transformer – something you see in our SME Synergy turntable this month. Providing the transformer's noise can be kept down (they are noisy too) then the moving coil cartridge gains dynamic range. Where I always hear hiss from a moving magnet cartridge when turning volume up, moving coils are hiss free providing a decent transformer is used with them. And I always use MCs with a transformer: this is the only way to hear what they can do.

All of which helps explain why moving coil cartridges are accepted – as group wisdom – to sound better. And also why underlying performance figures are far better than even the industry itself seems to realise. If you want to go MC for LP: think transformer, as in SME's Synergy. ●

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"As suddenly as it had appeared, the NWOBHM genre started to die"



Paul Rigby

After an influx of recently arrived vinyl I was reminded about a quint-essentially English music genre that landed within the musical firmament during the late-70s and arose as a response to the death of the first wave of prog and the rise of punk. It also emerged to counter the faltering of established rock music, with its rather excessive and slightly pretentious approach: just look at those self-indulgent guitar solos as evidence. Oh and let's not forget the never-ending drum solos. Nowadays, half the concert audience would have seen this as an ideal opportunity to check their mail and messages on their phones.

To younger rock fans and budding new musicians there just had to be something done about this. 'Something', in fact, was.

And it was given a name too.

In typical cack-handed fashion – because we English are terribly poor at creating snappy names and labels for things – our American friends do this sort of thing much better – the blossoming movement was called New Wave Of British Heavy Metal.

In many ways, the scene was a cousin of punk. NWOBHM (could an acronym be more clunky?) rediscovered the vivacious energy of rock music.

The new musicians received influences from certain bands. AC/DC was one, so was Judas Priest – but also Nazareth. I've just received a host of vinyl from this under-rated group that includes some of their best music: 'Razamanaz' (1973), 'Loud'n'Proud' (1973) – that was a busy year – then 'Rampant' (1974), 'Hair of the Dog' (1975), 'Expect No Mercy' (1977) and 'No Mean City' (1978). All were released during the run up and emergence of punk and NWOBHM.

Nazareth acted as an influence for a range of NWOBHM groups. Robb Weir, bassist for Tygers Of Pan Tang commented "I first started going to concerts in 1974. I remember watching Nazareth and they really started me thinking..."

The NWOBHM rock bands also took note of punk and infused it into their own style. Some musicians didn't even realise that fact. It would only hit them later, upon reflection.

The problem with the changing of the old rock guard and the growing influence of punk was the initially detrimental effect it had on the NWOBHM cause. Most record labels jumped on the punk bandwagon and simultaneously barged NWOBHM bands out of the way in their rush to sign up the latest gob-spewing 'erbert.

Yet, in an odd way, being forced into the shadows was the best thing that the NWOBHM bands could have experienced (not they would have appreciated the fact at the time). Why? Because the swathe of new rock bands were relegated to pubs and clubs to play their music and practice, practice, practice. That included future stars such as Iron Maiden, Tygers Of Pan Tang, Def Leppard, Samson and more.

This is also why you began to see the self-same rock bands paying further attention to the punk scene and adopting similar marketing methods by issuing their own independent releases. Def Leppard did that when they released 1,000 copies of their self-titled EP, while Iron Maiden's 'Soundhouse Tapes' also emerged in limited numbers.

The music press did a lot to create a groundswell of interest in the NWOBHM bands. The paper Sounds was a big supporter (it was this publication that coined the title, New Wave Of British Heavy Metal), as was radio and specialist shows

such as Radio 1's The Friday Rock Show. BBC's Rock Show presenter Tommy Vance also spread the word.

It was in 1979 that New Wave Of British Heavy Metal really caught fire with a record label scramble to sign artists. While Donington's Monsters Of Rock festival also hit in mid-1980.

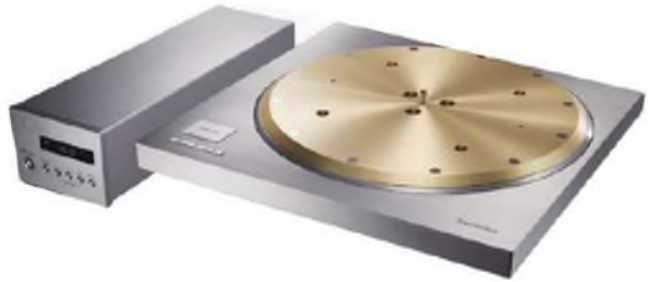
And then, as suddenly as it had appeared, the genre started to die in 1982 with a select few bands forging a career beyond that point. The reasons? There were plenty – but most centred around the lack of management support and the lack of support from record labels who slowly pushed a more commercial style onto unwilling bands. Which is why groups like Diamond Head, Praying Mantis and Blitzkrieg collapsed into obscurity after a promising start.

From the end sprang many new beginnings though, as NWOBHM influenced later arrivals such as Metallica to Megadeth to Anthrax.

To celebrate the genre, a host of NWOBHM rarities were uncovered and released in the appropriately titled 'Jobcentre Rejects: Ultra Rare NWOBHM 1978-1982' (On The Dole; 2019) featuring twelve tracks from bands such as Baseline, Predator, Spider, Stray, Overdrive, The Next Band and Metal Mirror. The original 7" singles were privately released, issued in extremely small quantities and are nowadays highly collectable – some of them fetch sums in the range £400-600 each when (if...) they ever show up on Discogs, eBay or similar. These same bands also suffered through a lack of support. Every single being a 'might have been' or an 'if only'.

Just because it only lasted a few years and has been officially dead and buried for decades, this release just shows how popular NWOBHM remains to this day. ●

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Any great turntable gives you a certain frisson when you hear it. It's that old 'shivers down the spine' feeling, a sense of being let into a world to which you had previously not been privy. This is a remarkable turntable, and arguably the apex of vinyl playback. It's difficult to see how the SP-10R motor unit can be improved upon. It is a definitive statement of engineering prowess, and marks the return of direct drive to the top tier of turntables.

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“The entry-point to good home hi-fi sound has never been so affordable”



Jon Myles

Listening to some of the latest equipment to pass through Hi-Fi World's listening rooms this month one thing immediately sprang to mind – has the price of good-quality components ever offered so much value?

Take, for example, the PSB Alpha 5 standmount loudspeakers I so much enjoyed listening to. A rather unusual – but efficient – design with the tweeter placed below the main mid/bass driver, they are superbly built yet cost just £299 per pair. Put that into context - there are interconnects and loudspeaker cables that can set you back a lot, lot more.

Yet these loudspeakers had detail, a room-filling sound and the ability to get the best out of both CD and high-resolution tracks for what can only be described as a bargain-basement price. Go back a mere five years and you'd be hard-pressed to find a pair of loudspeakers with the same ability for the price – in fact they may well have cost more in terms of what you are getting here.

Then there's the new Audiolab 8300CDQ also reviewed in this month's issue. Here we have a CD player, digital-to-audio converter, pre-amplifier and headphone amplifier as well. All this in one box for less than £1,100. It comes equipped with an ESS Sabre DAC – one of the best around to my ears – and no less than seven digital filters for tailoring the sound to your individual taste.

Pair this with the PSB loudspeakers and a mid-priced amplifier and suddenly you'll have a fully-fledged and impressive-sounding hi-fi system for less than £2,500 including associated cables.

When you consider that an Android mobile or iPhone with a pair of in-ear headphone monitors

can set you back around the same price, or often quite a bit more, then it's obvious we may be getting better value from our hi-fi than ever before.

So how has this all come about? Well, for a start, the price of cabinet construction has come down due to manufacturers being able to source suppliers from across the world. In terms of components such as the Audiolab the cost of the internal circuitry has also lessened as they are built in significant quantities using automated manufacturing in China.

But there is more to it than that. Just because something is cheap and readily available at a decent price does not mean that the whole package will come together with quality. There are many examples of low-priced loudspeakers and sources sounding, well, not quite up to the mark.

Which is where the Audiolab and PSB loudspeakers show their mettle. They both do their job with a value-for-money quotient that belies the price. The main reason is that they have both been superbly designed which is where the art of a good engineer (be it digital, loudspeaker or turntable) comes in.

Let's put this into context. Give someone unlimited money and the best materials and electronic components available and the chances are – if they know what they are doing – they will come up with a killer design that, in terms of sound quality and measurements, will take your breath away.

But would we be able to afford this wonder-product? The chances are probably not, unless you have been lucky enough to win the EuroMillions lottery or happen to enjoy a large inheritance. Which is why the likes of the Audiolab and PSB loudspeakers will always appeal to me. And, they are not the only examples. There are plenty

of loudspeakers and electronic components out there that offer more than you might expect for the money.

They are affordable items which allow us all to get the best out of our music collections without breaking the bank. There's a certain sense of great engineering and thought put into achieving that and it should be admired and celebrated.

Of course, as a hi-fi reviewer I'm always looking to discover new equipment and components that can bring out a better experience from my various sources of music. That is one of the many pleasures of doing this job. Give me the choice and time and I could happily spend a good few weeks working on assembling the best set of components I can fit in my listening room.

Yet, I also love to enjoy the fact that for newcomers to this hobby (well, let's call it a passion!) it's possible to assemble a hi-fi system at a reasonable cost that will just keep bringing you back for more and be a sense of satisfaction for years to come.

As I wrote previously, I once sat my brother down in front my home hi-fi to explain my love for the system I was then using. His eyes lit up and a few weeks later he went out to buy his own set of separates – which he still uses and loves to this day. However he has made his own tweaks with new loudspeaker cables and interconnects.

Yet, I have a feeling that the whole package could now be bettered for less money than he paid at the time. Which is why I'm convinced we are getting better value than ever before from our systems – and why the entry-point for sound quality and good value equipment has never been lower. So let's all enjoy it while we can! ●

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"throwing away analogue tapes after transfer to 'perfect' 16-bit digital was not a smart move"



Martin Pipe

In past columns, I've discussed obsolete media – and some of the equipment that can be used to bring it into the digital domain for more convenient enjoyment. If the music in question is commercially-available in a digital format you should buy this instead of digitising yourself, saving time and possibly – hopefully – getting better quality from an original source. But doing it yourself can be instructive – and fun!

Digital audio is at less risk of physical degradation. Tapes – analogue or digital – can shed their oxide and are susceptible to slow corruption by the earth's magnetic field. Vinyl records are prone to scratches, vulnerable to dust and will wear out just a little more with each play. Once in the digital domain, though, originals can be stored until needed again. Best to avoid using lofts and similar environments, unless they've been treated to avoid wild temperature swings between winter freeze and summer heatwave.

If you're planning to keep collections away from home (secure lockers, for example) it's worth asking their operators about temperature and humidity. Nowadays, record companies and major broadcasters like the BBC hold their valuable archives in expensively-controlled environments. Why retain them? They learned the hard way that throwing away analogue tapes, after transferring them to 'perfect' 16-bit digital, was not a smart move...

Digital audio files, sourced from records and tapes, can be copied from one digital medium to another with no quality loss. The destination media could be the internal memory of a solid-state player, or a USB Flash Memory drive. Or it could be another computer; regularly backing-up is a sensible precaution,

as hard drives and flash memory can fail.

Media also becomes obsolete, as those of you with documents stored on floppy disks may know to your frustration. Periodically migrating important data from an obsolete format to a newer one, using a computer intermediary that supports both, is always a good idea. Backing up music on a computer drive to a collection of labelled external Flash memory drives is a reasonably assured approach, since Flash Memory degrades and fails according to the number of write operations so it should last forever when written once for storage purposes.

If you're using a computer, I can thoroughly-recommend free Audacity recording/editing software. It's a comprehensive and powerful programme that takes a little learning if you've never used an audio editor before, but its on-line help is both extensive and succinct; I'd suggest you read the beginners section at least.

From Audacity you can select the appropriate soundcard input and configure the recording parameters when making a digital transfer, sticking with sample rate and resolution of the original e.g. 16-bit and 44.1kHz or 48kHz for DAT.

Start Audacity recording just before the desired music begins – stop shortly after it concludes, to avoid wasting hard-drive space. Audacity will allow you to trim any superfluous material from the end and the beginning of your recording, which appears on the computer monitor as separate left/right waveforms.

You can normalise levels to avoid audible jumps relative to other tracks in your collection. This process amplifies the captured audio so that the loudest peaks occur at a

level you specify (I use -2dB as this provides a little headroom).

Audacity tells you how much gain is needed to achieve this before the operation is carried out; if it's less than 1dB, then there's no point in carrying out the process!

Once you've normalised levels the result can be saved to the file format of your choice. FLAC is in my view the best choice, as it's lossless – file sizes are roughly half that of the raw PCM data (WAV, Aiff) captured by Audacity during the recording process. Flac also carries meta-data. Or if space is no problem simply stick to basic WAV that can also have an appended meta-data file, even it wasn't originally specified and may be missing. Audacity allows one to be edited and appended as an option at the end of the export process.

Once you have compiled a basic library with Audacity can also compile a secondary compressed library for portable phone since it gives a vast array of export possibilities, such as MP3 or WMA.

If you have captured an entire album's worth of material in one pass, you can see where individual tracks begin and end. They can be removed (cut) and saved individually with appropriate track names.

DATs can be problematic, and I've had to cut and paste from several 'takes' in order to achieve an acceptable transfer. It's all a lot of fun, but if a mistake is made you can always undo and try again!

Using a solid-state recorder? Audacity will import its recordings, if your computer can recognise the media. In a Mac don't forget to check the AudioMidi utility hidden away in the Utilities folder, which operates in conjunction with the Control Panel's Sound function and is where sample rate and bit depth are set. ●

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"This is a deliberate ploy of designed in obsolescence"



Dave Tutt

Think I should tell you a little something about a device that is used in most products that have a sizeable digital architecture inherent in their design. This is an obscure item that, without its arrival, we would probably still be perfectly OK, although our 'phones might have been a cm or two thicker. However, it has problems that I bump into when repairing modern products. It is called a ball grid array (BGA).

A BGA is a clever way of mounting today's big chips so that their massive array of inputs and outputs can be electrically accessed. It gets its name from an array of solder balls that melt when heated to mate with the chip. It's all done by machines.

Now a BGA should be quite a reliable device. It is solid in that it doesn't have wires coming out of the sides so there are no soldering issues on the edge. This means shorter path lengths to some extent so there is an advantage here too. Where are the connections? Underneath!

Where are BGAs used? Well, your phone for a start. Your laptop, the motherboard if you have a tower PC, your printer, your multimedia receiver, anything that connects to the internet – be it wirelessly or wired, probably your microwave oven control circuits, your washing machine and its programmer, indeed all sorts of electronic devices have them.

And what about your DVD player or perhaps TV? Well your TV has them at the core of its operation. If you want to see what happens when they fail then just drop onto eBay and check out the faulty TVs. If the display hasn't been physically broken the odd display

effects are all due to issues with the BGA on the main board and there is no way they can be fixed.

Now these chips are not all the same. They are custom designed and developed largely on the other side of the world – Far East – and made for the specific purpose of the product. So the big one in your TV might include analog to digital conversion, for Scart or phono inputs, digital processing and switching for the HDMI, switching and processing for USB and VGA interfaces, Common Interface support, and a dedicated processor to provide all the control functions, screen displays, tuning and storing all your faves and functions. There will be at least two others in your TV directly associated with the display itself.

As a result of all this activity BGAs get hot, very hot. As we know things expand when they get hot and different materials expand differently. So the BGA made from a copper or aluminium substrate with the silicon die probably containing in excess of 20 million transistors glued to it and the connection plate assembled into a sandwich that might be 4mm – 6mm high. Connecting the chip to the printed circuit board (PCB) is done with solder paste screen printed over the connections and then activated to form a solder joint with Infrared and the joints tested / visibly inspected using X-rays.

So our rigid chip is now stuck to the PCB which will have a totally different thermal expansion factor. Of course your manufacturer doesn't want to add a heat sink. It costs money, takes up space, but worse it may mean your wafer thin TV might have to be 4mm thicker! Oh the shame of it!

So what happens then? Well, it

is doubtful that the BGA itself fails although no matter what, it would be almost impossible to test it. The real issue with the combination of BGA and PCB is that they separate, usually just on a few connections of the hundreds – but enough to stop the functions of various aspects of the device. So your multimedia device might no longer process surround 7.1 or be happy with your USB stick or Bluetooth. Or as a defining issue the display on your TV splits in half or goes black and white in the top half.

You would perhaps have thought this is an easy fix as it's just something failed somewhere. With these sorts of jungle chips everything is in perhaps one or two devices on a board and there is no way to remove or replace them. Only the board itself can be swapped and even that is doubtful as there might be no spares available.

Worse actually is that the few boards that do appear are likely to be ripped from old units and sold as tested and working – perhaps.

This is a deliberate ploy of designed in obsolescence to ensure your broken device goes straight to the recycling pile and you dash back to the shop for a new one. Turnover is the key to their business model so why not use not only the latest technology but also something that can only be termed as having a short life?

In the repair business we cannot do anything about these faults. Worse, as equipment gets ever more complicated it is less and less likely that the fault is actually something worth even taking the lid off. It is a shame that manufacturers don't think about the green issues of what they do. We cannot go on throwing electronics away indefinitely. Or are we expected to? ●

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We do not sell these products. It is for your information only.

WORLD CLASSICS

Here is our list of the great and good from audio's glorious past, products that have earned their place in hi-fi history. You'll also see some oddities which aren't classic as such, but are great used buys. The year of introduction is given, alongside the original UK launch price.

TURNTABLES

EAT FORTE 2009 £12,500
Lavishly finished two box, two motor turntable with gorgeous Ikeda 407 tonearm bundled. Exceptionally stable and unfussy performer with a relaxed but highly enjoyable gait.



FUNK FIRM VECTOR II 2009 £860
Innovative engineering gives a nimble, pacey and musical sound that's one of the best at the price.

REGA P2 2008 £300
Excellent value for money engineering, easy set up and fine sound.

MCINTOSH MT10 2008 £8,995
Big, expensive, controversially styled and gives more than some might consider necessary, but an astonishingly good performer.

REGA P3-24 2008 £405
Seminal affordable audiophile deck with fine bundled tonearm. Tweakable, and really sings with optional £150 outboard power supply.

ACOUSTIC SOLID ONE 2007 £4,050
Huge turntable, both in terms of sheer mass and sonic dynamics. Fit up to three arms and enjoy, just don't damage your back moving it...

AVID VOLVERE SEQUEL 2007 £4,600
Stylish high end vinyl spinner with industrial strength build quality and a sound to match. Sound is edge-of-the-seat stuff.

MICHELL GYRODEC SE 2005 £1,115
Design icon with superlative build. Sound is beautifully smooth, effortless and exceptionally expensive.

MARANTZ TT-15S1 2005 £1,299
Cracking all in one deck/arm/cartridge combination, this must surely be the best sound/plug and play package at this price point.

MICHELL TECNODEC 2003 £579
Superb introduction to Michell turntables - on a budget. Top quality build and elegant design mean it's still the class of the mid-price field.



MICHELL ORBE 1995 £2,500
The top Michell disc spinner remains a superbly capable all rounder with powerful, spacious sound that's delicate and beguiling.

SME MODEL 10A 1995 £4,700
Exquisitely engineered deck and SME V tonearm combo that's an extremely accomplished performer with classical music.

LINN AXIS 1987 £253
Cut-price version of the Sondek with LVX arm. Elegant and decently performing package. Later version with Akto tonearm better.

ROKSAN XERXES 1984 £550
Super tight and clean sound, with excellent transients. Less musical than the Sondek, but more neutral. Sagging plinth top-plates make them a dubious used buy.

DUAL CS505 1982 £75
Simple high quality engineering and a respectable low mass tonearm made for a brilliant budget buy. Polished, smooth and slightly bland sound.

MICHELL GYRODEC 1981 £599
Thanks to its stunning visuals, this bold design wasn't accorded the respect it deserved. Clean, solid and architectural sound.

TOWNSHEND ROCK 1979 £ N/A
Novel machine has extremely clean and fluid sound. Substantially modified through the years, and capable of superb results even today.

MARANTZ TT1000 1978 £ N/A
Beautiful seventies high end belt drive with sweet and clean sound. Rare in Europe, but big in Japan.



REGA PLANAR 3 1978 £79
Brilliantly simple but clean and musical performer, complete with Acos-derived S-shaped tonearm. 1983 saw the arrival of the RB300, which added detail at the expense of warmth. Superb budget buy.

SONY PS-B80 1978 £800
First outing for Sony's impressive 'Biotracer' electronic tonearm. Built like a tank with a clean and tidy sound, albeit lacking involvement. Scarily complicated and with no spares support - buy with caution!

TRIO LO-7D 1978 £600
The best 'all-in-one' turntable package ever made. Clean, powerful and three-dimensional sound, ultimately limited by the tonearm.

ADC ACCUTRAC 4000 1976 £300
Bonkers 1970s direct drive that uses an infra red beam to allow track selection and programming. More of a visual and operational delight than a sonic stunner.

PIONEER PLC-590 1976 £600
Sturdy and competent motor unit that performs well with a wide range of tonearms. Check very thoroughly before buying due to electronic complexity and use of some now-obsolete ICs.

PIONEER PL12D 1973 £36
When vinyl was the leading source, this bought new standards of noise performance and stability to the class, plus a low friction S-shaped tonearm. Later PL112D was off the pace compared to rivals.



TECHNICS SP10 1973 £400
Seminal Japanese engineering. Sonics depend on plinths, but a well mounted SP10/II will give any modern a hard time, especially in respect of bass power and midband accuracy.

LINN SONDEK LP12 1973 £86
For many, the Brit superdeck; constant mods meant that early ones sound warmer and more lyrical than modern versions. Recent 'SE' mods have brought it into the 21st century, albeit at a price.

ARISTON RD11S 1972 £94
Modern evolution of Thorens' original belt drive paradigm, Scotland's original super-deck was warm and musical, albeit soft. Still capable of fine results today.

GOLDRING LENCO GL75 1970 £15.6S
Simple, well engineered motor unit with soft, sweet sound and reasonable tonearm. Good spares and servicing support even today.

GARRARD 301/401 1953 £19
Tremendously strong and articulate with only a veiled treble to let it down.



THORENS TD124 1959 £ N/A
The template for virtually every 1970s 'superdeck', this iconic design was the only real competition for Garrard's 301. It was sweeter and more lyrical, yet lighter and less impactful in the bass.

TONEARMS

REGA RB251 2009 £136
Capable way past its price point, the new 3-point mount version of the classic RB250 serves up a taut and detailed sound. A little lean for some tastes, but responds well to rewiring and counter-weight modification.

HELIUS OMEGA 2008 £1,595
Stylish and solid lump of arm with fabulous build quality, that turns in a dynamic and weighty performance.

AUDIO ORIGAMI PU7 2007 £1,300
The classic Syrinx PU3 updated to spectacular effect. Hand made to order, with any mass, length and colour you care for. Fit, finish and sound truly impressive.



GRAHAM PHANTOM 2006 £3,160
Sonically stunning arm with magnificent bass dexterity and soundstaging. Build quality up to SME standards, which is really saying something!

TRI-PLANAR PRECISION 2006 £3,600
Immaculate build, exquisite design and one of the most naturally musical and lucid sounds around.

MICHELL TECNOARM A 2003 £442
Clever reworking of the Rega theme, using blasting, drilling and rewiring!

SME 309 1989 £767
Mid-price SME comes complete with cost-cut aluminium armtube and detachable headshell. Tight, neutral sound with good tonality, but lacks the IV's pace and precision.

NAIM ARO 1987 £1,425
Charismatic unipivot is poor at frequency extremes but sublime in the midband; truly emotive and insightful.

SME SERIES V 1987 £2,390
Vice-like bass with incredible weight, ultra clear midband and treble astound, although some don't like its matter of factness!

NAIM ARO 1986 £875
Truly endearing and charismatic performer - wonderfully engaging mid-band makes up for softened frequency extremes.



ALPHASON HR100S 1981 £150
First class arm, practically up to present-day standards. Buy carefully, though, as there is no service available now. Totally under priced when new, exceptional.

SME SERIES III 1979 £113
Clever variable mass design complete with Titanium Nitride tube tried to be all things to all men, and failed. Charming nonetheless, with a warm and inoffensive sound.

TECHNICS EPA-501 1979 £ N/A
Popular partner for late seventies Technics motor units. Nice build and Titanium Nitride tube can't compensate for middling sound.

LINN ITTOK LVII 1978 £253
Japanese design to Linn specs made for a musical, rhythmic sound with real dynamics. The final LVIII version worth seeking out.

AUDIO TECHNICA AT 1120 1978 £75
Fine finish can't compensate for this ultra low mass arm's limited sonics - a good starter arm if you've only got a few quid to spend.

HADCOCK GH228 1976 £46
Evergreen unipivot with lovely sweet, fluid sound. Excellent service backup.

ACOS LUSTRE GST-1 1975 £46
The archetypal S-shaped seventies arm; good, propulsive and involving sound in its day, but ragged and undynamic now.

SME 3009 1959 £18
Once state of the art, but long since bettered. Musical enough, but weak at frequency extremes and veiled in the midband. Legendary serviceability and stunning build has made it a cult, used prices unjustifiably high.

PHONO STAGES

CREEK OBH-8 SE 1996 £180
Punchy, rhythmic character with oodles of detail makes this a great budget audiophile classic. Partner with a Goldring G1042 for an unbeatable budget combination.

MICHELL ISO 1988 £ N/A
This Tom Evans-designed black box started the trend for high performance offboard phono stages. Charismatic, musical and punchy - if lacking in finesse.



LINN LINNK 1984 £149
Naim-designed MC phono stage built to partner the original Naim NAIT - yes, really! Fine sound, although off the pace these days.

INTEGRATED AMPLIFIERS

NAIM NAIT XS 2009 £1,250
With much of the sound of the Supernait at half the price, this is powerful, articulate and smooth beyond class expectations.

MUSICAL FIDELITY PRIMO 2009 £7,900
Seriously expensive, but one listen explains why. Wonderfully exuberant sound that can only come from a top quality tube design.

SUGDEN A21A S2 2008 £1,469
Crystalline clarity, dizzying speed and forensic detailing. Power limited so needs sensitive speakers.

CREEK OBH-22 2008 £350
Brilliant value budget passive, with remote control, mute and input switching, plus an easy, a neutral sound.

CAMBRIDGE 840A V2 2007 £750
Version 2 addresses version 1's weaknesses to turn in a mightily accomplished performance, offering power, finesse and detail.

SUGDEN IA4 2007 £3,650
Goodly amount of Class A power, icy clarity and a breathtakingly fast, musical sound make this one of the very best super-integrateds.

NUFORCE P-9 2007 £2,200
Impressive two box preamp with superb resolution and an engaging sound.

MELODY PURE BLACK 101D 2007 £3,295
The clarity and openness of valves plus firm grip and fine detail make this a preamplifier masterclass.

AUDIOLAB 8000S 2006 £400
In another life, this sold for three times the price, making it a stand-out bargain now. Very clean, powerful and tidy sound.

MCINTOSH MA6800 1995 £3735
Effortlessly sweet, strong and powerful with seminal styling to match.

DELTEC 1987 £1900
Fast, dry and with excellent transients, this first DPA integrated is the real deal for eighties obsessives. Ridiculously punchy 80W per channel from a tiny, half-size box. Radical, cool and more than a little strange.

EXPOSURE VII/VIII 1985 £625
Seminal pre-power, offering most of what Naim amps did with just that little bit extra smoothness. Lean, punchy and musical.



AUDIOLAB 8000A 1985 £495
Smooth integrated with clean MM/MC phono stage and huge feature count. Extremely reliable, too. Post '93 versions a top used buy.

VTL MINIMAL/50W MONOBLOCK 1985 £1,300
Rugged, professional build and finish allied to a lively and punchy sound (albeit with limited power) make them an excellent used buy.

MUSICAL FIDELITY A1 1985 £350
Beguiling Class A integrated with exquisite styling. Questionable reliability.

MISSION CYRUS 2 1984 £299
Classic 1980s minimalism combines arresting styling with clean, open, lively sound. Further upgradeable with PSX power supply.



NAIM NAIT 1984 £350
Superb rhythms and dynamics make it truly musical, but tonally monochromatic. Fine phono stage, very low power.

CREEK CAS4040 1983 £150
More musical than any budget amp before it; CAS4140 loses tone controls, gains grip.

MYST TMA3 1983 £300
Madcap eighties minimalism, but a strong and tight performer all the same.

ROTEL RA-820BX 1983 £139

Lively and clean budget integrated that arguably started the move to minimalism.

NAD 3020 1979 £69

Brilliantly smooth, sweet and punchy at the price and even has a better phono stage than you'd expect. The archetypal budget super-amp.

ROGERS A75 1978 £220

Lots of sensible facilities, a goodly power output and nice sound in one box. The later A75II and A100 versions offered improved sonics and were seriously sweet.

A&R A60 1977 £115

Sweet and musical feature-packed integrated; the Audiolab 8000A remains a classic.



SUGDEN C51/P51 1976 £130

Soft sounding early Sugden combo with a plethora of facilities and filters. A sweet and endearing performer but lacking in power and poor load driving ability.

SUGDEN A21 1969 £ N/A

Class A transistor integrated with an eminently likeable smoothness and musicality. Limited inputs via DIN sockets.

ROGERS CADET III 1965 £34

Sweet sounding valve integrated, uses ECL86 output valves, even has a half useable phono stage, sweet, warm a good introduction to valves

CHAPMAN 305 1960 £40

Smooth pre/power combo with a sweet and open sound. Not quite up to Leak/Quad standards but considerably cheaper secondhand.

POWER AMPLIFIERS

ELECTROCOMPANIET NEMO 2009 £4,995 (EACH)

Norwegian power station as cool as a glacier tonally, yet impresses with sheer physicality and fleetness of foot. 600W per channel.

NUFORCE REFERENCE 9SE V2 2006 £1,750

Brilliant value for money monoblocks with massive power and super-clean, three dimensional sound.

QUAD II-80 2005 £6,000 PER PAIR

Quad's best ever power amplifier. Dramatic performer with silky but dark tonality, blistering dynamics, serious power and compellingly musical sound.



QUAD 909 2001 £900

Current dumper has a smooth and expansive character with enough wallop to drive most loads. Not the most musical, but superb value all the same.

NAIM NAP 500 2000 £17,950

Flagship amplifier will drive just about any speaker with ease. Factor in the company's trademark pace, rhythm and timing and it all adds up to one effortlessly musical package.

MARANTZ MODEL 9 1997 £8000

Authentic reproduction monoblocks still more than cut the sonic mustard. Highly expensive and highly sought after.

MICHELL ALECTO 1997 £1989

Crisp, clean and beautifully controlled with gorgeous styling. Partnered with the £1650 Orca this sounds delicious!



MUSICAL FIDELITY XA200 1996 £1000

200W of sweet smooth transistor stomp in a grooved tube! Under-rated oddity.

PIONEER M-73 1988 £1,200

Monster stomp from this seminal Japanese power amplifier, complete with switchable Class A and Class B operation. Clean, open and assured sounding, albeit a tad behind the pace on high speed dance music. Rosewood side cheeks and black brushed aluminium completes the experience.

KRELL KMA100 II 1987 £5,750

Monoblock version of the giant KSA-100 is one of the seminal 80s transistor power amplifiers. Massive wallop allied to clean and open Class A sound makes this one of the best amplifiers of its type.

RADFORD STA25 RENAISSANCE

1986 £977

This reworking of Radford's original late sixties design was possessed of a wonderfully rich, old school valve sound with enough power (25W) and lots of subtlety.

QUAD 405 1978 £115

The first of the current dumpers is a capable design with smooth, effortless power and a decently musical sound. 606 and 707 continue the theme with greater detail and incision.

HH ELECTRONICS TPA-500 AMPLIFIERS

1973 £110

Simple design with easily available components, solid build quality and fine sound make for a surprisingly overlooked bargain.

LECSO AP1 1973 £ N/A

Madcap cylindrical styling alluded to its 'tower of power' pretensions, but it wasn't. Poor build, but decently clean sounding when working.

QUAD 303 1968 £55

Bullet proof build, but woolly sound. Off the pace, but endearing nonetheless. Some pipe smoking slipper wearers swear by them!

LEAK STEREO 20 1958 £31

Excellent workaday classic valve amplifier with decent power and drive. Surprisingly modern sounding if rebuilt sympathetically. Irrepressibly musical and fluid.



LEAK STEREO 60 1958 £N/A

Leak's biggest valve power amp offers 35 Watts per channel and more low end welly than the smaller Stereo 20. Despite concerns over reliability rarity value means high price.

QUAD II 1952 £22

The all-time classic valve amplifier, with a deliciously fluid and lyrical voice. In other respects though, it sounds hopelessly dated. Low power and hard to partner properly



LEAK POINT ONE, TL10, TL12.1, TL/12 PLUS 1949 £28

Early classics that are getting expensive. Overhauling is de rigueur before use, using original parts if possible. Surprisingly crisp and musical. Deeply impressive in fine fettle.

PRE AMPLIFIERS

AUDIOLAB 8000C 1991 £499

Tonally grey but fine phono input and great facilities make it an excellent general purpose tool.



CROFT MICRO 1986 £150

Budget valve pre-amp with exceptionally transparent performance.

CONRAD JOHNSON

MOTIV MC-8 1986 £2,500

Minimalist FET-based preamplifier is brilliantly neutral and smooth with a spry, light balance in the mould of Sugden. Something of a curio, but worthwhile nonetheless.

AUDIO RESEARCH SP-8 1982 £1,400

Beautifully designed and built high end tube pre-amplifier with deliciously sweet and smooth sound. Not the last word in incision or grip.

LINN LK-1 1986 £499

A brave attempt to bring remote controlled user-friendliness to hair-shirt audiophile hi-fi. Didn't quite work, but not bad for under £100.

NAIM NAC 32.5 1978 £ N/A

Classic high end pre. Brilliantly fast and incisive sound that's a joy with vinyl but a tad forward for digital.

LECSO AC-1 1973 £ N/A

Amazing styling courtesy of Allan Boothroyd can't disguise its rather cloudy sound, but a design classic nonetheless.

QUAD 33 1968 £43

Better than the 22, but Quad's first tranny pre isn't outstanding. Responds well to tweaking/ rebuilding though...



LEAK POINT ONE STEREO 1958 £ N/A

Good for their time, but way off the pace these days. Use of EF86 pentode valve for high gain rules out ultra performance. Not the highest-fil

QUAD 22 1958 £25

The partner to the much vaunted Quad II monoblocks - cloudy and vague sound means it's for anacrophiles only.

LOUDSPEAKERS

WHARFEDALE DIAMOND 10.3 2010 £290
Great small standmounters for audiophiles on a budget; dry punchy sound with impressive sound-staging at the price.



YAMAHA SOAVO 1.1 2009 £3,000
Musical, transparent with impressive dynamics and cohesion. Excellent build and finish.

USHER BE-10 2009 £10,500
Clever high end moving coil design with immense speed and dizzying clarity allied to epic punch. Needs the best ancillaries to fly, though...



SPENDOR A5 2009 £1,695
Multi-talented floorstanders with generous scale and punch and Spendor's classic mid-range detail. Deliver a sound that thoroughly engages whatever you care to play.

MONITOR AUDIO PL100 2008 £2,300
The flagship 'Platinum' series standmounter has a lovely warm and delicate sound with superlative treble.



MARTIN LOGAN SOURCE 2008 £1,600
Brilliant entry level electrostatics, giving a taste of loudspeaker esoterica for the price of most moving coil boxes. Tremendous clarity, evenness and delicacy, although not the world's most powerful sound.

PMC OB11 2008 £2,950
Cleverly updated floorstanders give scale and solidity in slim and well finished package.

ISOPHON GALILEO 2007 £2,100
Big standmounters that really grip the music and offer quite startling dynamics and grip.

ONE THING AUDIO ESL57 2007 £1,450
One Thing Audio's modifications keep the good old ESL57 at the very top of the game.

MOWGAN AUDIO MABON 2007 £3,995
Massively capable loudspeakers that offer dynamics, scale and clarity in an elegantly simple package. Wide range of finishes, too.

B&W 686 2007 £299
Baby standmounters offer a sophisticated and mature performance that belies both their dimensions and price tag.

B&O BEOLAB 9 2007 £5,000
Technically impressive and visually striking loudspeakers with sound quality that more than matches their looks



ISOPHON CASSIANO 2007 £12,900
Drive units featuring exotic materials allied to superlative build quality result in an immensely capable loudspeaker. Not an easy load to drive, however.

QUAD ESL-2905 2006 £5,995
The old 989 with all the bugs taken out, this gives a brilliantly neutral and open sound like only a top electrostatic can; still not a natural rock loudspeaker, though.

B&W 801D 2006 £10,500
In many respects, the ultimate studio monitor; dazzling clarity and speed with commanding scale and dynamics.



REVOLVER CYGNIS 2006 £5,999
Revolver pull out all the stops and show what they can do with this magnificent flagship loudspeaker. A superb monitor that is like a mini B&W 801D in many ways.

USHER BE-718 2007 £1,600
Beryllium tweeters work superbly, allied to a fast and punchy bass driver. The result is subtle, smooth and emotive.

USHER S-520 2006 £350
Astonishingly capable budget standmounters that offer detail and dynamics well beyond their price and dimensions.

ACOUSTIC ENERGY AE1 CLASSIC 2006 £845
Brilliantly successful remake of an iconic design; not flawless, but surely one of the most musical loudspeakers ever made.



MISSION X-SPACE 1999 £499
The first mass production sub and sat system using NXT panels is a sure-fire future classic - not flawless, but a tantalisingly unboxy sound nevertheless!

MISSION 752 1995 £495
Cracking Henry Azima-designed floorstanders combined HDA drive units and metal dome tweeters with surprisingly warm results. Benign load characteristics makes them great for valves.

TANNOY WESTMINSTER 1985 £4500
Folded horn monsters which sound good if you have the space. Not the last word in lauteness but can drive large rooms and image like few others.



CELESTION SL6 1984 £350
Smallest two way design complete with aluminium dome tweeter and plastic mid-bass unit set the blueprint for nineteen eighties loudspeakers. Very open and clean sounding, albeit course at high frequencies and limp in the bass. Speakers would never be the same again...

HEYBROOK HB1 1982 £130
Peter Comeau-designed standmounters with an amazingly lyrical yet decently refined sound. Good enough to partner with very high end ancillaries, yet great with budget kit too. A classic



QUAD ESL63 1980 £1200
An update of the ESL57, with stiffer cabinets. Until the 989, the best of the Quad electrostatics.

MISSION 770 1980 £375
Back in its day, it was an innovative product and one of the first of the polypropylene designs. Warm, smooth, clean and powerful sound.

ACOUSTIC RESEARCH AR18S 1978 £125
Yank designed, British built loudspeaker became a budget staple for many rock fans, thanks to the great speed from the paper drivers, although finesse was most definitely not their forte...

YAMAHA NS1000 1977 £532
High tech Beryllium midband and tweeter domes and brutish 12" woofers in massive sealed mirror image cabs equals stunning transients, speed and wallop allied to superb transparency and ultra low distortion. Partner carefully!



JR 149 1977 £120
Cylindrical speaker was ignored for decades but now back in fashion! Based on classic KEF T27/B110 combo as seen in the BBC LS3/5a. Doesn't play loud, needs a powerful transistor amplifier, but has clarity and imaging.

KEF R105 1977 £785
Three way Bextrene-based floorstander gave a truly wideband listen and massive (500W) power handling. A very neutral, spacious and polite sounding design, but rhythmically well off the pace.

IMF TLS80 1976 £550
Warm and powerful 1970s behemoth with transmission loading and a mixture of KEF and Celestion drive units. Impressively physical wideband sound but rhythms not a forte.

SPENDOR BC1 1976 £240
Celestion HF1300 tweeter meets bespoke Spendor Bextrene mid-bass unit. The result is a beautifully warm yet focussed sound. A little bass bloom necessitates careful low-stand mounting.



HH ELECTRONICS TPA-50D AMPLIFIERS 1973 £110
Simple design with easily available components, solid build quality and fine sound make for a surprisingly overlooked bargain. Not exactly stylish, however

BBC LS3/5A 1972 £88
Extremely low colouration design is amazing in some respects – articulation, stage depth, clarity – and useless in others (both frequency extremes). Came in wide variety of guises from various manufacturers building it under licence.

LEAK SANDWICH 1961 £39 EACH
Warm sounding infinite baffle that, with a reasonably powerful amplifier can sound quite satisfying

QUAD ESL57 1956 £45 EACH
Wonderfully open and neutral sound puts box loudspeakers to shame. Properly serviced they give superb midband performance, although frequency extremes less impressive. Ideally, use in stacked pairs or with subwoofers and supertweeters.

SYSTEMS

MERIDIAN SOOLOOS 2.1 2010 £6,990
Crisp styling, bright, colourful touchscreen, plus excellent search facilities. This is one hard disk music system with a difference. Best partnered to Meridian active loudspeakers.



NAIM UNITIQUITE 2010 £995
Great little half width one-box system with truly impressive sound allied to a wealth of source options

ARCAM SOLO MINI 2008 £650
Half the size and two-thirds the price of a full-sized Solo, the Mini gives very little away in terms of performance to its bigger brother.

MERIDIAN F80 2007 £1,500
Fantastically built and versatile DVD/CD/DAB/FM/AM unit, designed in conjunction with Ferrari. Ignore nay-sayers who sneer that it isn't a 'proper' hi-fi product. Just listen.

MARANTZ 'LEGEND' 2007 £22,000
The combination of SA-7S1 disc player, SC-7S2 preamp and MA-9S2 monoblocks delivers jaw-dropping performance

SHANLING MC-30 2007 £650
Quite possibly the cutest all-in-one around with fine performance from the CD player, tuner and MP3 player input. Very low power, though.



AURA NOTE PREMIER 2007 £1,500
Lovely shiny CD/tuner/amplifier with fine sound quality and dynamic abilities.



ARCAM SOLO NEO 2006 £1,100
Excellent all-in-one system, with a warm, smooth and balanced sound to match the features and style.

PEACHTREE AUDIO IDECCO £1,000
Excellent sounding iPod dock, impressive DAC and fine amplifier section make this an excellent one box style system.



TUNERS

ARCAM FMJ T32 2009 £600
Excellent hybrid FM/DAB+ tuner with a smooth, engaging sound. Factor in its fine build and it's a super value package.



MAGNUM DYNALAB MD-100T 2006 £1,895
One of the best ways to hear FM that we know; superbly open and musical sound in a quirky but characterful package

MYRYAD MXT4000 2005 £1,000
Sumptuous sound and top-notch build quality make for a tempting AM/FM package. Warm and richly detailed on good-quality music broadcasts.

NAIM NAT03 1993 £595
The warm, atmospheric sound is further proof of Naim's proficiency with tuners.

CREEK CAS3140 1985 £199
Excellent detail, separation and dynamics - brilliantly musical at the price. T40 continued the theme...

QUAD FM4 1983 £240
Supreme ergonomics allied to a pleasingly lyrical sound with plenty of sweetness and detail made this one of the best tuners around upon its launch.



NAD 4040 1979 £79
Tremendously smooth and natural sound allied to low prices and good availability make this budget analogue esoterica

MARANTZ ST-8 1978 £353
Marantz's finest radio moment. Warm, organic sound plus an oscilloscope for checking the signal strength and multipath

YAMAHA CT7000 1977 £444
Combines sleek ergonomics, high sensitivity and an explicit, detailed sound.

SONY ST-5950 1977 £222
One of the first Dolby FM-equipped tuners, a format that came to nought. Still, it was Sony's most expensive tuner to date, and boasted good sound quality with brilliant ergonomics.



ROGERS T75 1977 £125
Superb mid-price British audiophile design, complete with understated black fascia. Smooth and sweet with fine dimensionality

SANSUI TU-9900 1976 £300
A flagship Japanese tuner. It boasts superlative RF performance and an extremely smooth and lucid sound



TECHNICS ST-8080 1976 £180
Superb FM stage makes for a clean and smooth listen.

REVOX B760 1975 £520
The Revox offers superlative measured performance although the sound isn't quite as staggering as the numbers. Fine nonetheless, and surely the most durable tuner here?



SEQUERRA MODEL 1 1973 £1300
Possibly the ultimate FM tuner. Massive in terms of technology, size and features dedicated to extracting every ounce of performance from radio, including impressive multi-purpose oscilloscope display.

LEAK TROUGHLINE 1956 £25
Series I an interesting ornament but limited to 88-100MHz only. II and III are arguably the best-sounding tuners ever. Adaptation for stereo easy via phono multiplex socket. Deliciously lucid with true dimensionality.

HEADPHONE AMPLIFIERS

GRAHAM SLEE NOVO 2009 £255
Dynamic headphone amplifier with a great sense of timing. Crisp, clear treble and warm midrange gives an involving sound.



MUSICAL FIDELITY X-CAN V8 2008 £350
Open and explicitly detailed sound plus serious bass wallop. A great partner for most mid-to-high end headphones.

CD PLAYER/RECORDERS

MUSICAL FIDELITY TRIVISTA 2002 £4000
When playing SACDs, the sweetest, most lucid and lyrical digital disc spinner we've heard. Old school stereo, pure DSD design. CD sound is up in the £1000 class, too! Future classic.

MARANTZ SA-1 2000 £5,000
The greatest argument for SACD. This sublime Ken Ishiwata design is utterly musically convincing with both CD and SACD, beating most audiophile CD spinners hands down.



SONY MDS-JE555ES 2000 £900
The best sounding MD deck ever, thanks to awesome build and heroic ATRAC-DSP Type R coding.

PIONEER PDR-555RW 1999 £480
For a moment, this was the CD recorder to have. Clean and detailed.

MARANTZ DR-17 1999 £1100
Probably the best sounding CD recorder made; built like a brick with a true audiophile sound and HDCD compatibility.



CAMBRIDGE AUDIO CD4SE 1998 £200
A touch soft in the treble and tonally light, but outstanding in every other respect.

SONY TCD-8 DATMAN 1996 £599
Super clean sound makes this an amazing portable, but fragile.

LINN KARIK III 1995 £1775
The final Karik was a gem. Superb transport gives a brilliantly tight, grippy dynamic sound, albeit tonally dry.

NAIM CDS 1990 £ N/A
Classic Philips 16x4 chipset with serious attention to power supplies equals grin-inducing sonics.

TECHNICS SL-P1200 1987 £800
CD version of the Technics SL-1200 turntable. Massively built to withstand the rigours of 'pr' use and laden with facilities - a great eighties icon.

SONY CDP-R1/DAS-R1 1987 £3,000
Sony's first two boxer was right first time. Tonally lean, but probably the most detailed and architectural sounding machine of the eighties.

MARANTZ CD73 1983 £700
A riot of gold brushed aluminium and LEDs, this distinctive machine squeezed every last ounce from its 14x4 DAC -super musical



MERIDIAN 207 1988 £995
Beautifully-built two-box with pre-amp stage. Very musical although not as refined as modern Bitstream gear. No digital output.

CAMBRIDGE AUDIO CD1 1986 £1500
Inspired Stan Curtis redesign of Philips CD104, complete with switchable digital filter. Lean but tight and musical performer.



MERIDIAN MCD 1984 £600
The first British 'audiophile' machine was a sweeter, more detailed Philips CD100. 14x4 never sounded so good, until the MCD Pro arrived a year later.

SONY CDP-701ES 1984 £890
Sony's first bespoke audiophile machine used a 16x2 DAC to provide a clinically incisive sound; supreme build quality allied to the pure unadulterated luxury of a paperback-sized remote control.

YAMAHA CD-X1 1983 £340
Nicely built 16x2 machine with a very sharp and detailed sound; sometimes too much so. Excellent ergonomics, unlike almost every other rival of the time.

SONY CDP-101 1982 £800
The first Japanese CD spinner was powerful and involving. Brilliant transport more than compensated for 16x2 DAC, and you even got remote control!



ANALOGUE RECORDERS

AIWA XD-009 1989 £600
Aiwa's Nak beater didn't, but it wasn't half bad nonetheless. Massive spec even included a 16x4 DAC!

NAKAMICHI CR-7E 1987 £800
The very best sounding Nakamichi ever - but lacks the visual drama of a Dragon.



SONY WM-D6C 1985 £290
Single capstan transport on a par with a Swiss watch, single rec/replay head better than most Naks. Result: sublime.

PIONEER CTF-950 1978 £400
Not up to modern standards sonically, but a great symbol of the cassette deck art nonetheless.

YAMAHA TC-800GL 1977 £179
Early classic with ski-slope styling. Middling sonics by modern standards, but cool nonetheless!

SONY TC-377 1972 £N/A
A competitor to the Akai 4000D open reel machine, the Sony offered better sound quality and is still no slouch by modern standards

REVOX A77 1968 £145
The first domestic open reel that the pros used at home. Superbly made, but sonically off the pace these days

COMPACT DISC TRANSPORTS

ESOTERIC PD 1997 £8,000
The best CD drive bar none. Brilliantly incisive, ridiculously over engineered.

TEAC VRDS-T1 1994 £600
Warm and expansive sound made this a mid price hit. Well built, with a slick mech

KENWOOD 9010 1986 £600
The first discrete Jap transport was beautifully done and responds well to re-clocking.

DACs

DCS ELGAR 1997 £8500
Extremely open and natural performer, albeit extremely pricey - superb.

DPA LITTLE BIT 3 1996 £299
Rich, clean, rhythmic and punchy sound transforms budget CD players.

CAMBRIDGE AUDIO DAC MAGIC 1995 £99
Good value upgrade for budget CD players with extensive facilities and detailed sonics.

PINK TRIANGLE DACAPO 1993 £ N/A
Exquisite; the warmest and most lyrical 16bit digital audio we have ever heard.

QED DIGIT 1991 £90
Budget bitstream performer with tweaks aplenty. Positron PSU upgrade makes it smooth, but now past it.

CABLES

MISSING LINK CRYO REFERENCE 2008 £495/0.5M
High end! interconnects, with deliciously smooth, open and subtle sound without a hint of edge.

TECHLINK WIRES XS 2007 £20
Highly accomplished interconnects at an absurdly low price. Stunning value for money.

VDH ULTIMATE THE FIRST 2004 £250
Carbon interconnects that help you forget the electronics and concentrate on the music. Miraculous transparency. Tight and tuneful bass mixed with air and space.



WIREWORLD OASIS 5 2003 £99/M
Excellent mid-price design with a very neutral, silky and self-effacing sound. Superb value for money.

TCI CONSTRICTOR 13A-6 BLOCK 2003 £120
Top quality 'affordable' mains outlet block, with fine build and good sonics. Well worth the extra over standard high street specials, which sound coarse and two-dimensional by comparison.

vinyl section

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JUNE 2019

www.hi-fiworld.co.uk

SME SYNERGY TURNTABLE 83

A high-end turntable package with cartridge and phono stage. Noel Keywood listens.

TURNTABLE TWEAKING 90

How do you get the best from your record player? Paul Rigby explains.

BOOK REVIEW 93

The Art of Sound, a visual history for audiophiles. Paul Rigby is wowed by this lavish book.

MOBILE FIDELITY

Three classic LPs from the US-based audiophile outfit includes Supertramp's classic 'Breakfast in America' (1979), one of the catchiest collection of songs available. Mastered from the original master tapes and pressed at RTI.

The other two releases did not feature original master tapes but they have been well mastered: Simon and Garfunkel's 'Parsley, Sage, Rosemary and Thyme' (1966) a superb album in which the pair first took control of an album, in production terms while 'Superfly' is Curtis Mayfield's soundtrack from the film of the same name. Running at 45rpm, this is one of the few truly iconic, game-changing albums of the seventies.



news

NO FILTER

A jazz quartet headed by Jerome Sabbagh & Greg Tuohey, 'No Filter' (*Sunnyside*; www.jeromesabbagh.com) is a pure analogue creation, recorded live to tape with no EQ tweaks for maximum emotion. Bernie Grundman even cut the vinyl reference. The results are distinctly cultured. Tuohey's guitar can offer true rock grit that contrasts wonderfully with the cool, slightly artful sax tones from Sabbagh. Quality. Oh, nice sleeve art too.



SILVA SCREEN

From the soundtrack specialists and on coloured vinyl, comes 'Un Dollaro Bucato/One Silver Dollar' (1965) a Spaghetti Western tale of revenge (surprise!), put to music by Gianni Ferrio via Silva Screen (www.silvascreen.com). In amongst the moody harmonicas and lonely acoustic guitars, the sparse brass and persistent percussion, tension and portent add to the drama. Lovely stuff.



KOKO MOJO SEVENS

An array of five 7" dinked for juke-box (adaptor needed) four-track EPs of classic R'n'B (www.koko-mojo.com).

The slick and dapper Andre Williams, who 'raps' over the backing music, heads his disc with 'Don't Touch!'

The raucous Larry Williams, the man who made 'Dizzy, Miss Lizzy' famous, starts with another classic 'Short Fat Fanny'.

Johnny "Guitar" Watson, a superb blues guitarist and influence on Hendrix begins with 'The Bear'.

Gene and Eunice were the first to have a hit with the song, 'Kokomo' before Perry Como nabbed it. His disc begins with 'Bom Mom Lulu'.

Joe Tex was an underrated soul performer who deserves attention and now you can via this 4-tracker headed by 'Davy, You Upset My Home'.



MUNSTER

A host of goodies from the Spanish audiophile label, Munster (munster-records.com) includes, on the Vinilíssimo imprint, Luiz Melodia and Maravilhas Contemporâneas. A beautifully laid back affair which initially sounds like a bossa LP but integrates jazz vibes with an accessible, moody pop gloss.

Voolva's 'The Stars Are Ours' is a space rock opera tale of alien abduction, eventually saving the universe! Lazy indie vibes with Zappa-esque constructions.

Mysterio's 'Mysterio' combines organic instruments, synths and smokey vocals providing low-key yet rhythmic, slightly quirky ditties.

Also look out for Tita Duval Y El Nuevo Ritmo De Bobby Rey and 'Cumbias Internacionales' (1974) featuring the Argentinian showbiz couple Tita Duval and Roberto Rey; Los Jets and 'Lección De Twist' a collection of rarities that reflect UK beat but also jazz music, including fifteen bonus tracks on CD. The Belairs' 'Mr Moto' handles surf music from 1960-1963, Sexteto Miramar '¡Salsa! Mi Hermana' covers New York Latin and Cuban tunes plus originals along the theme while Kiki D'ak's 'Breve Encuentro', a stripped vocal and guitar, provides simple arrangements covering songs from the likes of Françoise Hardy and France Gall.

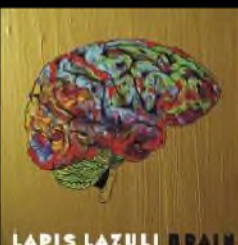


BANDCAMP BOOTY

Two from Sound Miracle (soundmiracle-recordings.bandcamp.com) includes 'Brazil Primitivo Vol. 1 - Rhythms, Legends & Styles (1899-1963)' and 'Wire Recorded Pieces' that showcases early attempts to manipulate sound via loops or reverse play.

W/V's self-titled LP (silkentofu.bandcamp.com) is an avant-garde, free-form vocal noise exploration from Juliana Venter with instrumental drone backing from James Welburn. Enter the maelstrom.

From Lapis Lazuli comes 'Brain' (lapislazuli.bandcamp.com) over two discs featuring furious prog sprinkled with innovative rhythms and constructions aplenty.



JEWEL

Her debut album from 1995, 'Pieces of You' (1995; Craft). A sweet and intimate LP, offering a strong voice that, nevertheless, offers a sense of vocal purity and confidence: Jewel managed to insert a vulnerability into her work.

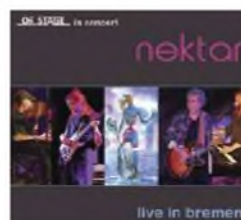


SIREENA

Two from German rockers, Nektar 'Live in Bremen' (2017), recorded in 2015 at a concert hosted by the Meisenfrei Blues Club. It offers a big sound and surprising vibrancy for a bunch of old geezers.

New Nektar, comprising recent Nektar keyboard recruit Klaus Henatsch and others (no original members are included) released 'Megalomania' in 2018, in the prog vein. With overly sincere and trite lyrics inserted for good measure.

Finally, look out for Green & Philharmonisches Orchester Hagen's 'Symphonic Floyd'. A live album featuring five tracks including 'Atom Heart Mother'.



...AND FINALLY

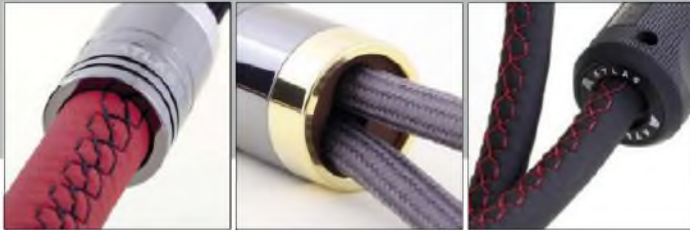
The Laughing Hyenas' 'Life of Crime' (1990; Touch and Go; www.tgrec.com) offers hardcore punk in an Iggy kinda way while 'Hard Times' (1995) includes an EP and was the final LP by the band. Brilliant stuff with a Rolling Stones-esque sound.

Mara Simpson has released '285 Days' (marasimpson.tmor.es). Classically trained, she offers blues vibes with a quiet soul direction that's almost conversational.

T H E A T L A S L U X E C O L L E C T I O N

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Spinology

Spin LP and add in technology – what do you get? Spinology from SME in their new Synergy turntable package. Noel Keywood listens.

Here's a mighty construction of a turntable from SME – a statement package as it were that comes as a whole. Just plug it into an amplifier's line input and you're up and running with the arguably the best sound in the world from LP. If at a cost of £14,950. And a little set-up procedure – but at the price best to rely on a dealer set-up.

The new Synergy comes with Ortofon's Per Windfeld Ti moving coil (MC) cartridge, identifiable by the PW Ti logo in gold lettering on the cartridge side; price of cartridge alone is around £3200. It sits in an SMEIV variant 9in cast magnesium fixed-headshell arm, feeding a built-in Nagra solid-state phono stage with input transformers for super-low noise – unusual, but the most effective way of getting the best from any MC cartridge. I always use them, on our Icon Audio PS3 MkII valve phono stage fed by an SME309 arm, or at home in a World Audio Design

preamp fed by an SME3012S arm.

A large and sturdily built external power supply provides three speeds to the main unit's motor: 33, 45 and 78rpm. Another external supply, from Nagra, sends power to Synergy's phono stage. That means two external supply units and many cables. The motor supply unit is formed to sit alongside the compact platter/arm assembly, or it can be placed elsewhere – if within reach for access to the speed buttons. Cable length of 125cm gives some leeway in placement. The Nagra supply has no power switch and is best hidden away, being connected by a 125cm long cable; it remains on all the time.

The Synergy is massively built, comprising a machined alloy base unit sitting on four adjustable feet, a sub-chassis with arm platform isolated by three damping units and a motor isolated by its own suspension system. A sub-platter is belt driven from the motor and carries a heavy (4.5kgs) main platter with integral damped-layer LP mat

support. To stabilise LPs – warped ones in particular – there's a chrome-plated screw-on puck. All up weight of the main assembly was 19.5kgs on our scales, the external SME power supply coming in at 3kgs, so a shelf must be able to support 22.5kgs in all. Clearance dimensions were 51cms wide, 40cms deep and 18cms high. No dust cover is supplied.

Superbly built and finished, the Synergy is a tribute to fine engineering and feels wonderful to use. The solid body of Ortofon's Per Windfeld Ti cartridge – like that of our in-house Ortofon Cadenza Bronze – is a symbiotic match to SME's similarly sturdy arm. The only worrying weirdy being daylight between cartridge and arm: Ortofon use a three point mounting system with the PW Ti, unlike our Cadenza Bronze or A95 units, and it spaces the cartridge from the headshell.

SME use top quality Crystal internal wire and external cables, that mate with solid gold plated phono socket outputs. Disappointing though



ortofon

accuracy in sound



2M

The 2M Series, named after the abbreviation of Moving Magnet (MM) technology, is an affordable range of pick-up cartridges with first-class audio design principles throughout. Featuring Ortofon's trademarked split-pole pin technology for a flat frequency response, all 2M cartridges have a high output for easy integration into any turntable system.

Ortofon's philosophy is to play the record sound as accurately as possible, without colouring the sound in any way. Both the 2M Bronze and 2M Black have diamonds which are cut and polished to the highest standards of the industry. The 2M Bronze and 2M Black also have interchangeable stylus units, and replacement styli are readily available in the UK.

The 2M range has been structured in the same way as the popular Rondo and Cadenza Moving Coil series, with ascending quality as you move from Red - Blue - Bronze - Black. The spectacular 2M Black has become the flagship of 2M, and all Ortofon moving magnet cartridges. 2M was also the last product designed by Ortofon's former chief engineer, Per Windfield, who developed the 2M series over the final 2 years of his 30 year tenure with Ortofon.



Red

A hugely popular all-purpose cartridge with a Tipped Elliptical stylus that delivers an open, dynamic sound with a slight touch of warmth.



Blue

An affordable step up in the range, which adds a greater resolution, dynamics, and detailed sound thanks to the Nude Elliptical stylus.



Bronze

Featuring a superior body, the Bronze picks up even the highest frequency information for a rich, detailed and deep soundstage, and can be further upgraded with ease.



Black

The musician's choice and flagship of the range, the 2M Black features a Nude Shibata stylus which guarantees a true-to-life sound performance. This is truly the best MM has to offer.



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Ortofon's Per Windfeld Ti moving coil cartridge has a heavy but strong one-piece stainless steel alloy body, for rigidity.

that there were no bypass outputs to feed the Per Windfeld into an alternative phono stage. I would only use a top MC like the Per Windfeld with a valve phono stage possessing input transformers – but no-go here. And a balanced output option, ideally from a balanced phono stage, would offer another step-up in quality appropriate to SME's no-compromise approach.

Measurement showed the phono stage of our review sample overloaded at a too-low 0.5mV and in use there was distortion with high level LP test tracks – see Measured Performance. Changing the gain setting from 67dB to 47dB cured this. It lowered output too, making a pre-amplifier with high gain necessary so I used the World Design Pre4 review last month – it was a perfect partner.

As it stands the Synergy should ideally be used set to low gain in

be removed.

The Nagra phono stage has an MM input option that bypasses the input transformer with small jumpers in the circuit board, should a user want to go to MM.

SOUND QUALITY

Initially I fronted the Synergy with our Creek Evolution 100A amplifier – as a sound check – and decided

low a World Design Pre4 preamplifier was necessary. The Stereo30 SE in turn fed our Martin Logan ESL-X hybrid electrostatic loudspeakers through Chord Company Signature X cables. There were no hum problems and nearly silence at full volume, but also a sense of some body to the sound – with disc spinning.

The Synergy as factory-set gave a harder CD like sound than when



An under view with covers removed to reveal Nagra's all-discrete phono stage (no silicon chips) with input transformers. It comes pre-set by SME with a 67dB gain option for MC, but can be dealer adjusted for MM.

against this combo as a tad too dry, even though the Creek is a muscular but smooth classic solid-state

set to low gain and the World Design Pre4 valve preamplifier, which is how I used it.

A coherent package in mechanical and sonic terms, relying on enormous strength and rigidity throughout, the Synergy produced a sound that was equivalently strong yet controlled – to a degree unusual with vinyl. I got a good picture of it



Rear view showing the gold plated phono sockets that provide a line level output from the internal phono stage.

conjunction with a high gain (x10 or 20dB min.) external preamplifier. I reviewed it as delivered, and also re-set to avoid in-out overload. This would be a dealer adjustment however – lots of special screws to

amplifier with no dryness. Instead I turned to our Icon Audio Stereo30 SE single-ended valve amplifier, fed direct from the Synergy via Chord Company cables, with Synergy gain set to high as delivered; with gain set



Synergy's magnesium tonearm sits on SME's unique sliding baseplate that provides adjustment of tracking error without alteration of arm geometry.

Choose the Best Tonearm



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Origin Live Arm Features:

- **Highly developed Low friction bearings** to enable your cartridge to function at it's best.
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- **Superior Rigid Materials** to give your music outstanding dynamics.
- **Trustworthy Design:** Origin Live has been developing leading Hi Fi equipment since 1986. We pride ourselves in innovative designs, and clients often tell us even the lower arms in our range massively outperform brands costing considerably more.

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"The best tonearm I've heard" **Hi Fi World**

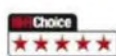
"The most addictive product I've heard" **Audio 10 (USA)**

"For me Origin Live in the analogue sector is the discovery of the year! ..." **Image Hi Fi (Germany)**

"The biggest improvement I've made in 25 years of listening to music and lots of exchanges of hi-fi stuff!!breathtaking, big new level!" **Ferdinand Roehrig**

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from our Mobile Fidelity 12in 45rpm re-master from analogue tape onto 180gm vinyl of Dire Straits So Far Away, where the sense of temporal grip upon a muscular dynamic came through as drums panned across a wide sound stage, punching out firmly – a characteristic strength of a rigid arm. An open and clear window into the performance made Mark Knopfler's small inflections on guitar deliciously obvious, delivering great

sense of insight. The Synergy was CD-like with this mightily analogue LP, it was so well manicured in its delivery, yet beyond CD in its dynamics. This was with factory set-up. With reduced gain the sound eased out to become less CD like.

After a few 45rpm 'LPs' from Mobile Fidelity,

the Scissor Sisters (Ta Dah) and a brace of 45rpm singles I turned to normal 33s, such as Hugh Masakela's Uptownship on 180gm vinyl from Analogue Productions. Again, the Synergy gave opening hand drums an impactful presence free from bloom or overhang – a dry but spectacular rendition that infused the performance with a sense of surgical speed. Masakela's trumpet blared out centre-stage with vigour, and with that lovely sense of timbral richness – devoid of digital bleach – that quality analogue provides. There was no



Above the main chassis sits a sub-chassis with arm platform of enormous strength.



The external motor power supply has three speed selection buttons and a speed lock indicator. It's contoured to match the main chassis.

doubt this was a top quality turntable package, Ortofon's Per Windfeld Ti fusing nicely with the arm to give fantastic impact to percussion, rising from a silent background.

The same strengths graced classical performances, with little intrusion from ticks, pops or noise of any sort to mar Marianne Thorsen playing Mozart Violin concertos, backed by the Trondheim Soloists, on a 180gm LP from 2L of Norway (DXD 352.8kHz digital recording). The Synergy found extra power in her playing, interjections from the Soloists having their own clear presence and sonic strength.

A Decca re-master by Pro-ject (available from importer Henley Audio) of Mozart's Symphony No9 on 180gm vinyl played by the Vienna Philharmonic was similarly free from noise but had powerful orchestral dynamics, individual strands well separated.

Inner grooves were no problem for the Per Windfeld Ti when playing Time To Say Goodbye sung by Rosella Caporale, on an 180gm LP (Two Countries One Heart) from Hi-Fi Direct of Italy. Her voice was clear and distortion free centre stage – a lovely performance.

Synergy showed its metal – as it were! – spinning the Syd Lawrence Orchestra, recently recorded live direct to 30ips 2in master tape (Disc



Crystal cable phono plug terminated interconnects with earth terminals.

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Nagra's external power supply delivers 12V to Synergy's phono stage.

2) in London by Chasing The Dragon audiophile recordings (www.chasing-the-dragon.co.uk) and pressed on 180gm vinyl. Rapid drumming in Sing Sing Sing thundered from our Martin Logans across a geologically wide sound stage and the brass blared with vigour. With this LP the Synergy made poor old CD sound timid.

A blemish was slight motor drone at 33rpm, audible when close to the turntable. It increased at 45rpm and even further at 78rpm to become obvious. It didn't feed through to turntable: there was no drone through the 'speakers – but SME need to quieten this; turntables run silent nowadays.

that is hard to find elsewhere: think clinically fast and perfect. All the same motor noise and premature overload in the phono stage are issues that need resolution. Wonderful – but needs tiddling.



A toroidal mains transformer dominates the interior of Nagra's linear power supply – no switch-mode here.

CONCLUSION

SME's new Synergy all-in-one turntable is a high level package. Most all-in-ones come with the cheapest cartridge available; SME's comes with the most expensive cartridge available (well, nearly). That's how it is aimed and that is how SME play it. Fabulously engineered it offers a sound from LP

MEASURED PERFORMANCE

Speed accuracy was near perfect and wander about nominal low, making variations of speed (wow) also low, our analysis showing a very low peak at rotational rate 0.55Hz (33rpm) and little else of higher frequency. Speed can be changed in 0.1% increments.

Nagra's internal phono stage had a low input overload ceiling of 0.5mV our Rohde&Schwarz UPV analyser showed – and as Nagra quote. This is insufficient headroom for Ortofon's Per Windfeld cartridge fitted. A high level tracking test

(CBS STR-112, 45µm lateral) caused the Synergy phono stage to overload, as did all tracks (50µm and above) of Clearaudio's tracking test disc. Setting gain to low cured this but a high gain external preamplifier is then needed.

Equivalent input noise (A wtd) was extremely low at 0.07µV – typical of an input transformer.

Frequency response (equalisation accuracy) was accurate, but with a slight lift (+0.8dB) below 40Hz our analysis shows.

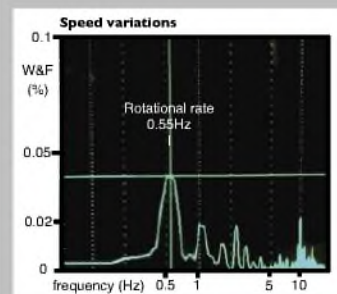
The arm is rigid and free from resonances, like all modern SMEs, a Bruel&Kjaer accelerometer showed.

With 2.6gms tracking force the Per Windfeld Ti cartridge tracked all levels on CBS STR-112 test disc, with Clearaudio's tracking disc 70µm level.

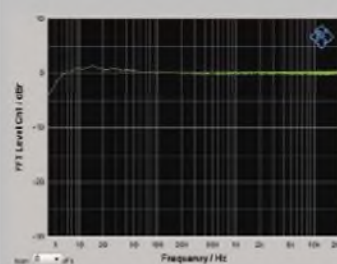
Frequency response of the PW Ti measured flat to 20kHz with JVC TRS-1007 test disc, even on inner grooves due to its Replicant stylus.

Synergy's phono stage overloads on high level signals from LP. It can be set to avoid this, but a high gain external preamplifier is then necessary. The turntable and arm are otherwise superb in performance. **NK**

SPEED STABILITY



FREQUENCY RESPONSE



Speed error	-0.1%
Wow	0.1%
Flutter	0.04%
Wow & Flutter (unwtd)	0.1%
Wow & Flutter (wtd)	0.07%



Nagra's phono board with gain switches near top, cylindrical MC input transformers below, and MM/MMC jumpers just below them.

SME SYNERGY £14,950



EXCELLENT - extremely capable.

VERDICT
Top quality turntable package with top quality sound – if with blemishes.

FOR
- sound quality
- build and finish

AGAINST
- motor drone
- overload
- no dust cover

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Tweak your turntable!

How do you get the best from your record player? Paul Rigby checks out a range of great value accessories that can enhance your deck's performance without having to spend a fortune.

You buy a turntable, hook it up to the rest of your hi-fi chain and away you go, entering the groove portal to analogue heaven. Then, after a while, you begin to wonder. That bass, hmmm... could be a tad firmer, perhaps? Then there's the midrange, slight smearing of the performance when the music gets a little busy, do you think? The soundstage – well, perhaps it's not quite as spacious as you would have hoped.

Don't worry, this happens to us all. It's the Curse of the Audiophiles and one that Hammer House of Horror failed to cover in their classic movie series during the seventies. It's that demonic invasion that bites the hi-fi enthusiast and demands that every audiophile can only be happy and content with their hi-fi for a short while before the desperation infects us: the need to upgrade!

If you want to enhance the sound quality of your analogue source, the obvious gut reaction is to upgrade the turntable itself. That can cause unnecessary straining of the wallet though – as well as the frowning of the partner.

There is another way. Rather than upgrade the entire turntable, you can upgrade bits of it – enhancing individual parts to squeeze out improved sonic performance.

I've selected a Pro-Ject RPM 1 Carbon turntable, which you can pick up for around £375, as my victim and roped in a heap of ancillaries including a replacement stylus, new mat, isolation feet, added plinth, new cables and even a replacement platter. Just to see what happened.

The RPM 1 is a good quality turntable and a solid performer but is ripe for tweaking. And so I began with an old ELO orchestral/rock track, First Movement, if you don't mind...

Turntables need some care – but look after them, make some cost-conscious improvements and the results are impressive...



A NEW PLATTER: ACRYL-IT (£165)

Sound quality really moved a-pace here with a wholly new soundstage installed, giving a low noise performance, a solid basic musical structure plus impressive precision and focus that not only added a measure of pace to the track as a whole but also improved the tonality throughout.

That sonic improvement was further enhanced by adding a cork mat on top of this replacement platter.

ORTOFON 2M BLUE [£185 ON ITS OWN OR £110 AS AN UPGRADE FOR A 2M RED]

You can perform the upgrade by swapping over the original Red stylus, which easily pulls out from the body, with the Blue which easily plugs back in. You don't even have to remove the cartridge from the arm.

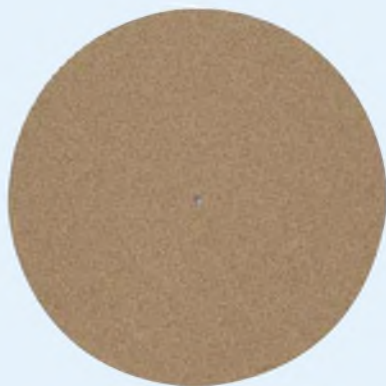
With the 2M Blue in place, the music featured less noise and greater precision in the upper mids. Guitar strings offered a better 'twang' while the accompanying cellos arrived with an enhanced focus. All were strong yet sprightly in tone.



THE MAT: LEATHER-IT & CORK-IT [£50 AND £20 RESPECTIVELY]

I had two possible upgrades to hand here: a leather mat and a cork example. I began with the leather upgrade which lowered veiling noise, creating a much smoother mid band.

There was, however, a blanket of warmth over the upper areas of the sound frequency spectrum with a slight roll-off at the top edges. Because of that, I preferred the sound from the cork mat which was slightly more dynamic in terms of the upper mids. In fact, the frequency extremities seemed to be further apart with the cork mat, giving a wider spectrum of sonic colours.



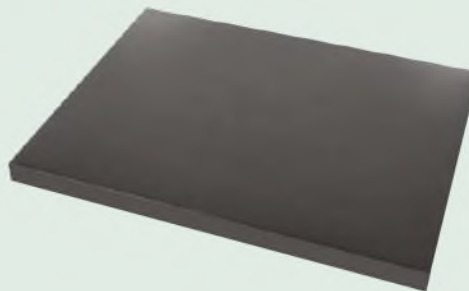
NEW PHONO CABLES: CONNECT-IT CC [£99]

I then replaced the phono cables. Despite a slight lift in the midrange which added some stridency to the upper mids, the response of the new cables was to lower noise further which enhanced the overall soundstage.



THE FEET: ABSORB-IT [£140 FOR PACK OF 4]

The feet enhanced bass and provided a strong and significant range of lower frequencies, providing real traction for the cellos. I felt that the feet were good, solid designs but I wanted more. For the price, I expected better value for money.



PLATFORM BASE: GROUND-IT [£250]

Bass improved with the platform but the lower frequencies were enhanced in a balanced fashion along with the midrange and treble.

Upper midrange highlights were just as detailed and light on their feet but, this time, the string plucks for the Spanish guitar, for example, added a substantial and portentous resonance.

CONCLUSION

The moral of this tweeky tale? Never underestimate a basic turntable design! I wonder how many of us upgrade our turntables without ever getting to hear its full potential? Certainly, the RPM I was transformed by these accessory upgrades.

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Sound History

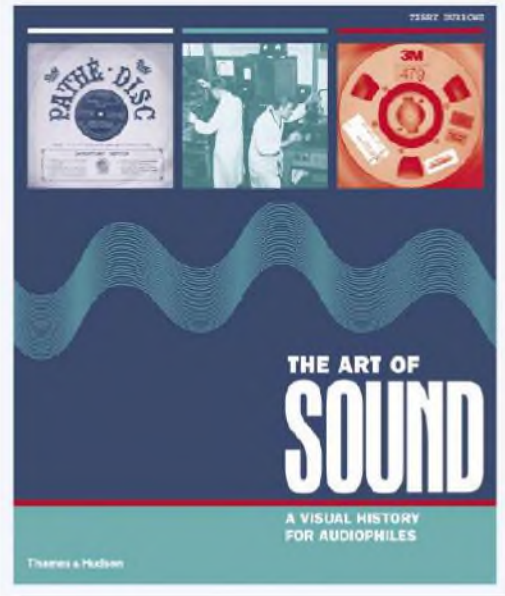
A look back at the beginnings of recorded sound, taken largely from EMI archives. Paul Rigby is wowed.

THE ART OF SOUND: A VISUAL HISTORY FOR AUDIOPHILES

Terry Burrows

Price: £35

Thames & Hudson



Spanning 350 pages in hardback, this beautifully produced book spans the evolution of sound recording and playback on a global scale from Scott de Martinville's invention of the phonograph in 1857 to popular streaming services of today.

Although the author has used a range of sources, the basis and core of the book is drawn from support by The EMI Archive Trust. It was established in 1996 and contains a wealth of fascinating information, images and objects donated by The EMI Group of companies over the decades of its existence. In fact, the Trust continues to be supported by Universal Music Group who provide a home for the Trust assets in their purpose-built archive in Hayes, Middlesex.

Hence, the book features some of the stunning artefacts that the Trust holds and uses them as a spine for its story. And that's not a bad thing because the EMI group of companies and the people in and around them had an enormous role in the development of recorded sound.

Even before the book starts in earnest, I was bedazzled by two colour plates. The first shows the EMI prototype for an 8-track digital mixing desk from 1979. The first experimental digital recording sessions took place in that year.

Then I turned the page to an image of a physical 3D model of a stereo groove, constructed in 1932 and used by Alan Blumlein (a tremendous electronics engineer, born in London with 128 patents to his name) to demonstrate the new technology and how the groove can store two separate channels despite being tracked by a single 'needle'.

Only then do we get to the Contents page! Which gives you an idea of the wealth of material shoe-horned into this book. Although maybe that's an incorrect metaphor because the production values dictate that plenty of high quality imagery is used on a wealth of white space to allow each picture to pop out of the page, along with original photographs, poster and pamphlets – plus copies of original blueprints in some cases.

After an interesting introduction, the book is divided into distinct sections: the Acoustic Era, the Electrical Era, the Magnetic Era and the Digital Era. I like the fact that, despite plenty of information filling the later and more recent technology areas, the majority of the book is targeted towards the early part of recorded music – so you're well into 200 or so pages before you even sniff a magnetic reel-to-reel tape.

In fact, the book leans heavily towards the outmoded, the moribund, the dead and dying formats, in today's terms. Even when modern technology is discussed it

tends to be rather unfashionable and dated variants of the same.

Don't buy this book thinking that you're going to read a lot about cutting-edge technologies and advanced research. This is a book of history. Which, all in all, makes the contents much more fascinating – and I'm glad the editorial direction was skewed that way. The information and images you'll find here are rare, little known and plain surprising.

Highlights are far too numerous to mention but include a large double page spread photograph of an old 78s gramophone factory, busy and bustling; the portable gramophone (The Guiniphone) with a fold-away cardboard horn; a range of test equipment created by EMI such as the tank-like constructions attributed to the Type 5 Gain set to test amplifier gain; the wonderfully monikered Self and Mutual Inductance Bridge, created in 1937; the Columbia Moving-Coil Lathe from 1922-1925, belt driven from an outboard motor; the intriguing twin-speed EMI L4A Portable Tape Recorder from 1962 – and so much more.

This is a book that all Hi-Fi World readers need now. You will slaver over this one, mark my words. Beautiful to look at, informative and a delight to read, I guarantee "Ooos" and "Ahhs" from this beauty. **PR**

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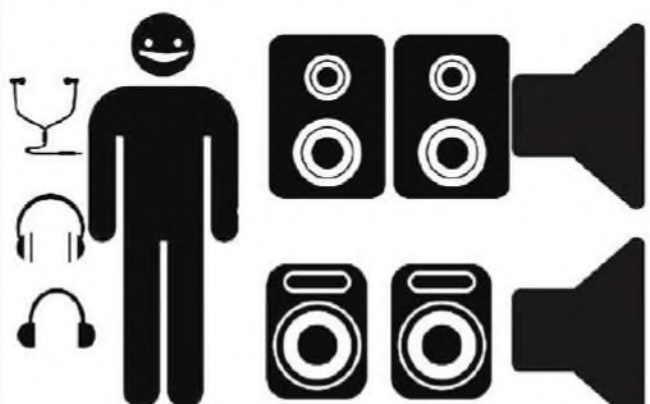
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MUSICAL FIDELITY A5 CD player superb condition with valve output stage £450 very light use as working away, with original box and manual Hornchurch Essex area Email bernkarm@yahoo.co.uk

NEXT MONTH

JULY 2019 ISSUE

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Also, we hope to bring you —
CHORD ETUDE POWER AMPLIFIER
PIEGA PREMIUM 701 SPEAKERS
PLENUE COWON X30 EAR BUDS
EAT E-GLO PETIT PHONO STAGE
COPLAND CTA408 INTEGRATED AMP
...and much more.



This is a selection of what we hope to bring you, not a complete list. We regret that due to a wide range of issues, we cannot guarantee that all products listed above will appear.

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CURTIS MAYFIELD

Paul Rigby looks at 1970s soul-funk legend Curtis Mayfield – courtesy of a new four-LP box set 'Keep On Keeping On'.



"He did his own thing, danced to his own beat and had a lot of success"

Mayfield holds an odd place in the music firmament. The guy was a 24karat talent yet he is sometimes ignored when the names of the greats are listed, sales of his music is not as high as it should be and his legacy should, in my opinion, be lionised – yet he is often viewed as a bit of a cult figure or, if that term is too extreme, a talent that is continually rediscovered to the delight of the finder.

Maybe one of the reasons for that lies in who he was, as his son Todd Mayfield explained "...he was a very private person and...he was on a private label. He made a choice to stay in Chicago and not live on either coast. He was a very family-oriented guy especially in the late part of his life. He did his own thing, danced to his own beat and had a lot of success".

During the sixties he was the lead singer for the soul group, the Impressions. The importance of his work would have stood the test of time alone but his solo work during the seventies to pioneer funk, to push lyrics towards social commentary and to establish the blaxploitation genre as a commercial force with his superb Superfly LP (1972; newly reissued this month via Mobile Fidelity) dominate. From this point, he was seen as an equal to the likes of Stevie Wonder and Marvin Gaye in terms of creative talent and innovation.

Many would say that Mayfield had already reached that level after the release of his first solo LP, simply entitled 'Curtis'. Originally issued in 1970, it was released on his own label, allowing him to control his recordings and song publishing and own a recording studio. A set-up like that was highly unusual at the time.

You can sense that blend of artist and businessman from an encounter he had with Jerry Butler, Mayfield's old songwriting and business partner. "Curtis came to me one day and said 'Jerry, I want to buy you out'. My feelings were hurt a little bit and I said 'Why, what did I do?' He said 'You didn't do anything. I just want to own as much of me as possible'. Curtis was self-contained and had it

all going on. He was one bad little guy, man".

When 'Curtis' was released, it hit the ground running and became a highlight of the entire soul genre. It was as if Mayfield had been sitting on the songs in this album for years, honing, tweaking and polishing until they emerged in perfect condition, together on a single album. He even produced the LP himself. His blend of orchestrations with nods to classic soul of the past and the newly emerging funk genre provided an attractive blend of musical colours. Maybe this is why fans were never really disappointed that only one song from this LP made it as a single, '(Don't Worry) If There's a Hell Down Below We're All Going to Go'. This album was made as that: an album project. It was made to be heard as an album and digested as such. With this album, Mayfield wanted people to open their eyes to what was happening all around them. As his son Todd explained "He was very conscious and observant about what was going on. He wanted to give people something to think about: 'food for thought' he would always say – but not in a preachy way. He wanted people to see what he was seeing".

You can now find this album, presented in a gatefold sleeve with a poly-lined inner, on black vinyl within a new four-LP box set called 'Keep On Keeping On'; it features newly remastered versions of the first four solo studio albums.

For mastering, I don't hear the annoying sibilance oft reported from earlier reissues but a welcome sense of space across the soundstage. There was a pinching in the treble, though, and spacial restriction in the mids creating a touch of claustrophobia in the upper frequencies which prevented the music from sounding rich and transparent. That said, the soundstage was broad and well structured, the music retained a sonic discipline with no bass bloom or midrange smearing, giving the sonics a generally entertaining presentation.

The box set features 'Curtis' (1970), 'Roots' (1971), 'Back to the World' (1973) and 'Sweet Exorcist' (1974). Available in a slip case, it includes a 12"x12" print. **PR**

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