



Pre-position

David Price finds Audiolab's new 8200CDQ CD player/DAC/preamp fits in very nicely with his hi-fi lifestyle, thank you very much...

There are few products that I've waited for longer than this. As hi-fi launches go, it began to lapse into 'Kate Bush new album syndrome' – by which I mean it was rumoured for years, then announced, then shown to select members of the press, and then finally... *nothing*. Then another very long wait. But at last, as if by magic, the Audiolab 8200CDQ arrived at World Towers, a fading distant memory made real at last!

It was worse because I'd actually heard one about a year ago; it was precisely this that had me holding my breath right throughout last winter and this spring. Its designer John Westlake had blasted over from his Eastern European home in his S-Class AMG Merc, complete with his son who'd come along for the ride, to demo an 8200CDQ to me in my own house. It was when we put it up against a £12,000 dCS DAC, and the £950 Audiolab had by no means disgraced itself, that the penny began to drop that

this was a special digital product.

I suppose I shouldn't have been surprised. I've been well aware of Mr Westlake's CV and how handy he is with a piece of veroboard and a few silicon chips for many years now. One of the first things I reviewed for *Hi-Fi World* back in 1994 was the Pink Triangle Da Capo DAC, and this prompted me to – when my brother asked me for a budget CD player tip – recommend the purchase of a Cambridge Audio CD4SE. He still has that mid nineties silver disc spinner, and it still sounds superb; not surprising considering it was another box of bits first put together by John... In both cases, we had curiously, oddly, un-CD-like machines making music in a way that their price rivals frankly couldn't. The interesting thing to me was they didn't sound 'more analogue', they just sounded 'less digital' – taking them into a wonderful 'middle world' where music really resides.

So, here we are with the 8200CDQ, which is a CD player, digital preamp (i.e. DAC with input switching) and analogue preamp rolled into one. It's basically the

8200CD on steroids, and indeed John Westlake says the additional time spent on getting the CDQ right after the launch of the CD has made it all the more desirable. I don't know about that, but I can certainly testify to whoever's interested that it was a *lot* of time!

As well as being a CD player, the 8200CDQ has a choice of two preamplifier modes; digital or analogue. In digital mode you can switch between two optical (24/96), two coaxial (24/192) and one USB (24/96) inputs (or of course the inbuilt CD player) and control the volume digitally via the DAC. In analogue mode there are an additional three line-level analogue inputs.

The preamplifier section is fully balanced and all analogue input signals are converted to balanced form, helping to reduce distortion and noise. There's also a direct-coupled and discrete Class A headphone amplifier, accessible via a socket on the front panel. In both digital and analogue preamp modes, the output level can be increased to levels above 0dB to give real gain.





The player is notable for using the American ESS Technology Sabre DAC, a device which came out about three years ago but which has appeared in very few hi-fi products to date because – say Audiolab – it is too expensive. It's very sophisticated, with 256 individual DACs per channel within the chip, to increase inherent conversion resolution, while also reducing static conversion errors. The conversion process within the Audiolab CDQ results in the 512 DAC elements each operating at 84.672MHz, which makes for a conversion process that's switching 3,840 times faster than the typical audio upper bandwidth of 22kHz, thus keeping it well away from the human ear. As per Naim's DAC, Audiolab's CDQ operates either in integer Oversampling or Upsampling mode, depending on the input sample rate. All digital word lengths are extended to 32bits for internal processing, and it will accept up to 24/96 when working in DAC mode.

The 8200CDQ features in-house Audiolab developed, user selectable digital filters for optimal listening and measurement modes – in addition to the more conventional types for easy comparison – allowing the user to tune the CD/Q performance to their preference depending on system and musical tastes. They include Optimal Time Domain NOS (preferable for audio performance, slow in-band roll off), Optimal Time Domain ZS (preferable for audio performance, no in-band roll off), Optimal Frequency Domain (Measurement Mode filter), Standard Fast roll off and Standard Slow roll off.

In addition to the standard

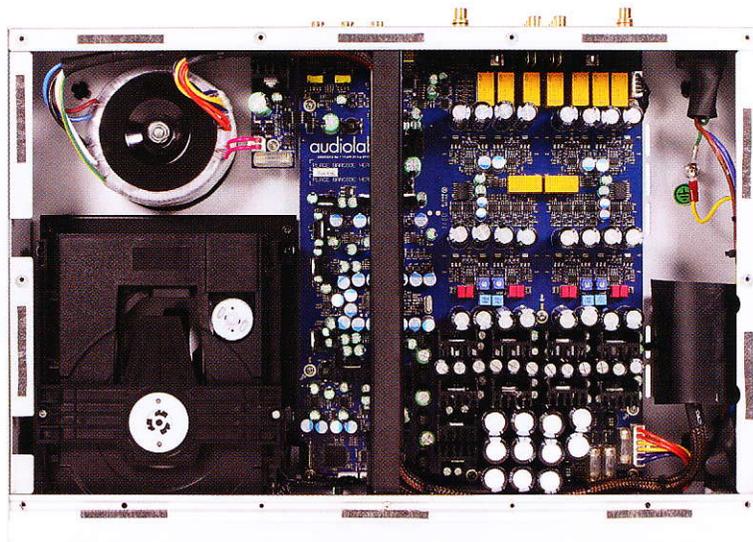
supplied filters, the CDQ allows user upgradeable digital filters via USB download, insuring future-proof customisable performance.

Along with being especially proud of the filtering, John Westlake has taken a lot of trouble over jitter reduction; a proprietary high performance discrete master clock is fitted. While the Sabre DAC's sample rate converter achieves 100% jitter attenuation within the digital domain it's claimed, external analogue domain induced artefacts via RF breakthrough and PSU coupling affect the DAC's ultimate sonic performance. So for this reason, Audiolab developed their Cascaded Asynchronous Time Domain Attenuator circuit. This is to isolate the DAC substrate from the potentially detrimental analogue domain of effects from non-synchronous digital input data. To achieve optimum performance, three identical cascaded stages are used,

with each individual stage providing increased isolation, Audiolab claim. It also sports an Asynchronous USB mode, where the DAC has total control over the timing of the audio data transmission, effectively clock-linking the computer to the DAC's internal clock.

Careful attention has been paid to the analogue output stage; the CDQ has true balanced analogue XLR outputs, connected directly to a pair of proprietary AudioLab FET based Class A stage buffers per channel. This results in a serious improvement of RF IMD rejection and no measurable RF rectification, Audiolab say.

The unit is fully DC coupled with no AC coupling capacitors. High tolerance polypropylene film/foil capacitors and special surface mount resistors are used in the signal path. The player features a total of 34 regulated supplies, 14 of which are



ultra low noise discrete designs, combined with LC filtering for maximal interstage and RF isolation; a total of almost 250,000µF of bulk storage capacitance is used within the CDQ. Each section of the player is independently regulated, Audiolab says.

With such a lot of work gone into it, the 8200CDQ is still relatively innocuous for a standard sized hi-fi separate. Despite using aluminium throughout its casework, it's quite heavy by £950 CD player standards. I must say the finish is excellent, and the new style brushed aluminium fascia looks swisher than the previous painted design, even if it has lost a little of its character. Black or silver finishes are available.

SOUND QUALITY

Having heard a pre-production prototype of the 8200CDQ in my own system, I wasn't as bowled over by its sound as I should have been – because I knew what to expect! Yet our early production review sample is better even than I remember the first machine, and that's no small claim; here is a sub-£1,000 digital disc spinner (and preamp, and DAC) that simply doesn't sound anything like its price. Put it this way; having spent more than a little time of late with the £2,500 Meridian G08.2 and the £2,995 Leema Antilla IIS Eco, the £950 appeared totally relaxed in such exalted company...

Indeed, it was quite spookily close to the latter in its general character, giving a slightly relaxed yet compelling sound; a little soft (or should I say 'not hard like most CD'), ever so slightly on the warm side of neutral (not a typical Audiolab trait), wonderfully expansive with a cathedral-like soundstage, and musical in a way that simply isn't associated with digital. The Audiolab 8200CDQ is a very accomplished machine in every respect, but for me its stand-out talent is to make music flow onwards and upwards, relentlessly yet caressingly, in a way that normally only good vinyl can.

Kicking off with some classic progressive rock, and Egg's 'Seven is a Jolly Good Time' is a characteristically spacey late sixties piece, all phased vocals and jangling guitars, backed up with some thick electric organ action and some wonderfully louche rock drumming of the Keith Moon school which could only have come from that time, with its profusion of exotic recreational substances (so I am told). This track is normally murdered by CD, which invariably sounds matter of fact, analytical and largely disinterested in the curious musical

happening it is supposed to recreate. But not so the Audiolab, which sounded almost enraptured. Certainly its performance was scintillating, capturing its madcap rhythms with utter faithfulness and ease where normal CD players simply walk on by, preferring not to bother. At the same time, a wonderfully full and thick bass punched along the rest of the song, underpinning a midband which was vast in scale; vocals towered over this, and small cymbals glistened

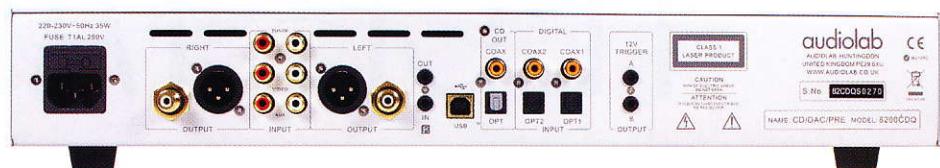
"after the Hong Kong handover, I retreated into my lab, only emerging out for the occasional meal and sleep; the origins of this design date back to then..."

behind sweetly.

Uriah Heap's 'Come Away Melinda' crystallised what's special about this silver disc spinner – the midband. Vocals were spectacular; tonally full and tactile, while the backing acoustic guitar part was rich yet precise. Set behind this, the Mellotron was a joy to behold, so natural in timbre (again normally an instrument that only LP can really get to grips with). The closing cymbal flourish was again quite arresting, the player giving a beautifully vibrant and tactile rendition of wooden sticks hitting metal, rather disguising the fact that I was listening to 16/44 Red

good enough to be used with top quality sources, but that there's very little wrong with its built-in disc transport. Interestingly, powered by my MacBook Pro via USB things took a small step backwards; the Audiolab made very nice music indeed but there was a slightly diffuse quality to standard 16/44 WAV files that I didn't get when playing their CD originals. It made a fine stab; musical and smooth, but I still feel that computers have a way to go to beat purpose-built disc transports.

Fed with 24/96 FLAC in the shape of the Beatles' 'While My Guitar Gently Weeps', the 8200CDQ



Book CD.

Jumping ahead in time a decade, and I found myself listening to UB40's 'King' from 'Signing Off'. A simple production done in a low rent studio, it nevertheless soared around me, the Audiolab throwing out a vast left to right stereo image as if someone had hit a giant stereo wide button. The track sounded truly cavernous, with instruments given loads of space and yet not one encroached on another to blot it out; the way the 8200CDQ did that great high end hi-fi trick of letting all the elements of a mix play along with one another with complete stability and clarity, was pure pleasure. Again, it showed itself as a slightly warm performer, filling the room with a deep and tuneful bass, yet this in no way made for a fat, bloated sound. Instead,

gave superb results, with a vast three dimensional soundstage and a gorgeous delicacy to Harrison's voice.

Experimenting with the filters is a whole new game of its own; early on I elected to use the Optimal Transient options which gave the speediest sound and the most natural rhythms, but there's plenty of choice for those willing to experiment. I suspect most will fix on their favourite and never change it, but those with wildly different source material may well flip between the various options more often.

As an analogue preamplifier the 8200CDQ is excellent in its way, offering a very clean and open sound that's characteristically Audiolab, although you'd have to say that a good budget tube design such as Icon Audio's LA4 gives a more spacious

and three dimensional sound, and better rhythmic flow – at the expense of the Audiolab's forensic detail of course.

CONCLUSION

As a standalone CD player, this is one of the most impressive new products I've come across in a long

while – especially at its amazing price of under £1,000. I'm quite serious when I say it's up there with many three thousand pound designs in most respects; only a slight lack of deep bass extension and grip, allied to outright dynamics, puts it behind – and in some aspects, such as rhythmic flow, it's arguably ahead.

Factor in that brilliant built-in DAC, USB connectivity and a very decent transistor preamplifier and it's an absolutely staggering package at the price. It's at times like this that I run out of superlatives, having used them all in previous reviews, so I'll put it this way – the new Audiolab 8200CDQ is a bit special, actually.

MEASURED PERFORMANCE

The analogue preamplifier has a gain of x4 (+12dB) maximum and can deliver 4V at its phono output before output overload occurs, a low value but sufficient to drive all power amplifiers. The XLR output has double the gain and can deliver double the output too, 8V maximum. So if you need high gain XLR is a must, but an XLR-to-phono lead or adaptor could be used. Frequency response was ruler flat across the audio band.

Frequency response rolled down above 12kHz with the Optimal Transient Filters, our frequency response analysis shows, an optional filter characteristic that can make music processed through the DAC sound warm. This included CD played on the preamp transport tests confirmed, the Audiolab measuring much like Chord Electronics' DAC64

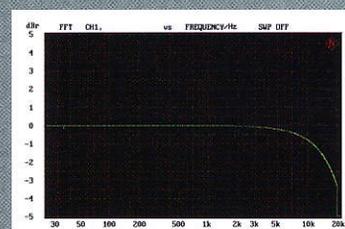
in this respect.

Distortion was low and EIAJ Dynamic Range high at 98dB, if not quite up with the best (100dB). Output was 2.3V with volume set to 0dB but up to the maximum possible 4V / 8V with volume turned up.

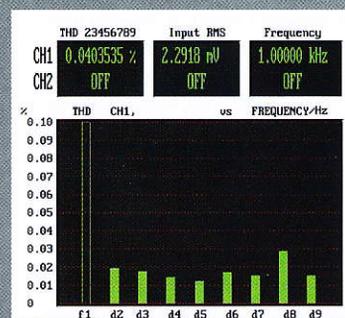
The 8200 CDQ measures well and should sound good. NK

Frequency response (-1dB)	2Hz - 12kHz
	2Hz - 21.2kHz
Distortion (%)	0.0008
0dB	0.22
-60dB	
Noise (e.i.n.)	3µV
Separation (1kHz)	102dB
Noise (IEC A)	-106dB
Dynamic range	98dB
Output (phono/XLR)	4/8V

FREQUENCY RESPONSE



DISTORTION



TECH TALK

David Price talks to Audiolab's John Westlake...



DP: Which version of the ESS Sabre 32 DAC do you use - is it the Reference? If so, why did you choose it?

JW: Yes - we use their top and most expensive DAC, which – apart from ESS's proclaimed unique 32bit Hyperstream DAC architecture and Time Domain Jitter Eliminator – has a direct voltage output from the DAC array. No poor quality internal op-amps or IV conversion here!

In my very early twenties I designed one of my very first commercial DAC designs – the Pink Triangle DaCapo. This was a discrete DAC with two DAC elements per channel – four DAC elements for a stereo DAC. The ESS DAC takes

this many stages further with 1024 DAC elements for a stereo DAC – that's 512 DAC elements per channel. Both the DaCapo and ESS's DAC's produce a true voltage output node.

This direct voltage output allows us to passively filter RF products (with no active electronics) which are produced from the digital to analogue conversion process before they can cause potential RF related intermodulation distortion products in the very sensitive front-end circuits of the analogue output stages.

Simple Passive filtering can only attenuate these RF products to a reduced level – we then use

JFETs in the front-end of our Class A analogue stages which offer significant immunity to RF-demodulation. RF leakage from the digital conversion process is one of the main reasons we believe conventional digital designs have a tendency to sound hard and bright. The use of the JFET front end degrades the SNR, but in our opinion the sonic benefits outweigh the degraded technical measurements – sound quality over performance figures.

DP: Is the digital filter your own design? What's your favourite setting?

JW: Yes, the filters are developed by us. Dominik (the other half the design team) is responsible mainly for the software side of the product, although he's also been very supportive on the hardware side. The Optimal Spectrum and without question our favourite Optimal Transient type filters are direct descendants from our earlier R&D on FPGA based filter and modulator structures. The Optimal Spectrum filter is a 'perfect' digital filter at least from the frequency domain perspective – in that it achieves full attenuation by FS/2 (half the sampling frequency – as stipulated essential for 'Aliasing free' digital conversion by the basics of sampling theory). This differs from most digital filter designs, which only achieve -6dB at FS/2 to maximise the silicon area (i.e. reduce cost).

While the Optimal Spectrum filter has almost ideal frequency domain performance, it introduces both pre and post ringing within the time-domain. The Optimal Transient types on the other hand can be considered the total opposite of the 'Perfect Frequency Domain' filter – trading poorer frequency domain performance for 'optimal' transient performance – with zero pre or post ringing.

There are three versions of the Optimal Transient filters – and here's where it gets both interesting and frustrating! All three versions achieve exactly the same digital data – the final 1s and 0s are mathematically identical – but the calculations processed differently within the DAC. Think of it this way; $4+0 = 4$, $0+4 = 4$, $3+1 = 4$, $1+3 = 4$, $2+2 = 4$; there are many ways to arrive at the same answer, but achieved via different mathematical calculations. These calculations are being processed on the DAC silicon itself, which introduces second order effects such as modulation of the internal PSU, modulation of the die level conversion clock – and even direct RF modulation across the silicon die itself. How much do these 'second order effects' affect the sound quality? Well, by listening to the first two permutations of the Optimal Transient filters (Optimal Transient and Optimal Transient XD) by a large amount is the surprising answer.

The Optimal Transient DD filter is a bit of wild card, as it takes into consideration the second order effects and applies corrective processing to nullify these effects – but once again its time domain and

frequency domain characteristics are the same as the first two variants. Minimum Phase filter is a hybrid of the two main Optimal types, in that it has reasonable frequency domain performance with no pre-ringing in the time domain. The Fast and Slow filters are standard digital filter types – mainly included for comparison – personally I give them very little time.

DP: If there's one outstanding piece of the CDQ's design, what is it?

JW: With over 30 PSU supply rails – close to 250,000uF of supply decoupling, a discrete ultra low short term phase noise (ultra low jitter) clock oscillator, discrete fully balanced Class A output stages, fully balanced analogue preamplifier signal path, and with all active gain stages operating in Class A, and no less than 1,700 components, generally we are very proud of the design...

Maybe stating the weakness would be easier – the earlier LCD display on the CD/CDQs drew a lot of flack (granted, not our proudest moment) – now its been updated to the OLED display (Older units can be returned for update to the OLED display). So the only real complaint we get now is the CD Tray, but as its only function is to load and unload the CD onto the optical block, it has no effect on sound quality. I'd rather spend our design budget on components that matter for sound quality than cosmetic items.

DP: How long did the design take in total? What extra development work was done, to cause the long delay?

JW: When does R&D end and product design start? I've been researching and developing DAC technology since before DaCapo – and in greater depth since the Hong Kong handover when at the end of the party and era, I basically just retreated into my Lab, only emerged for the occasional meal and to sleep. The origins of this design data go back to way before we started to work with Audiolab – it was to be launched under our product brand (Dominik's and myself) – but really the last thing the hi-fi industry needs now is a new brand. Audiolab has given us the ideal platform to launch our designs.

The more recent delays in the launch of CDQ where primarily due to production issues – really

lack of production line space. The overnight success of the Audiolab 8200CD has our production lines operating three shifts per day but we are still running on backorder. Component sourcing has also been an issue as the sales of the CD are beyond Audiolab's expectations, with 1,700 components in each CDQ – that's millions of component parts a month – it only takes one component shortage to bring the whole manufacturing process to a rapid halt – the recent disasters in Japan caused major headaches for the whole industry.

At the same time, we also had to be very careful with the quality control – expanding too fast and without care, quality is normally the first to take a hit. With lessons learnt from the CD, we deliberately have held-off CDQ and DQ to ensure we are able to maintain the quality level. CDQ / DQ benefited from this unexpected delay with the addition of the 12V Trigger (not on the very first CDQ units) – and the improvements in sound quality...

DP: Which sounds better - the 8200CD or the CDQ?

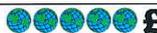
JW: By quite a margin the CDQ – the CD and CDQ where originally meant to sound identical apart from the additional preamplifier features of the CDQ – however in the time interval between CD's release and the CDQ's we where able to make changes in component quality of the CDQ's PSU sections that had a big effect on sound quality.

DP: Is there a DAC/preamp planned?

JW: Yes, completing the CD / CDQ series is the DQ which is a CDQ but without the CD Section – so a DAC / line level preamplifier. A network music player is also planned – but we are waiting for the industry to settle down – everything I've tried is too complex to use, I don't want to be a computer engineer to listen to music! You will see more Apple-compatible products in the not to distant future...

DP: Are there any cool features hidden in the OS?

JW: Well not so much hidden as not-obvious-without-reading the manual; on the OLED versions of CD/CDQ, holding down the Time/Info button will expand the text size on the display. Holding down the Display button gives you eight levels of display brightness!

VERDICT  £

Superbly musicality allied to excellent versatility makes this a brilliant value package.

AUDIOLAB 8200CD £949.95

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FOR

- superb rhythmic flow
- midband transparency
- widescreen soundstage
- functionality, versatility
- design, build, finish

AGAINST

- the wait