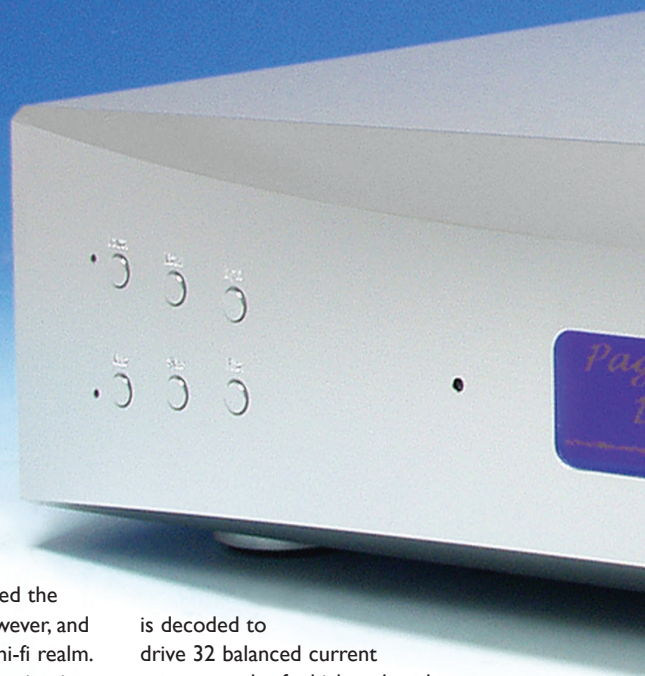


# Ring Tone

David Price attunes his ears to the latest incarnation of dCS's glorious Paganini DAC, sporting the company's legendary Ring DAC electronics...



In these days of fiscal instability, credit crunches and general industrial woe, surely there can't be *that* much of a market for £10,000 digital to analogue convertors? Aside perhaps from certain impossibly priced turntables, if ever there was a luxury object that you wouldn't think people would want right now, then this would surely be it. Yet the £9,599 dCS Paganini DAC has made a real name for itself, despite the prevailing economic squalls, managing to justify its place in life as one of the most desirable digital products around - at least to those who can afford it.

Having spent a couple of weeks with this distinctively styled, uniquely designed and (for yours truly at least) prohibitively priced bit of kit, I can see why it hasn't fallen victim to the slings and arrows of outrageous economic fortune. Whilst your average merchant banker may have cancelled his Koenigsegg and foreclosed on that Bermudan beach bolt-hole, if his ears are still in working order then I'd suspect he'd be telling his accountant to file the dCS under 'capital investment' rather than 'expenses' and duly going ahead with the purchase. You see, it delivers digital sound the like of which I simply haven't come across before.

The reason for this is not because it has a particularly well engineered power supply, a trick tube analogue output stage populated by an unusual strain of ultra-rare new old stock mid-fifties Mullards, or the world's best implemented aftermarket oversampling chip. Instead, the dCS Paganini DAC is, like all other dCS products, the proud custodian of the company's patented Ring DAC. As its name suggests, Data Conversion Systems started in the late nineteen eighties selling digital systems for military applications.

The company soon followed the passion of its creators however, and moved into the specialist hi-fi realm. The Ring DAC of the early nineties proved the jewel in its crown so to speak, offering a completely fresh approach to the job of changing ones and noughts to different voltages.

Whereas almost all DACs and/or CD players on sale throughout the world use bought-in, off-the-shelf digital-to-analogue conversion integrated circuits (and associated digital filtering ICs), dCS do not. With off-the-shelf electronics, hi-fi manufacturers become little more than box-stuffers, implementing someone else's ideas as best they can. But dCS developed technology that doesn't exist on a single chip, and can't be bought from your local electronics components supplier. The patented dCS Ring DAC circuit uses around forty integrated circuits, none of which are DAC chips. Instead, the circuitry uses Field Programmable Gate Array (FPGA) chips, Digital Signal Processing (DSP) chips and a microcontroller system, all of which run code developed and maintained by dCS. This means that the Ring DAC is essentially custom software 'stamped' into programmable memory chips, rather than a mass produced integrated circuit such as Philips' original TDA1540 DAC chip.

The Paganini DAC naturally uses the latest version of the Ring DAC package. Essentially it's a clever working compromise between multibit and Bitstream DACs, being the 5bit, 64 times-oversampling system first seen in the early nineteen nineties dCS Elgar (albeit in considerably evolved form), and is claimed to produce exceptional linearity across the dynamic range. All data presented to the Ring DAC is oversampled to the DAC's native 5bit format (at about 3MS/s), and this

is decoded to drive 32 balanced current sources, each of which makes the same contribution to the output. The drive to the current sources is rotated randomly (hence the 'Ring' appellation), meaning that any mismatch in the DAC circuitry appears as noise rather than distortion of the original data word, thus improving linearity. As well as this, a sophisticated multi-mode phase locked loop (PLL) is used to significantly reduce clock jitter.

The Paganini DAC has standard AES3 and S/PDIF digital inputs, as well as IEEE1394 interfaces designed to be used primarily with DSD from the matching £8,999 Paganini transport. It can either work with its own master clock (and indeed clock the transport if needed), or it can be locked into an external word clock such as the £4,499 dCS Master Clock. For the purposes of this review, I had one of these to hand for comparison, but did the bulk of my listening without it. Most of the listening was done with a high end Sony CDP-R1 transport, but I tried a number of sources, even a lowly Cambridge Audio DV30 DVD player!

The front panel of the dCS Paganini DAC is, needless to say, a striking apparition. The fascia is an elaborately machined, and very thick, chunk of machined aluminium, and it sports a backlit dot-matrix LC display showing the input selected, clocking status and sampling frequency amongst other things. I wouldn't say it's the most beautiful thing I've seen, but it is purposeful and switch-offable. The DAC is also notable for its large volume control knob, so it can be used both as a DAC and a line level digital preamplifier; an excellent feature. Maximum output can be either two



or six volts to suit different amp/speaker combinations. Four filters are provided in DSD mode to allow listeners to tailor system response. The 460x400x110mm, 11kg casework is of excellent quality but still, I would gently point out, not up to the exquisite standards of rival Japanese high end designs.

### SOUND QUALITY

You don't have to be *Hi-Fi World's* most eagle-eyed reader to know that I'm a fully paid up member of the analogue appreciation society. In fact I worry that I've almost become a caricature of myself, turning up as I do on press trips with a Sony cassette Walkman hanging out of my breast pocket, when all my fellow hi-fi scribes tout the latest iPod weaponry. With this in mind, I remained sceptical of the dCS's aural abilities right through the set-up and warm up process, until the moment I pressed 'play' on my CD transport...

The most profound, defining characteristic of the Paganini DAC is its sheer lack of grain. It is defiantly smooth and open sounding, in a way that I've not heard from any other digital to analogue convertor. But this isn't smooth in the sense of a Bitstream DAC that's been further tweaked with an ever-so-slight top-end roll-off. Where the latter gives you a dull and slightly dusky sound with workmanlike but unexpressive dynamics, the dCS gives an intricate, almost personal rendition of the music it is fed, with oodles of light

shone on the mix.

The result is CD sound with a surprising evenness and finesse to it, devoid of almost all of its upper midband glare. Even compared to seminal CD players like Oracle's CD1500/II reviewed a couple of months ago (at roughly the same price) and Naim's considerably more expensive CD555/PS555, there's a satin smoothness to the sound where others would finish it with a coat of gloss. This lets you hear 'into' the mix, whereas other high end digital products, brilliant as they may be, seem to throw the mix at you instead. Simply Red's 'Fairground' bristled with detail, where normally this curious mid-nineties mix sounds either opaque and impenetrable or glassy and nerve-jangling. Suddenly, I could see that it wasn't an impossibly poor recording, just one that simply didn't sound good outside the studio. The complex percussion suddenly slotted into place, rather than hovering around the beat, giving things a real sense of direction where normally there is none. Vocals snapped into focus through the dCS, flattering singer Mick Hucknall rather than hindering him.

The Paganini DAC doesn't have a naturally propulsive nature. It's not like you could ascribe any particular character to it like you would, say, a machine with classic Philips TDA1541 DAC chips inside. It doesn't want to rock you, take the role of 'an impact player', coming on to steal the show. This means that just as it can unpick

the knotty mix that is 'Fairground', it can render the strains of Al Jarreau's 'Summertime' with remarkable ease. One minute it's doing heavily sequenced mid nineties electronic pop without so much as a bead of sweat on its brow, and the next it's lilting through some slick 'dinner jazz' (if you'll pardon that dreadful phrase) like it was born to be. Were it not such an unerringly neutral machine, it would have given a masterful rendition of one and a hash of the other; as LJK Setright used to say, it is for the musician to have character and not the hi-fi equipment.

'Summertime' issued from my loudspeakers as it had been sugar-coated and then vacuum-packed in candyfloss for good measure. The album from which it comes, 'Tenderness', a mid-nineties recording produced by Marcus Miller, is a high watermark production-wise, and the dCS Paganini DAC showed why. It has such a tidy, orderly sound yet never sounded in the slightest bit dry or mechanical; think the very best vinyl, likely through a broadcast direct drive sporting SME Series V tonearm and Lyra Titan moving coil. I was struck by the sheer expanse of the soundstage, and the pinpoint precision of the instruments and musicians without the recorded acoustic. There was a massive, almost disconcerting, sense of space to the recording, the like of which I've not heard from 16/44 Red Book digital before. Tonally the dCS was a joy too; saxophone sounded reedy and





**CONNECTIONS**

- 1x stereo pair XLR analogue, (2V or 6V switchable)
- 1x stereo pair RCA phono analogue
- 2x IEEE 1394 digital inputs (for dCS-encrypted DSD; 1 bit data at 2.822MHz)
- 2x AES/EBU female XLR digital inputs (24 bit PCM at 32, 44.1, 48, 88.2 & 96kHz or as a Dual AES pair at 88.2, 96, 176.4 & 192kHz)
- 2x S/PDIF digital inputs (24 bit PCM at 32, 44.1, 48, 88.2 & 96kHz)
- 1x BNC (word clock input at 32, 44.1, 48, 88.2 & 96kHz)
- 1x BNC (word clock output; 44.1kHz In Master mode)

breathily but never harsh or searing as the soloist went up and down the scale. Piano sounded eerily realistic too, with a tangible solidity normally only heard from digital running at higher resolutions; harmonics gleamed like sunlight on the morning sea.

Nick Drake's 'Hazy Jane II' was another ear-opener for me. On CD, I always tend to migrate to electronic music, feeling it does this the least badly, so an early seventies analogue recording of folk (brilliant as it may be) wouldn't have seemed a happy partner for the little silver Frisbee. Nonetheless, the dCS was able to showcase the delicacy of the original recording from this remastered Island disc, and the subtle beauty of Drake's vocals shone through. The DAC's combination of smoothness and forensic low level detail once again made this an unexpected treat; lesser CD playback systems simply fail to get as far inside the recording as the dCS. Strings had a magical, romantic quality, cymbals a soft yet deliciously delicate demeanour; not screeching violins and crashing hi-hats here. And interestingly, the sound of plectrums against steel strings on a guitar was carried with beguiling subtlety whereas it's normally little more than noise on lesser systems.

Interestingly, it was here that the dCS Master Clock pushed the DAC up still higher in my estimation; even though it's designed primarily for driving the Paganini transport in conjunction with the DAC, switching it in added a fraction more focus even when the DAC was flying solo.

Slotting Bach's fifth 'Brandenburg Concerto' (Diego Fasolis, I Barocchisti) into the disc tray and sitting back, I again found myself beguiled by the dCS's gentle but hypnotic rhythmicality. Whereas a Naim CD555/PS555 almost adds a rock drummer and a backing band to this recording in its desire to push

the movement along to a resounding climax, the dCS sits back, pulls in the slack and lets the music move along in its own way, unhurried yet utterly entrancing. It also affords a massive sense of space to the proceedings; I've never heard Red Book sound as expansive as this. Then there's the tonality to the instruments; the Paganini never delivers the warmth of a top turntable playing an all-analogue recording, yet it still sounds oddly vinyl-like in the delicacy with which it brings individual instruments to life by rendering them so realistically. By comparison, almost every other DAC I've heard sounds like it's a digital scanner with the colour balance ramped right down.

**CONCLUSION**

This is a very 'matter of fact' sounding device, which is to say it lets the music's essence out, rather than trying to impose another one on it. In a way, the dCS sounds curiously unimpressive. Given its stratospheric price and arresting visual presentation, the first few bars of any given song can sometimes elicit an "is that it?" type response; you find yourself expecting to be commanded by its presence, summarily shoved back in your seat or cowering behind the sofa. But this isn't the Paganini's style. Instead, its main aim in life is self effacement; it's the DAC that doesn't want

to be there.

This is the main difference between it and rival high end DACs and CD players I've heard; all have impressive, obvious and (usually) very enjoyable characters, whereas the dCS seems to regard discretion as the better part of valour. It's just there, getting on with the job, sounding supremely open and organic, with an amazing lack of grit, brightness or any other perceptible character trait of the positive or negative variety. This, I would suggest, is its great achievement; just like good vinyl you can sit yourself down and listen for hour after hour, transfixed with the music not the medium. It's a massively high price to pay for such a privilege, but I'm sorry to say that it's worth it.

**REFERENCE SYSTEM**

- Sony CDP-R1 CD transport
- Esoteric P30 CD transport
- Sugden IA-4 amplifier
- Audio Research VSi60 amplifier
- Yamaha NS1000M loudspeakers
- Quad 989 loudspeakers

**VERDICT** Superlative, state-of-the-art modern DAC with a uniquely 'undigital' sound.

**dCS PAGANINI DAC** £9,599  
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 +44 (0)1799 531999  
 www.dcsLtd.co.uk

- FOR**
- organically musical
  - expansive soundstaging
  - profound focus
  - lack of distortion
  - engineering depth
- AGAINST**
- nothing

**MEASURED PERFORMANCE**

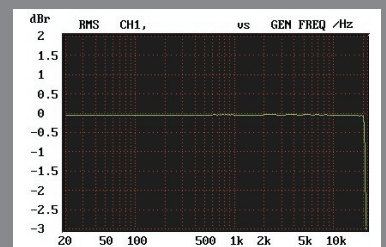
With a 44.1kHz sample rate signal the Paganini was super flat out to 21kHz our analysis shows; there was an almost uncanny absence of anti-alias filter influence. With 48kHz sample rate signal the Paganini gave a very similar result, being flat out to 21kHz again. The small shortfall from the expected 24kHz bandwidth limit (less than 1kHz or so for the filter) is not due to the DAC but the upper limit of our Rohde & Schwarz stepping digital generator. Performance was identical from the balanced XLR output and unbalanced phono socket output, and also between all four filters. However, above 21kHz only Filter 1 gave a 'brick wall' response with no throw up. Filter 2, 3 and 4 gave progressively more out of band information, mimicking an analogue roll-off, but unlike analogue roll off such a digital roll off is usually an image that doesn't correlate well and results have to be judged subjectively.

Distortion levels were very low right down the DAC's dynamic range, from 0.0003% at 0dB to a low 0.21% at -60dB, down to 4.5% at -80dB. These figures compare with the best DACs available although they do not improve on them, a 111dB EIAJ Dynamic Range value being one dB or so below what is possible. Results were identical from the balanced and unbalanced outputs.

The Paganini measures well in all areas. It accepts up to 24bit code at 48kHz and gives low distortion. Filtering can be changed to affect the out-of-band roll-off, making it 'tunable'. NK

Frequency response (-1dB)	
CD	2Hz - 21kHz
Distortion	%
0dB	0.0003
-6dB	0.00026
-60dB	0.21
-80dB	4.5
Separation (1kHz)	121dB
Noise (IEC A)	-113dB
Dynamic range	112dB
Output	2V

**FREQUENCY RESPONSE**



**DISTORTION**

