

# dCS Vivaldi One

Hugely flexible, hugely capable and, well, just plain 'huge', dCS's flagship Vivaldi four-box digital stack has been condensed into a one-box solution. So why a limited edition? Review: **David Price & Paul Miller** Lab: **Paul Miller**

There comes a time when you have to pop the champagne cork, relax and have fun. That's what dCS (Data Conversion Systems Ltd) has done with its new £55k Vivaldi One single-box disc player/upsampling DAC/streamer. It's a limited edition of just 250 pieces, designed to celebrate the company's 30th anniversary. In that time, the company has gone from being an Official Secrets Act signatory supplying advanced radar systems for the RAF towards the end of the Cold War, to one of the most respected high-end digital audio specialists around.

For that reason, dCS CEO David Steven felt it was time to do something special. Think of the Vivaldi One as a stepping stone between the company's past and future – it packages up much of what dCS has worked on before, and adds something new too...

## CONDENSED STACK

David Steven says it's essentially a full Vivaldi separates system [*HFN* Feb '13] in a single box – with its electronics (processing platform, Ring DAC, network board, clocking), plus chassis design, transformers, isolation and layout all closely following Vivaldi principles. It also sports what the company believes to be the best SACD/CD optical disc mechanism available, TEAC's Esoteric VRDS Neo mk3. He muses that it just might be, 'the last great one-box CD player in the world'.

At its heart is the latest version of the Ring DAC [see PM's boxout, p35], which first appeared when the company became the doyen of recording studios in the early '90s. Let's not forget, dCS created the first 96kHz/24-bit ADC (analogue-to-digital converter), then produced a matching DAC, ushering in the brave new world of high resolution digital. There's also an upsampler built-in – another company first back in the late '90s – and an optional

external clock. A decade ago, dCS was the first to introduce an asynchronous USB audio input in the vanguard of serious computer audio and, naturally, the Vivaldi One is thus equipped also.

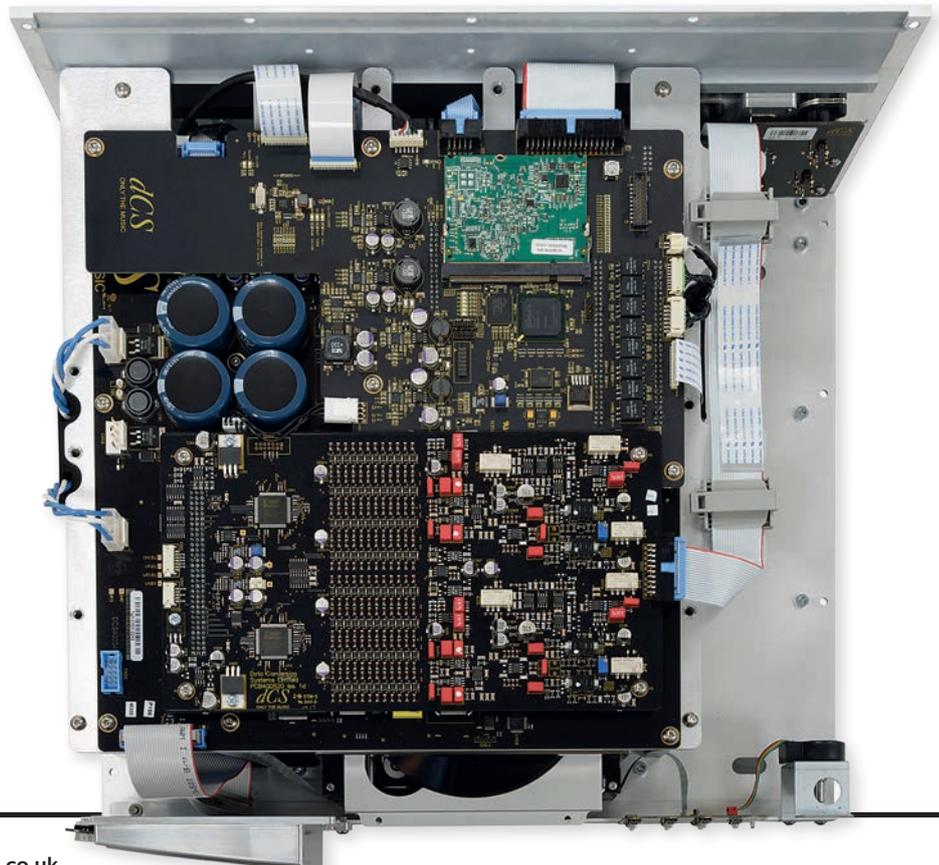
The company has never been a dedicated follower of fashion. Its products are superbly built and finished – you would expect nothing less at this price – but until now it has avoided doing exotic finishes. The Vivaldi One ushers in a new era for dCS, and this new creation has the option of everything from gloss white or black (£2300 extra) to black chrome plate (£11,500), nickel plate (£5000) and even a Decoplate 24-carat gold (£20,000). The latter, seen by visitors to the Hi-Fi Show *Live* 2017 in Windsor, has been produced in conjunction with highly respected British electroplaters FH Lambert.

The Vivaldi One is effectively a highly complex digital audio processor with its

own optical drive. It is extraordinarily versatile, supporting LPCM up to 384kHz/24-bit, DSD up to DSD128, plus DSD in DoP format. It supports all major lossless codecs, in addition to MQA-encoded files. Importantly, because this is all done in software on FPGAs, the machine is easily upgradeable for any future digital formats, via firmware updates. This machine is said to have twice the logic capacity of previous generations for just this purpose, alongside the newest iteration of the Ring DAC.

## WELTER OF OPTIONS

Digital inputs include asynchronous USB, AES/EBU (single or dual-mode), S/PDIF (coaxial and optical) plus Ethernet for streaming. Cleverly, when they're not connected they don't show as 'available' on the display. There's also a vast range of outputs including dual AES, standard AES/



**RIGHT:** The 96 latches (a matrix of 2x48) that comprise the Ring DAC core are visible here with the two driving FPGAs sitting alongside [see boxout p35]. The balanced analogue output lies to the right, the disc transport directly below



EBU and S/PDIF, with analogue outputs covered by unbalanced RCA and balanced XLRs. The Vivaldi One's output voltage can also be set to 2V or 6V allowing it to drive pretty much any power amplifier directly in variable output mode.

The Vivaldi One also has the company's latest streaming board fitted, and is certified Roon Ready as well as having TIDAL, Apple AirPlay and Spotify Connect functionality. This is all handled by the dCS control app, and a dCS Universal Remote Control – the latter a large, aluminium-clad coffee table affair that offers all basic functions, plus a rotary volume knob that converts the Vivaldi One into a source/preamp via its variable outputs.

*'It strings together 1's and 0's in a spookily natural way'*

This highly complex beastie is configurable via a menu system, navigated via its superb, pin-sharp OLED display (or App). Hitting the fascia's Menu button

provides a variety of options – for example, via Audio Settings, LPCM may be converted to DSD, or upsampled, alongside a wealth of filter modes [see PM's boxout, below]. The remote control lets you toggle between these, but it isn't possible to set the upsampling mode (ie, DXD, DSD or DSD128) this way – instead you have to work through the Unit Settings menu. The disc drive finds tracks rapidly and the sliding metal tray is a pleasure to use, but although very quiet I'm bound to say that it isn't completely silent

**ABOVE:** Modelled on the original Vivaldi, the One's flowing curves are milled from a 16kg slab of alloy. It can be controlled via the rotary and array of buttons, but dCS's huge IR remote [p37] and/or iPad app are more convenient

while spinning. Otherwise, the Vivaldi One exudes an air of consummate quality with perfect panel fit and that 'milled from solid' feel. It is immaculately finished without being showy or fussy – you really cannot ask for more, although at this price one should not expect anything less.

### **VIBRANT AND ORGANIC**

There's a school of thought that says analogue and digital formats get better, the closer they get to one another. Vinyl LP gets ever tighter, tauter and more detailed, while CD and hi-res files become

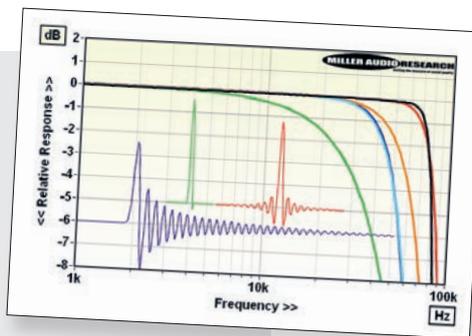
increasingly vibrant, three-dimensional and organic sounding. The Vivaldi One is the very embodiment of the latter, managing to string together 1's and 0's in a spookily natural way. It appears to magically 'unlock' digital music files, no matter how they are delivered, and is far

more agnostic over the choice of format than you might imagine.

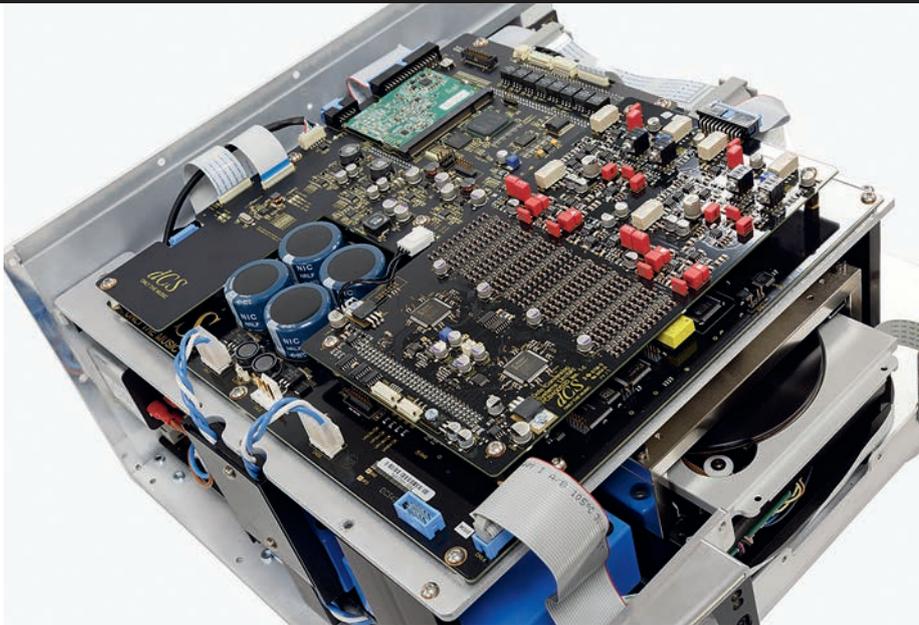
Whether it's CD, hi-res LPCM or DSD, the listener is left revelling in the music at hand, rather than pining to hear the same thing in a different format. Give the Vivaldi One a good CD and you never find yourself wanting more. If it's a fine recording then it sounds great regardless of media. If it's a bad recording then one can still hear ➔

### **RINGING THE CHANGES**

User-selectable digital filters are not uncommon, as we saw in Oppo's UDP-205 [HFN Jul '17] and Matrix Audio's X-Sabre Pro [HFN Nov '17], and typically include sharp and slow roll-off versions of linear and minimum phase filters. For the Vivaldi One, dCS has included six filters for CD, four for 48kHz-96kHz media and six for 176.4kHz+ media, the majority being linear phase types that trade ringing in the time domain against stopband rejection. While the CD filters all offer a perfectly flat 20Hz-20kHz response ( $\pm 0.05\text{dB}$ ), only Filter 5 is a minimum phase type, similar to Filter 6 for 192kHz data [blue impulse and response on inset Graph]. dCS has its own 'NOS' Gaussian filter that it (very sensibly) reserves for high sample rate inputs only [Filter 5 for 192kHz inputs, green traces]. Used with CD/48kHz inputs this type of filter would produce a marked loss in HF response and even with 192kHz files is  $-0.4\text{dB}/10\text{kHz}$ ,  $-1.6\text{dB}/20\text{kHz}$  and  $-6.5\text{dB}/40\text{kHz}$ . Filters 1-4 are all linear phase for all sample rates [black, red, cyan and orange]. The DSD filters 1-3 are flat to 20kHz: DSD Filters 1 and 2 reaching 100kHz at  $-8.5\text{dB}$  and  $-21\text{dB}$ , respectively, Filter 3 rolling off to  $-3\text{dB}/60\text{kHz}$  and  $-23\text{dB}/80\text{kHz}$  while DSD Filter 4 is  $-0.7\text{dB}/20\text{kHz}$ ,  $-6\text{dB}/30\text{kHz}$  and drops steeply at 40kHz. PM



## DIGITAL MEDIA PLAYER



**ABOVE:** While the core digital and analogue circuits are screened off in the top of the alloy chassis, the bulk of the enclosure houses its multiple PSUs and the TEAC mk3 Esoteric VRDS Neo disc mech

past that and enjoy the music. Few other 'reference' front-ends will take you as close to the original venue, where everything is painstakingly yet exuberantly reproduced.

### ASTONISHING INSIGHTS

This is only possible by a broad coalition of strengths, with no obvious weaknesses. I find this a characteristic of dCS products in general, and sometimes such uniformity leads critics to label the company's designs as 'characterless'. Yet this is to miss the point, because the Vivaldi One is so *able*. It has immense rhythmic insight, offers panoramic soundstaging, vibrant tonality, firecracker dynamics and can properly convey the natural rhythm of the music, regardless of how complex this may be. It never attempts to stray from neutrality just to sweeten the musical pill.

808 State's 'Ancodia' [from *90; ZTT 102CDX*] was first in the disc tray. A crudely recorded slice of techno from 1989, this

CD was mastered on DAT and sounds distinctly lo-fi, yet it proved a revelation here. Where there is usually blurring and slurring between the beats, the speed and insight offered by the Vivaldi One was astonishing. It could slice and dice opaque recordings in a way that I didn't think possible from digital. It was as if it was shining a brighter light while peering through a better, more optically perfect lens. I found myself fascinated by the way the notes started and stopped – you could almost hear the snare drum's full envelope, its attack, delay, sustain, reverb. It felt almost as if you could slow this really busy mix right down, peer deeply inside and then speed things up again as you wished.

Its soundstaging is sublime. I had always heard 'Ancodia' as a diffuse wash of sound with imprecise stereo imaging. Yet the Vivaldi One revealed the different strands of the mix – lead keyboard, backing synths, drum machine, bass synthesizer, ↻

### RING DAC

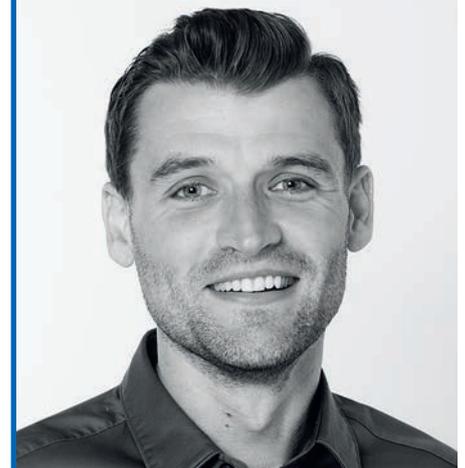
Announced by dCS back in 1991, its Ring DAC converter is now a highly evolved and practical technology, combining the pure monotonic conversion of a genuine 'single-bit' DAC with the operation of a PWM bitstream-style converter. Instead of truncating incoming data to a stream of single bits, dCS reduces LPCM (and converts DSD) to an average of 4.6 bits whose 24 possible values are mapped to the 48 'identical' current sources that comprise the Ring DAC (the matrix, above and p32). This differs from traditional PWM DACs that use these bits to control the length of *time* a single current source is held open or closed. In practice, dCS's 48 current sources can never be truly identical in size so the mapping of bits to current sources is randomised. Fixed errors, that would otherwise appear as harmonic distortions, are thus traded for an inaudible increase in noise. Here, three mapping options are stored in two FPGAs. PM

### DAVID STEVEN

'There were several reasons why we decided to do the Vivaldi One,' says dCS CEO David Steven. 'Firstly, I wanted to celebrate 30 years in business, because much as we feel and act like a start-up at times, to remain at the cutting edge of digital for this long is no mean feat. Secondly, the pace of change in this business is getting faster, and since Vivaldi launched it seems like all our R&D has been focused on streaming, user interfaces, new formats and sample rates.'

'I wanted the Vivaldi One to be the last great one-box disc player. It doesn't quite have the same beguiling sound of the full Vivaldi stack, despite coming close to its magic.' And dCS won't be doing a one-box Rossini, 'This is a unique venture,' says David. 'There are some audiophiles who love the simplicity of a single-box player and would never buy a Vivaldi stack. They were a key audience, but this was one product we didn't design with a *specific* customer in mind.'

The special finish options were an interesting new avenue, he adds. 'We have always wanted to experiment with them and the Vivaldi One was perfect because it wasn't a new product in the sense that we were manufacturing using known variables – metalwork, electronics, etc. It has a longer lead time than other dCS products so we felt more confident in working with suppliers to produce new customisable finishes. Some of the them are spectacular, including a black anodised and copper piece for London's Spiritland music venue.'



## DCS VIVALDI ONE



**ABOVE:** Four S/PDIF inputs (one optical and three coaxial) are offered alongside two AES/EBU, one asynchronous USB, one USB flash drive port, network loop-through ports and both single-ended (RCA) and balanced (XLR) fixed/variable audio outs

all clearly spatially delineated. Keen to hear more, I switched to David Sylvian's 'Every Colour You Are' [from *Everything And Nothing*; Virgin VJCP-68248.49] and was struck by the rock-solid location of the different instruments in the mix. It was as if they'd been glued to different parts of the listening room, and were going nowhere. The soundstage was vast in all three dimensions, yet the Vivaldi One held everything inside it under a vice-like grip.

### SEAT-OF-THE-PANTS RIDE

Timbral detail proved breathtaking too. Donald Fagen's 'Tomorrow's Girls' [from *Kamakiriad*; Reprise WPCP-5210] is a dry recording, hardly dripping with colour and contrast, yet the Vivaldi One seemed able to get right into its very fabric and tell the listener just how the recording was produced. You could hear all the effects-pedals on the guitar work, keyboards and drums, and despite being compressed and processed Fagen's voice had a startling immediacy.

Paul McCartney's 'Band On The Run' [Hear Music HRM-32565-00; 96kHz/24-bit] drove the point home: it was dripping with harmonics, especially the wonderfully raspy trombone heard in the bridge to the middle-eight. The electric organ shimmered and steel string guitars had a magnificent sheen.

Meanwhile, the effects of the digital filters are very subtle. Some appear to give fractionally better spacing between the notes than others – with a tauter rhythmic groove – on certain programme material, but as the manual says, 'try them and decide for yourself which you prefer'...



Whether it was Pink Floyd's 'Money' on SACD [*Dark Side Of The Moon*; EMI 7243 582136 2] or Art Pepper's 'You'd Be So Nice To Come Home To' [Acoustic Sounds DSD, via USB], the Vivaldi One showed itself to have blistering dynamics – especially noticeable on tiny musical inflections that lesser players and DACs miss. It tracks these subtle accents in such a nimble way yet is able to serve up the might of Vaughan Williams' Symphony No 2 [LPO/Haitink; EMI CDC 749394 2] with such conviction.

The Who's 'Won't Get Fooled Again' [from *Who's Next*; Polydor 527 760-2] sounded like a controlled explosion. The spectacle of Pete Townshend's crackling guitar riffs battling it out with Keith Moon's staccato snare drum – cymbals crashing away as he 'machine-guns' those pan rolls – had me mesmerised. The Vivaldi One has an icy clarity that brings no succour to cold-sounding recordings, yet its brilliant tracking of dynamics gives a riveting, seat-of-the-pants ride. Regardless of source, it focuses on the music's emotional impact and rams it right home. ☺

### HI-FI NEWS VERDICT

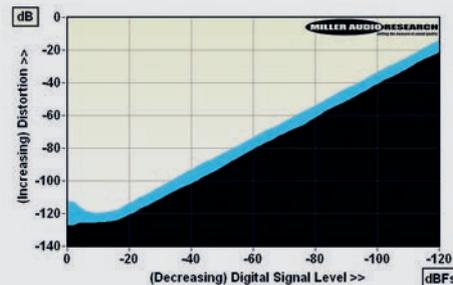
If you're looking for something to make your digital music sound 'nice' or 'impressive', then the Vivaldi One is not for you. Rather it shines a penetrating light on the recording, taking you up close and personal. It's a majestic performer that enraptures the listener, whatever one chooses to play. It looks visually striking too – all the more so with those new finishes – but it is the sound that you will never forget.

Sound Quality: 90%

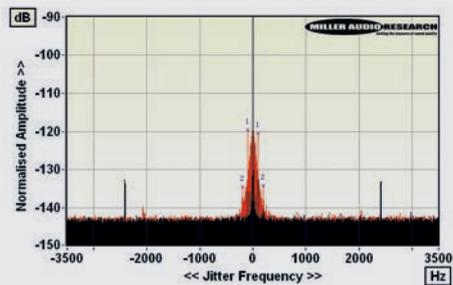


Comparisons with the full Vivaldi 'stack' [*HFN Feb '13*] reveal subtle improvements brought about in the evolution of dCS's signal processing and Ring DAC technology and its integration into this one-box solution. The analogue output buffer still has a fabulously low, cable-agnostic 560mohm source impedance and offers a variable output up to 5.88V. This is perfect for driving power amplifiers directly. The A-wtd S/N ratio is now fractionally higher at 117dB and low-level resolution good to  $\pm 0.15$ dB at  $-120$ dB. Distortion is fractionally lower too: down to 0.00001% at  $-10$ dBfs and no higher than 0.00009% over the top 30dB of its dynamic range through bass and midrange. At 20kHz distortion falls between 0.0001-0.0004% over the top 30dBfs [see Graph 1, below, and note the Y scale now expanded from  $+20$  to  $-140$ dBfs from  $-120$ dBfs]. The only competition faced by the Vivaldi One in technical bragging rights is from Chord's similarly innovative DAVE DAC [*HFN Apr '16*].

The proximity of the multiple PSU's inside the Vivaldi One may account for the minuscule increase in 50/100Hz-related jitter from 10 to 50psec here, while the Ring DAC's uncorrelated noise 'skirt' is also still visible [red spectrum on Graph 2, below]. Interestingly, both correlated and noise-like jitter are lower via DSD at 22psec [black spectrum]. Frequency responses depend on choice of filter [see boxout, p33], with Filters 1-4 delivering a ruler-flat  $\pm 0.05$ dB (20Hz-20kHz) with CD media albeit with reduced stopband attenuation (125dB, 35dB, 12dB and 6.1dB, respectively). Filters 5/6 offer a full 125dB stopband rejection with a  $\pm 0.04$ dB response flatness – Filter 5 is a minimum phase type with significant post-ringing and Filter 6 a linear phase type with lower amplitude, but more extended, pre/post ringing. PM



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



**ABOVE:** High resolution jitter spectrum comparing 48kHz/24-bit (red, with markers) and DSD (black)

### HI-FI NEWS SPECIFICATIONS

Maximum output level / Impedance	5.88Vrms / 560mohm (XLR)
A-wtd S/N ratio (LPCM / DSD)	117.0dB / 116.5dB
Distortion (1kHz, 0dBfs/-30dBfs)	0.00005% / 0.00009%
Distortion & Noise (20kHz, 0dBfs/-30dBfs)	0.00024% / 0.00035%
Freq. resp. (20Hz-20kHz/45kHz/90kHz)	+0.0 to -0.0dB/-0.7dB/-7.4dB
Digital jitter (48kHz/96kHz / DSD)	50psec / 45psec / 22psec
Resolution @ -100dB/-120dB	$\pm 0.1$ dB / $\pm 1.5$ dB
Power consumption	34W (1W standby)
Dimensions (WHD) / Weight	444x220x420mm / 27.4kg