

DAC Again!

MARTIN COLLOMS, HIS LAB AND A VARIETY OF COMPONENTS
DELVE DEEPER INTO THE NAIM DAC

MARTIN COLLOMS



Naim's first standalone *DAC* was launched last year with quite a fanfare including national and dealer roadshows, which is how I first got to hear it. Malcolm Steward gave it a good once over in the last issue (*Vol3 No4*) in a Naim system context, and here we're benchmarking the performance under alternative system arrangements, including the ground switch settings, different transports, plus a lab checkout.

This self-powered *DAC* may be augmented on its analogue side by the full size *XPS2* multi-output power supply, Burndy cable connected, leaving its internal power supply for the digital side. The well heeled might also consider using the much more costly *555PS* supply.

While some high definition material was used via the USB stick memory and an *iPod*, most listening was done with familiar CD material and via the S/PDIF interface. (It does not handle SACD.)

Sound Quality

Vanquishing those disappointing results obtained with that early *HDX* server/hard drive player, this naked *DAC* proved relatively insensitive to choice of transport, while different S/PDIF cables showed sound quality variations of about 5-8%.

We tried the Rega *Apollo*, Naim *CDX2.2*, Marantz *CD-7*, Micromega *CD10* and an ancient but trusted Meridian *200*. Most Naim-like for S/PDIF source was the *200*, followed by the Micromega and then the *Apollo*. Several rated SPDIF cables were used and Naim's *CD1* sounded best with the *DAC*, with Transparent *Digital* a close second; 75 ohm 'standard' BNC was also pretty good, but clearly inferior on clarity and dynamics.

All in all the sound quality score was an impressive 72, easily beating the *CDX2.2* and knocking on the door of the *CDS3*. It gave a wholly coherent, evenhanded and universally appealing musical performance, with very low coloration

or digital signature. It combines a neat balance of both Naim and general audiophile virtues that's remarkable at the price, and will embarrass many 'computer tech' *DACs* which might be highly praised elsewhere, but which sound disappointing when scrutinised under a genuine hi-fi microscope.

Used on its own the *DAC* had detail and depth, sounded upbeat, interesting and well focused, yet did not draw attention to itself. High treble was sweet and clear, the bass went deep and was well defined. There was nothing really to pick holes in, but would the bigger supply add more drama, greater kick yet more detail and bass rhythm speed?

We gave the *XPS2* a second shelf (the approved installation technique), and found the upgrade far from trivial, as Malcolm found in his review. The combination ranks with the best in its price sector with a classy 90 marks, nominally beating the *CDS3* reference (though cost of a required transport/audio feed for the *DAC* also needs factoring in). It set high standards in dynamics, dynamic expression, bass line tunes and timing, for rhythmic vitality, and invited a play-off against my *CDS3*. While the *DAC/XPS2* does score higher, the *CDS3* was slightly more musical and involving. The latter had a degree of 'connectedness' found one-box players where mechanism and electronics are housed in the same unit, which just seems to elude separate disc drive/*DAC* combos. The one might be superior numerically but you still might choose the other.

The Naim *DAC* sounded distinctly 'analogue' on better quality recordings. It was fluid, with low grain, very good resolution, and very low coloration or 'signature'. A stream of 'near excellents' was awarded for depth, focus, stage width and detail.

Intriguingly the super low jitter master clock and heavily buffered, protected audio data used in this *DAC* should in theory have totally suppressed transport and other digital audio source differences, never mind the type of coax cable used. But it did



Reference System:

Naim *CDS3*, Marantz *CD-7*, Naim *CDX2.2/XPS* players; Krell EVO 402, XTC Pre SE, ARC REF 5 amplification; Avalon *Eidolon Diamond*, PMC *fact.8* loudspeakers; Transparent *XL MM2*, vhdH *The First Ultimate*, Naim *DC1*, Burndy cables.

not. A similar result was found with the costly *DCS* replay systems with their equally authoritative master clock design. (*Vol3 No3*) Is this yet another triumph for the human ear over those predictions based on ‘zero jitter’ theory?

Experiments with the ground switch to correct connection issues in non-Naim systems suggested that this did have a significant effect, worth a few marks, and worth experimenting with. We scored ‘universal’ systems on the ‘float’ setting; ‘grounded’ took up to 7% away, with reduced rhythm, clarity and listener involvement. The reverse may well be the case in an all Naim system.

I was not much taken with the USB input performance, and agree with Malcolm that digital replay via an *iPod*, supposed to be OK in this ‘direct’ mode, is ‘limp’, if reasonably transparent and detailed. Maybe my ambition to find an ‘off the shelf’ portable player that works as a high quality digital music source will never be realised. Nevertheless the stick input can show a 10% or so relative gain for 24/96 over 16/44.1. Moreover a

subsequent A/B comparison using the S/PDIF input from a server showed still more advantage for hi-res, about 15% over standard CD 16/44.1, so this *DAC* is well future proofed.

Lab report

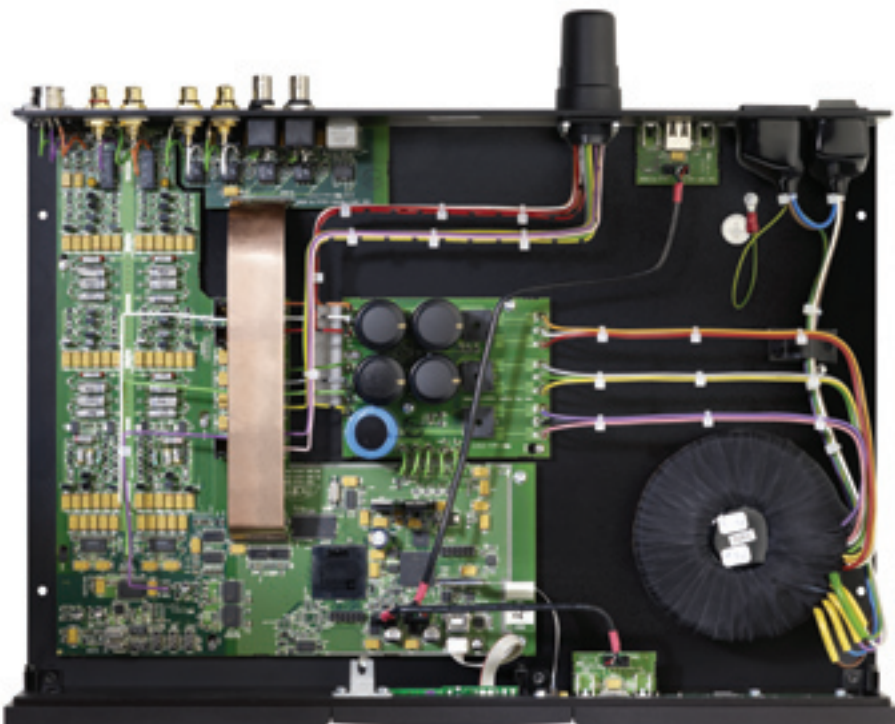
While this *DAC* has an inherent high definition audio capability, it also has an analogue output stage that has been voiced for sound quality, not some arbitrary lab performance standard. Since an output filter is used to keep higher frequency noise out of the subsequent amplifier, and since we can’t measure hi-resolution audio below an inherent noise and distortion floor, not all the hi-resolution tests could be performed in a way that revealed their technical advantage. For example, at full level both 24-bit and 16-bit inputs gave the same -89dB result for high frequency CCIF intermodulation (a fine result in any case). For the -10dB measurement the ‘meter’ read -88dB, but spectrum analysis showed that the difference product was actually a very good -95dB for a 24-bit input (see CCIF analysis). Tested at full level Red Book, 16-bit gave a textbook -95dB for noise and distortion (see 1kHz dithered spectrum analysis 24- and 16-bit input), where the hi-res 24-bit signal showed similar distortions but a beneficially lower noise floor. In fact this residual distortion is of analogue origin.

Naim claims low phase noise and low jitter, and a good indication may be found in a high dynamic range measurement of a pure 1kHz tone (see noise and jitter graph). This is an exemplary result, showing an extremely pure centre tone and very low levels of noise (essentially in the noise floor); second harmonic is very low at -110dB.

Linearity with 16-bit dithered signals was also excellent: -0.15dB at -70dB, -0.3dB at -90dB, and -0.6dB of error at -100dB. Moving to 24-bit gave accurate replay at -100dB, and just 3dB of extra noise at -120dB, which represents very good low level resolution and linearity.

Note that this *DAC* gives a slightly high output level, which can be a little misleading with A/B comparisons. Against the nominal 2V standard it gives 2.3V, an audible 0.6dB extra.

Channel balance is held within an excellent



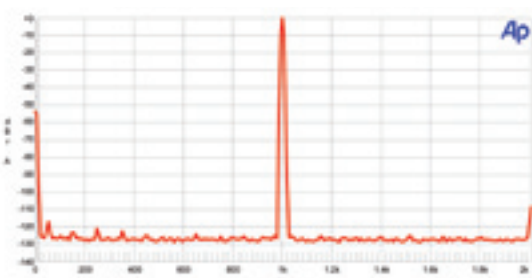
0.11dB over the whole range. The frequency response is essentially flat down to 10Hz, but slightly muted in the upper treble: -0.73dB by 20kHz, -1.4dB by 23 kHz, and steeply rolling off thereafter. Channel separation is excellent: 118dB at 20Hz, 116dB at 1kHz, and still 98dB by 20kHz. Output impedance is very low at 17ohms rising a little to 19ohms by 10 kHz. Signal-to-noise ratios are very good too: for 16-bit inputs I got 89db CCIR, 94dB unweighted (and there are no detectable hum components), and 98dBA. The 24-bit result comes out 104dB CCIR (1kHz wtd) and 112dBA, both fine results. DC offset is zero.

Conclusions

Performing very well in the lab for the preferred S/PDIF PCM inputs, the dynamic range is close to 24-bit on hi-res material and distortion is consistently low. The output will drive anything, but for critical comparisons do note the slightly above average output level. Jitter rejection is excellent and self-noise very good too, so the output is notably clean, and totally free of hum components.

Straight out of the box, the sound quality was exemplary at this price level, close to Naim's still excellent *CDS3*. The latter player is better of course, but adding the *XPS2* power supply upgrade with an optimum transport takes this *DAC's* sound quality somewhat above the *CDS3*, though not on every point. Nevertheless this *DAC* is a top performer on sound quality. It's good value for money and is effectively a universal design for both Naim and other audiophile quality components. Consequently, taking all into account, the new Naim *DAC* may be highly recommended.

Naim DAC 1kHz Noise and Jitter, High Resolution, 24 bit data

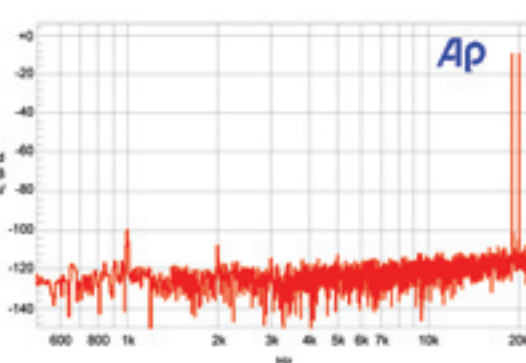


HIFICRITIC CD PLAYER TEST RESULTS			
Make NAIM	Date: 4/2/2010		
Model DAC	Ser.No. NS283887		
Distortion, THD inc noise 16 bit	20Hz	1kHz	20kHz
0db	-96dB	-95.6dB	-dB
-10dB	dB	-86.3dB	dB
Channel separation	dB	dB	dB
0dB	118dB	116dB	98dB
Frequency response	-dB	0dB	-0.73dB
Intermodulation Distortion	19kHz/20kHz 1:1		
-10 dB	0 dB output	-89dB	1kHz difference tone
		-96dB	
Signal to noise ratios	A wtd	CCIR 1k	Unwtd
Ref: 0dB	24bit/ 112	104	109dB
16bit	98	89	94dB
Channel Balance	R ch is reference		
	0.017dB	0.018dB	0.02dB
Linearity ref 0dB	-70dB		
		-0.15dB	
	-80dB		
		-0.2dB	
	-90dB		
		-0.3dB	
	-100dB		
		-0.6dB	
Maximum output level (1% clip)	100k Ohm load		
		2.295 V SE	- V Bal
	600 Ohm load		
		2.85 V SE	- V Bal
Output impedance	SE		
		18 Ohms	
Balanced	DC offset		
	Left 0 mV	Right 0 mV	
Size (WxHxD)	432 mm	70 mm	301 mm
Weight	5.6kg		
Prices: (DAC + XPS2)	£1,995 + £2,910		

Naim DAC 1kHz: With Dither 24 bit (violet) and 16 bit Normal



Naim DAC -10dB CCIF I/M 19/20kHz @ -90dB



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