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REVIEWED THIS ISSUE: NAIM NDS, C.E.C. TL3N/DA3N, WILSON AUDIO ALEXIA, LINN AKURATE DSM, AUDIOQUEST DRAGONFLY, GRADO SR80i, CAMBRIDGE AUDIO DACMAGIC 100, THINKSOUND TS02+, MICROMEGA MYDAC, GRADO SR325i, PSB M4U 2, MARTIN LOGAN MIKROS 70, CONCERT FIDELITY CF-08LSX2, BEYER CUSTOM ONE PRO, BOWERS & WILKINS P5, BEYER T70/T70P, GRADO PS1000, BEYER DTX 501P, BOWERS & WILKINS P3, VON SCHWEIKERT UNIFIELD-2, SENNHEISER IE80

The New Boss?

MARTIN COLLOMS ASSESSES NAIM'S NEW NDS FLAGSHIP, A NETWORK-CONNECTED DIGITAL AUDIO PLAYER/STREAMER/DAC

It was early 2012 when I and colleagues had the full press treatment for the launch of the *NDS*, but with so much review work undertaken since then I had rather forgotten the details. Was it a DAC, an audio streamer, or an internet radio? A USB stick-to-S/PDIF converter? A network to S/PDIF 'transport'? Or indeed all of these?

I do remember being mildly surprised that it came without a power supply, though this has been a long established feature of some high end Naim products. I also learned that it cost £6,500 unpowered, and it turns out that while the basic £1,585 *XP5 XS* supply option will get it working, and the 'next up', 'find a spare *XPS*' (£3,335) upgrade (which runs with one power umbilical) certainly won't be a null result, the *NDS* does not truly take off without a *555PS* (£5,485), which by design powers analogue and digital sections separately. Those able and willing to gild this lily could even go for the double *555PS* combination and have one driving each Burndy power umbilical, thus totally separating analogue and digital sections. This would take the total price to more than £18,000, the same territory as imported 'high end' DACs such as the MSB *Diamond Signature* series (which also has various hardware and power supply options). In context, this £12,585 Naim *NDS/555PS* combo may be regarded as the network equivalent of the long established *CD555* 'flagship' CD player

One significant benefit from attending the Naim do was the opportunity to compare numerous permutations and combinations of its *DAC*, network players and supplies. The options were laid out for us to audition on a comparative basis including the next down model, the *NDX* (Vol6 No3), (essentially a streamer version of the Naim *DAC*, see issues Vol3 No4, Vol4 No1). Monitoring via remarkably communicative active versions of the *Ovator 600* loudspeaker, the step change differences were plain enough at every system price point, even though I had little basis for judging absolute quality. Furthermore, these gains were essentially proportional to the extra cost of each step, so the hierarchical aspect of the range was clearly demonstrated ahead of this formal review.

Much audio equipment is getting more versatile but also more complex, providing innumerable options and settings, some not very obvious since they are frequently buried in menus and sub menus. My own MSB *Platinum Signature* DAC has its own unmemorable nest of menus, and resetting and/or altering modes usually requires reading a page or two of fine print.

I would recommend two readings of the *NDS* manual, if only to find out what you probably don't need to know. You will also need it to do subtle things, like turn the S/PDIF output on or off, or operate the reset. It also helps illuminate the near countless number of input/active modes which are selected by scrolling down lists. While the *n-Stream* App constitutes a great *iPad* remote control for your music library, and has volume provision for an associated pre-amplifier, it cannot replicate all the facilities of the supplied multi-function remote

MARTIN COLLOMS

control handset, aside from input selection. Too numerous to mention all modes, note that the *NDS* display may be auto-muted after selected intervals (for slightly better sound), and operational settings and outputs may also be configured.

The *NDS* is presented in full width Naim livery, with the classic one-piece extruded alloy shell casework which still dings worryingly (though this is intentional, and has no perceptible effect on the sound). Neatly presented with a bright and clear green OLED display, the 'triptych' front panel has just a memory stick input on the left, an illuminated badge in the middle, and the display alongside a cluster of nine pushbuttons on the right. The latter cover 'play/pause', 'input' (*via* a rolling menu listing), four navigation buttons to speed menu operation, an 'OK' button for entering a setting, plus 'stop' and 'exit' (eg from a selected menu mode).

Memory stick playback includes display of track data and this is a convenient route to accessing special collections of red book discs or tracks or the odd Hi Res download, with front panel control access allowing 'direct play' (a bit like loading a CD. A 16G stick will take a small collection, but ought to be copied as these sticks occasionally fail.

Important features we tried out included the rear panel ground lift switch (especially useful for non-Naim systems), and a software switch to select the audio outputs (DIN or RCA or both). The selection of digital outputs includes an 'off' mode that further improves internal noise levels in favour of the wanted operating mode.

Unlike some of the competition, all the input and output facilities have benefitted from considerable research: for example, the S/PDIF output is compatible with costly digital input active loudspeakers. Likewise when the S/PDIF input (which has up to 24-bit/192kHz potential resolution) is selected, other input modes are shut down in order to get maximum transparency and sense of connection from such external sources. (It may also sometimes be convenient to use a CD drive mechanism ['transport'] to play CDs directly without needing to start up the network control.)

Many *NDS* facilities may be handled *via* the dedicated infra-red remote handset, though this would normally be via the *n-Stream* App with an *iPod*, *iPhone* or *iPad*. (An *iPad Mini* is arguably the best option for readability and convenience.) There's also wired remote output from the *NDS* that links the App commands to the volume control and input switching of a matching pre-amplifier (never mind similarly linked compatible CD players and *DAC*s). Not much has been left out, though there's no computer-fed USB socket or *iPod* audio connectivity, nor are balanced audio outputs provided.

As noted, the unit is intrinsically unpowered, and is linked to the various power unit options by custom Burndy-terminated cables. The idea is to put the supply on a separate shelf to keep its noise and vibration away from the ultra quiet *NDS* environment. Incidentally I found no benefit from 'audiophile' feet for either power supply or *NDS*, so clearly Naim has already got this matter well sorted. The dealer will advise on de-stressing and flexing the cables, their optimal orientation and avoiding contact with local structures. This is a very serious product that deserves careful installation.

After delivery, four underside screw clamps must be carefully removed with the NDS upright (which is actually harder than it sounds). Power consumption is a modest 35W. Naim states that the *NDS* can play all common (and some not so common) audio file and stream formats at up to 24-bit/192kHz resolution: WAV, FLAC, AIFF, ALAC, AAC Windows Media-formatted content, Ogg Vorbis and MP3; the *NDS* also recognises M3U and PLS playlist formats, and supports gap-less playback across all formats. There's also 'vTuner 5*' (a full service internet radio provision), and an RS232 socket for dealer controlled software updates.

While it offers exceptional connectivity, Naim has always subscribed to the concept of operational simplicity. No opportunity is consequently provided to 'tune' the sound, for example by offering multiple options of re-sampling, oversampling, dithering, or digital filter type options, such as 'soft', 'steep', 'linear phase', 'apodising'. Naim makes the point that a designer cannot optimise the overall sound,

"The more attention paid to the installation, the better the sound quality that's revealed. I know now it would be a grave mistake to underestimate the potential of the NDS"

including careful selection of components and supplies, of grounding layout and inter-stage isolation, when the main signal processing section remains moving target accessible to the user. Thus Naim offers immutable, optimised signal processing at a fixed output and at nominal 2V single-ended (DIN and RCA) switchable outputs.

The *NDS* uses ladder type multi-bit *PCM1704* DAC, a technology which as a rule leans more towards timing and dynamic qualities in replay, and here handles 24 bits at up to 192kHz. Naim has produced a white paper on this network player that goes into considerable detail about the design, and provides clear insight into the high level of detail researched to raise the sound quality bar. Many solutions were needed to improve upon the existing *NDX* streamer, such as better clocking, multiple, separated and quieter power supplies, and comprehensive microphony counter-measures. The latter include the design and mounting of circuit boards, the routing and dressing of internal cables, and the separation of analogue and digital sections onto high mass (infrasonically tuned) spring-suspended brass slab subchassis.

Digital filtering is hybrid, fundamentally IIR, a method that incurs some phase errors, while some filter coefficients have been fine-tuned by adding some extra 'poles' (filter stages) to improve the phase response. The IIR approach is favoured for its much lower processing overhead, reducing noise and power draw; nevertheless it computes at 40 bits internally for minimal rounding errors.

In addition to the internal physical separation of analogue and digital sections and the inherently separate power supplies, numerous screening cans are fitted, for example to the DACs to keep out high frequency noise. This practice is combined with through-hole and multi-layer PCB technology to allow each stage to work optimally. While the output stage of many DACs is something of an afterthought, frequently built with convenient integrated circuits, Naim has opted to use discreet linear circuitry for the current-to-voltage convertor, and for the multi-stage seven pole analogue filtering, and these are temperature-stabilised by mutual thermal coupling. The whole provides a powerful wideband analogue output with minimal spurious signals.

The matching *555PS* power supply is from the recent low noise *DR* series, and has a high power toroidal transformer. (Just one supply unit was used throughout these tests, though a second *555PS* may be added to improve performance further.) It delivers a heap of separate regulated lines, these internally separated between analogue and digital by running two high power and mechanically stable umbilical cables fitted with aircraft grade Burndy connectors. Separate shelves are advised for these units.

Sound Quality

Some equipment sets a good standard right away, which is always encouraging but occasionally represents a false dawn, as when you explore the permutations and combinations of system set up and connection, a performance ceiling may be reached beyond which further attention yields little reward. Not so with the *NDS*. It appears that its inner core is tuned and adjusted to an intrinsically high level. The more attention paid to the installation, the better the sound quality that's revealed. I know now it would be a grave mistake to underestimate the potential of the *NDS*.

Early lab testing revealed no particular concerns about electrical aspects of matching: the response is flat and well extended, channel balance is excellent and the very low output impedance is neither load or cable sensitive. (It's delivered at a near standard 2.2V [an audible 1dB too loud!], and is absolute phase correct.) It will even operate with the chassis clamps in place, but then you'll never know how good it really can be. (I did this deliberately to try and place a value on this costly-to-implement feature.)

Even in a fettered state it's actually very good, compares favourably with established international designs in its price range, and indeed sounds quite like some of best of them. The next step is to housekeep all the soft switch settings (choosing which inputs and outputs will be used and those which can be switched off), and then carefully (without tipping the unit) remove those four transit bolts. It goes without saying that the Burndy cables will have already been de-stressed, such that the optimally positioned power supply allows the plugs to glide simply into the *NDS* sockets without need for twist or stress. This procedure minimises the mechanical coupling to the supply enclosure with its heavy transformers, and lifts sound quality a little further. Other preliminaries to dispose of include considering what I call secondary facilities: whether they should be enabled, used in anger for audio replay, or disabled to allow the 'best parts' to really sing.

From the start, *NDS* replay has an almost indefinably creamy texture, rather remote from the kind of digital audio mostly experienced, yet there's

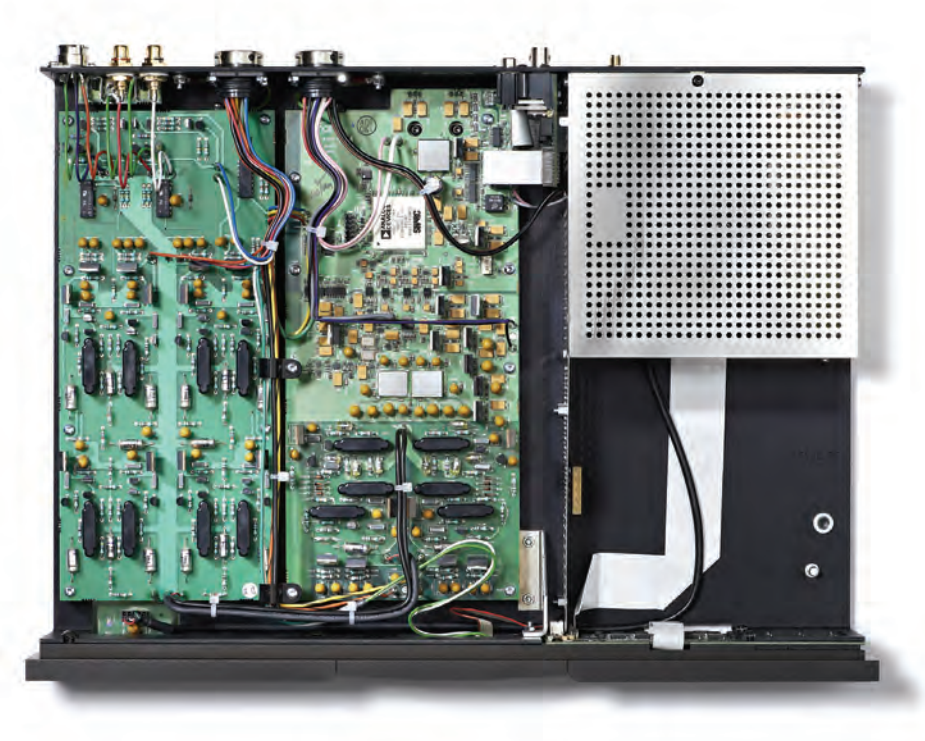
no loss of transient power or definition, no softening of attack, no blurring of the leading edges of timing transients. Somehow listening seemed easier than usual, and the *NDS* presented information in a more perfectly blended, cleaner, yet more consistently forward driving manner.

We have heard some great bass lines from the world's best DACs and the *NDS* is not left behind at all. In particular it achieves the required satisfying and involving thudding crispness for the upper bass notes, laying these right on time with the well weighted, deeper bass notes. This brought rock performances to life with a convincing degree of both stage presence and dynamics, an aspect that is certainly Naim at its best. The effect on cathedral organ was fascinating, bringing an unexpectedly expressive growl to the pedal notes, adding the drama, attack and pace that's more like the live instrument.

Plenty of great transparency has been heard from other designs, for example the Linn *Akurate DS* at a relatively modest price, while the various upper range DCS and MSB DAC combinations also excel here, with further gains in other areas. And of course we found substantially good transparency with the S/PDIF driven Naim *DAC* itself (*Vol4 No1*). Historically, deep transparency has not been associated with Naim components, though more recent generations have certainly improved considerably in this respect. But an *NDS/555PS*, fully trimmed and bedded into a good system, confidently delivers great transparency.

The *NDS* is deeply subtle. It takes times to learn its full measure, and many tracks need playing. Then one will discover its subtle introspections, clearer intonations, richer textures, more musically convincing gradations of tone colour, and its closer approach to live sound realism. The midrange is naturally rich, full blooded and vibrant, and this is allied to crisp and well defined bass lines. It also delivers something unexpected with bowed bass viol, with a quality of grip and vibrancy that gives the sound of this instrument unexpected power and naturalness. This goes with the excellent timing and dynamics to enhance the sense of rhythm, and with it listener involvement, making this a compelling overall experience. Is this a benefit of that costly integral subchassis system?

It is up with the best for focus, stereo image perspectives, stage width, convincing 'out of phase' surround effects, and image depth. Significantly 'un-digital', there isn't a trace of grain or fizz, mid ringing or 'blocky' hardness. It simply sailed away in the company of the £48k Wilson *Alexia*s driven by the D'Agostino power amp, which is some compliment. It rocks and swings, but can also be subtle with a fine velvet texture. High quality recordings of a grand piano sounded just like – a grand piano.



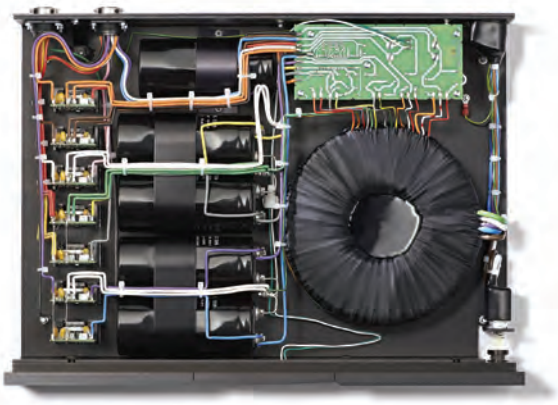
So far we have the general impression of the network driven *NDS*, with a score hovering at the class leading 270 level. But more is available: note the following findings of some secondary listening tests.

Secondary Listening Tests

S/PDIF output soft key switch 'on' and 'off'
This was conducted while the *NDS* was on the network. Yes, there is a difference, affecting as much as 8% of the analogue sound quality; once it is heard correctly (ie 'off') one doesn't want to turn it 'on' unless specifically using this output (in which case the *NDS*' analogue output will not be required).

NDS S/PDIF streamed output-vs-UnitiServe output-vs- good CD transport
This is not an easy experiment, as attention must be paid to power supply options, supports, and the specific S/PDIF and network cables used (the latter the source of data for the *NDS* digital output). Following six like-for-like comparisons for the Red Book CD format, the *NDS* data stream matched my reference CD transport, which is a very good result, while the use of hi-res (HD) material clearly moved it ahead of this standard. An HDD *UnitiServe* S/PDIF source was not quite as good as the *NDS* on CD material, then showed some gain for the HD formats, but again not to the same degree as the *NDS*. From these results, and knowing our references, we may conclude that the *NDS* S/PDIF

The System
Krell *Evo 402E* and D'Agostino *Momentum Stereo* power amps; Audio Research *REF5 SE and REF10* control units; Townshend *Allegri* autoformer control; MSB *Platinum Signature IV DAC* with *Diamond* supply, Metrum *Hex* DAC; Naim *UnitiServe* network server/S/PDIF source; Wilson Audio *Sophia 3* and *Alexia,* Quad *ESL63* speakers; Finite Elemente *Pagode Reference* racks; Cardas *Golden Reference* and Transparent *XL MM2* cables. Mains cables included Naim *PowerLine* and Transparent *MM2*.

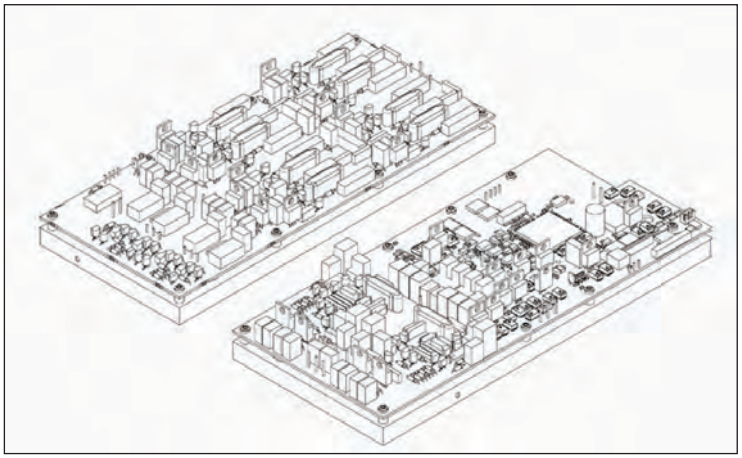


output is no afterthought and is in fact a reference grade digital audio source.

Use of selected network cable
Using Meicord Cat6 over standard Belkin Cat6 to the net switch and the NAS drive does improve the sound and adds 5-8% of sound quality, with more grip and clearer timing, better high frequency definition, more clearly layered perspectives, more subtlety to the differentiation of mid range timbre and texture. Network cable quality still matters.

S/PDIF input, operating as a simple DAC
With the network disconnected it was clear that the *NDS* was also Naim's best S/PDIF DAC to date, and by a large margin (still in the 270 region).

Ground lift effect
Once the system was up and flying, my remaining audiophile (non-Naim) arrangements could easily reveal whether the *NDS* chassis switch was set to grounded or float. 'Float' gave a further sense of realism and immediacy with deeper backgrounds, and is well worth trying for another 5-8%. (Grounded is likely to work best in an all-Naim system context.)



Selection of required audio output terminal
This seemingly ridiculous step of assigning the output socket supplies a further reward perhaps 4% of sound quality, so it's worthwhile to choose the right one exclusively.

USB stick input only
We set all the modes to off via the soft switches, and disconnected the network cable for this hot rod, direct input mode. Keep your seatbelt on! While it must be the best network player DAC going, shutting down the network both inside and out allowed the USB drive to take full and exclusive command of the *NDS* simple file replay, with another quality jump of some 15%, which is quite unmistakable when you hear it. Grip, immediacy, purity, rhythm and clarity push forward with a compelling emotional connection.

Sound Summary
With the *NDS* scoring a true reference grade 300 points give or take 15 depending on operating modes you can have both your audiophile and your Naim cake, and eat them both. It positively declaims the extended and careful research and development, with virtually nothing left to chance, in fact with a full awareness from the design team of the opportunity and responsibility to define the state of the art for streamer and DAC audio sound quality.

Lab Report
As is increasingly found, equipment output levels are creeping above the nominal 2V CD output, here reading 2.23V – 1dB louder, and clearly enough to influence the outcome of an A/B test. This single-ended signal is sourced from a capacitor coupled but low (30ohm) output impedance, so it will be happy with a wide range of cables and loadings, while channel balance was an excellent 0.027dB, consistent right across the 20Hz to 20kHz audio band.

For higher sample rates the frequency response held within -0.33dB by 20kHz (an inaudible loss), while the low range was well extended to -0.05dB at 20Hz, and also better than 0.1dB down by 10Hz. Channel separation was also top class: 115dB midband, better than 100dB at 20kHz, and better than 105 dB at 20Hz.

Intermodulation distortion was also fine, -93dB at full level and better than -100dB by the time the -10dB modulation level had been reached. The discrete 'power op-amp' output circuitry is clearly very linear.

The 140dB range high resolution 'jittergram' revealed a few noise spikes at about -120dB, but also a desirably narrow spectral line for the 1kHz

modulation, which was held to -133dB, grounding out at an excellent -140dB. This reflects the excellent re-clocking employed, and the very low resulting jitter and noise floor.

Noise levels were very good too, 112dBA, 104dB CCIR (1kHz), and still 107dB unweighted, confirming very low mains hum induction. The good name of the DAC fitted was confirmed in very good linearity extending down to -120dB modulation, very close to full 24-bit replay resolution. As expected DC offset was zero and the output is absolute phase correct.

The results show extreme accuracy and great load tolerance, indicating a consistent sound quality in a variety of installations, and further checks confirmed that this was essentially maintained for the full range of specified sample rates and input formats. The mechanical isolation system is also highly effective, seen through careful cable dressing and a well executed suspension for the vital circuit boards.

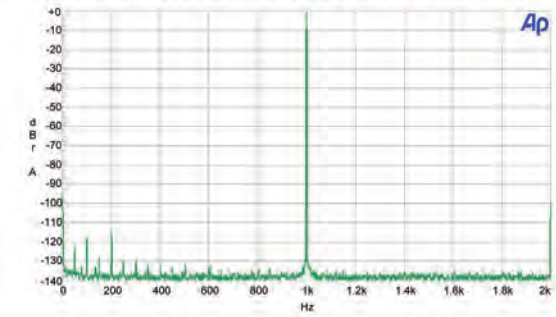
Conclusions

The *NDS* may not reach out and grab the attention. It does not attempt to advertise traditional Naim qualities too loudly, and at times there is almost a subtle understatement that invites one to participate in a musical event. It is certainly neutral almost to a fault, subsuming itself into a good system without shouting its presence. These are all positive virtues, pointing towards a near invisible, grain-free, low coloration replay that allows all kinds of music to breathe freely.

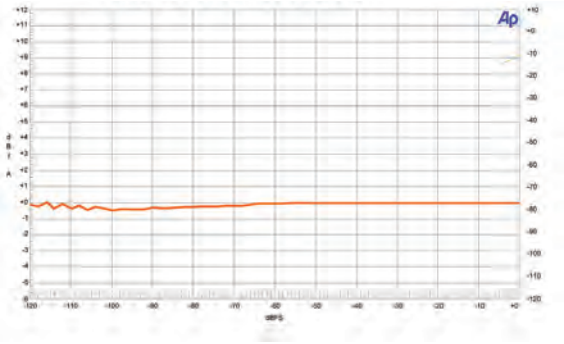
The sophistication of the electronic and mechanical design, driven by a ruthless dedication to the musical qualities of sound reproduction, has resulted in a first class product of international audiophile stature. A measure of its quality in review may be seen in how often you need to listen to it, and whether you are moved to go back to other references. The answer to the first is 'often', and to the second 'infrequently'.

Quite simply the *NDS* provides top class digital replay, with a low noise floor, with stability and focus, transparency timing and dynamics, which to my mind echoes analogue sound quality at its best. Naim has created a true multi-format reference level digital streamer/DAC with extraordinarily dark backgrounds and great purity. It sounds involving and upbeat, highly connected and delightful, with excellent stereo imaging and amazing bass. And that particular quality heard for the replay of 'studio masters' via a memory stick has to be heard to be believed. Highly recommended

Naim NDS DAC Digital jitter 1kHz full level, 0-2kHz span, 140dB resolution



Naim NDS DAC D-A Linearity to -120B



HIFICRITIC AUDIO EXCELLENCE

Streamer/DAC TEST RESULTS

Make NAIM NDS/555PS		Date: 10/2/2013	
Model DAC		Ser. No. 3332541	
Distortion, THD inc noise 16 bit	20Hz	1kHz	20kHz
0dB	-93.5 dB	-95 dB	
-60dB	- dB	-43 dB	
Channel separation	>105 dB	>115 dB	>100 dB
Frequency response	-0.05 dB	0 dB	-0.33 dB
Intermodulation Distortion			
19kHz/20kHz 1:1 0 dB output		-93.3 -dB (1kHz difference tone)	
-10 dB		-101 dB	
Signal to noise ratios	A wtd	CCIR 1k	Unwtd
Ref: 0dB 24bit/	112.2	104.2	107.4 dB
Channel Balance, R ch is reference	0. 03dB	0.027 dB	0.026 dB
Linearity ref 0dB			
-70 dB		-70.08 dB	
-80 dB		-80.15 dB	
-90 dB		-90.33 dB	
-100dB		-100.40 dB	24 bit
-110dB		-110.44 dB	
-120dB		-120.23 dB	
Maximum output level (1% clip)	100k load	2.233/ 2.227 V SE	-- V Bal
Output impedance SE		30 Ohms	(capacitor coupled)
DC offset	Left 0 mV	Right 0 mV	
Size (each, 2 units) (wxhxd)	432 mm	87 mm	314 mm (14kg NDS)
Prices	NDS £6,500; Power supplies £1,595, £3,355, £5,485, 2x £5,485		

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