dCS ROSSINI APEX
CD PLAYER/STREAMER

Right at the outset of this review I'd like to cut to the chase and shine some light on the most important attribute of the dCS Rossini Apex CD player/streamer, which is that, internally, it is fundamentally different to every other digital audio product on the planet.

Rather than using a conventional 'ladder' DAC to convert digital signals into analogue ones, the dCS Rossini Apex uses an unusual DAC design known as a 'Ring' DAC. Also, whereas most manufacturers buy 'off-the-shelf' ready-made DACs for use in their CD and network players, dCS (which stands for Data Conversion Systems) uses what's called Field Programmable Gate Array (FPGA) to help with the digital-to-analogue conversion — not only so it can ensure superior performance, but also so it can upgrade that performance via software updates. (dCS also provides hardware updates, but I'll leave that for later.)

These two significant differences from 'industry-standard' practice result in equally significant outcomes for any audiophile lucky enough to be able to own a dCS product… and I say 'lucky' because all dCS products command premium prices.

dCS RING DAC

A full explanation of what a Ring DAC is would be far too long to include in this review. If you are interested in the technical details, you can download the thirteen-page explanation that's posted on the dCS website, read it, and then skip to the next section of this review. But if you'd rather read a shorter, rather potted version, please do read on…

The Ring DAC addresses a few problems associated with a ladder DAC, but the most significant one is that all ladder DACs will have decoding errors introduced by the fact that the resistors used to convert the digital signals to analogue will not be the exact value they're supposed to be, due to manufacturing tolerances. Look at any resistor catalogue and you'll see you can buy the same 'ohmage' value resistor — say 10 kiloohms — in several different tolerances, such as 1%, 5% and 10%.

As you'd imagine, this means that if you buy a 10-kiloohm resistor with a tolerance of 10%, the manufacturer is not selling you a resistor with a value of exactly 10 kiloohms, but one whose actual resistance will be somewhere between 900 and 1,100 kiloohms. If you decide to spend up big, and buy the resistor with a tolerance of 1%, you are again not guaranteed a resistor of exactly that value, but one that will have a real resistance of somewhere between 990 and 1,010 kiloohms. You get the gist.

Small differences in resistance don't make much of an impact in many electronic circuits, but they do when it comes to creating a ladder DAC, because these incorrect resistor values cause errors in the current that's flowing though the resistor, which in turn causes errors in the analogue voltage output from the DAC. Further to that, these will differ depending on the 'bit' that's being decoded. This occurs because an error at a low volume level will have a greater effect on sound quality than the same error at a higher volume level. All

these problems are exacerbated by the fact that most ladder DACs use a single current source, so any error in conversion will be the same every time a specific digital-to-analogue conversion is made.

dCS's proprietary Ring DAC, on the other hand, does not use a single current source. Instead, it has 48 different current sources available for use, and these sources are switched randomly during the conversion process by the FGPA. This means that a resistor in a dCS Ring DAC will not be driven by the same current source every time, as it would be in a ladder DAC, meaning that the inevitable errors in conversion caused by the resistor values being slightly incorrect will be averaged out, leading to smoother and more cohesive sound quality.

To give you a rough analogy of how this averaging process might work, the theory is a bit like taking your own blood pressure using one of the low-cost devices that are available to consumers. Although your blood pressure will be constant (at least, it will be over a fairly short period of time), the machine you are using to measure it will have errors, so if you measure just the once, you might find you have a systolic pressure of 150 or more (not good!). Measure again and you might measure 120 (very good!). But your machine has just returned two wildly different readings from what is essentially exactly the same blood pressure. So what is your real blood pressure… is it 150 or 120, or something else entirely? What you do is continue measuring, until you have made, say, five different measurements, after which you take the average of the five. That average will be your real blood pressure. And that's essentially what dCS's ring DAC is doing: using an averaging technique to eliminate conversion errors and maximise accuracy.

So what's the advantage of doing this with an FPGA? The secret is in the second of the four words that describe the device that's being used to make the digital-to-analogue conversion — Programmable. Unlike conventional DACs, whose operation cannot be altered after they have been manufactured, the operation of an FPGA can be adjusted after manufacture. The advantage of this should be obvious, but if not, here's an explanation by David Steven of dCS: "If a [DAC's] design and capabilities are fixed, then the performance of a system cannot be updated as new platforms and formats emerge. The solution to this problem is to use, as dCS does, an FPGA-based platform. As FPGAs can be reprogrammed and updated remotely, new features, functions and enhancements can be added over time via software updates, increasing the lifespan of a product and ensuring it remains at the forefront in terms of both features and performance."

Although dCS's Ring DAC technology is proprietary, it is not the only company using a Ring DAC. Other companies do as well. However, there are differences between these differing Ring DACs being used. The most important is the fact that only dCS uses 48 current sources — all other Ring DAC implementations employ fewer current sources, which inevitably means that the 'averaging' effect is less effective. Then there's the fact that most other Ring DACs are not implemented via FPGA but by hardware, so they are not upgradeable in the same way that a dCS Ring DAC is.

ROSSINI APEX UPGRADE

It is important to note that the 'Apex' is an upgraded version of the original dCS Rossini, using all-new Ring DAC software and hardware. dCS says that the Apex modifications improve both the player's digital and analogue performance. The company says it has reconfigured the main Ring DAC circuit itself, replacing individual transistors on the board with compound pairs; modified the feeder reference supply, resulting in lower output impedance; enhanced the filter stages; improved the symmetry of the summing stages; and created a totally new output stage.

Due to the upgradeable nature of almost all dCS products, existing dCS Rossini CD player/streamers can be upgraded to Apex status, via both hardware and software upgrades, so if you own one, contact your hi-fi dealer for more detailed information.

The Rossini Apex can also be controlled by dCS's fantastic Mosaic streaming interface — a very simple and powerful piece of software that not only gives you total control over the unit's myriad streaming functions (so you can use your iOS or Android device to search tracks and albums, queue them, view album artwork, etc) but also over the Rossini Apex itself, eliminating the need to push any of the

player's on-unit buttons.

Unlike many such apps, dCS's Mosaic app has a very intuitive install and configuration wizard that makes setup a breeze.

THE EQUIPMENT

Try to lift the dCS Rossini Apex CD/streamer and you could be forgiven for thinking it had a power amplifier built in, such is its weight (17.4kg). Its user manual should give you pause as well. Spiral bound with hard covers, it is 58 pages long and one of the few I know of that has an index… all of which should give you an idea of the complexity of the device. Because you obviously do not want to be pulling out a 58-page manual every time you want to use the Rossini Apex, dCS also provides a single page laminated 'Menu Guide' for quick reference.

The remote control is not only enormous (and I don't use that description lightly — it's nearly a foot long (29.7cm), 2.5 inches (64mm) wide and 1.5 inches (33mm) deep, it is also the very first remote control I have seen in my entire life that has an almost full-sized rotary volume control on it! Incredible! It's also incredibly solid, because the fascia of the remote is made from a solid 6mm-thick slab of aluminium alloy. I think it's well worth mentioning that one reason for the superb build quality of the Rossini Apex — and its remote control, for that matter — is that it is entirely manufactured by dCS itself in Great Britain.

Although the remote control has all the buttons and controls you will need, I wasn't entirely enamoured by the way I had to use them (or the front panel controls too, actually) to interact with the player. For example, the 'Menu' button is used not only to call up the menu but also to select individual menu items, which didn't seem logical to me. I would have preferred a separate 'Enter' button. Also, to compare the effect of the various different digital filters available, I could not find any way of easily and quickly switching between them using the remote or front panel buttons, so I was unable to make an instantaneous A–B comparison between any two. Overall, I think it would be better to use the Mosaic interface to control all the Rossini Apex CD player/streamer's functions.

Since I have mentioned that different digital filters can be used, I should point out that you have a choice of six filters in PCM mode which, according to dCS, "give different trade-offs between Nyquist image rejection and the phase response" as well as four filters in the DSD mode, which dCS says "progressively reduce out-of-audio band noise level."

One thing dCS does not really emphasize about the Rossini Apex is that you don't need any other component in your system other than a power amplifier

In terms of streaming format compatibility, the dCS Rossini Apex offers the full suite of all major lossless formats, including FLAC, WAV and AIFF up to 24-bit/384kHz, plus DSD64 and DSD128 in DFF/DSF format. It also supports (amongst others) lossy formats such as WMA, ALAC, MP3, AAC and OGG.

You can stream wirelessly to the Rossini Apex from an iPod, iPhone or iPad via Apple AirPlay (at 44.1 or 48kHz), but note that there is no Bluetooth. I don't see this ommission of being of much importance, mind you; if you're using a player of this quality, you should be feeding it the highest-quality signals, and that means hardwiring sources rather than going wireless.

Hardwiring to the various digital inputs on the rear panel means the CD player/streamer has all your digital bases covered. The USB 2.0 Type B connector operates asynchronously, accepting up to 24-bit/384kHz PCM as well as DSD64 and DSD128 in DoP format. The USB Type A connector can stream PCM from a flash drive at up to 24-bit/384kHz as well as DSD64 and DSD128. The XLR and SPDIF connectors, meanwhile, individually accept PCM up to 24-bit/192kHz or DSD64 in DoP format, though if you use the XLRs as a dual AES pair, they accept PCM at up to 384kHz, and DSD64/128 in DoP format. As usual for optical inputs, the Toslink accepts only PCM up to 24/96kHz.

As you'd expect of any premium streamer in 2022, the Rossini Apex CD/Streamer is Roon Ready, though naturally you need to have a Roon account and have Roon installed on your NAS drive or networked PC to benefit. The dCS is also fully MQA-compatible, so networked MQA files will be streamed bit-perfect and USB-sourced MQA files will be unfolded and rendered to the original sample rate.

One thing dCS does not really emphasize about the Rossini Apex is that you don't need any other component in your system other than a power amplifier, since it has all of the necessary preamplifier functions built in (volume, balance, phase etc). You obviously would not be trying to save money by eliminating a preamplifier from your system, but connecting the Rossini Apex directly to a power amplifier guarantees a purer signal transfer to your loudspeakers than any other system implementation.

IN USE AND LISTENING SESSIONS

It's interesting that the front panel display's brightness is infinitely variable, which is a big step up from the usual choice of three options. You can also opt to have the display off, which might be preferable if you're using Mosaic control. However, I thought it even more interesting that you can choose to switch the otherwise-illuminated dCS logo off if you want to too. I'd imagine that dCS owners would like to advertise the fact they owned an exclusive and prestigious brand, rather than hide that fact.

Another point of interest to me (and I hope to you!) is that dCS uses a curious mixture of letters, numbers and icons for its menus, some of which it has created itself and some of which are not entirely intuitive. The 'swap left and right channels' icon is very self-explanatory, for example, but the 'switch phase' button uses a correctly formed quaver symbol to indicate 'natural' phase, and an incorrectly formed quaver symbol to indicate reversed phase. It does, therefore, rather depend on you being able to read music in order to know which phase is which!

Actually, I suspect you'll enjoy whatever music the dCS Rossini Apex is playing irrespective of whether its phase is natural or reversed, because it's simply a stunning-sounding component. Listening to Bizet's Carmen Suite No.1, I was impressed that all the instruments remained exactly and precisely located across the soundstage irrespective of changes in dynamics, because it's something I rarely hear from any digital component. And, since I am speaking of dynamics, the dCS CD player/streamer also let me hear dynamic nuances that just are not revealed by most digital components — or, I must say, by many analogue components either!

It wasn't just the dynamics of this work or the localisation of instruments that impressed me either. The presentation of the soundstage was totally clean and crisp, and not only did I always instantly hear when an instrument started playing, but also the instant it stopped… there was no unwanted overhang. The purity of instrumental tone was equally impressive. The tonal quality of all the instruments was neither warm nor clinical — 'natural' is, in my mind, the perfect descriptor for it.

Playing the title track of Beach House's latest and undoubtedly finest album, 'Once Twice Melody', the Rossini Apex CD demonstrated an uncanny ability to reveal the complexities that underlie what on a lesser player appears to be just the hazy, soft-focused dream pop of their previous albums. Listening to the album on the Rossini Apex, I was able to hear the intricacies of the double-tracking, the myriad underlying melodic elements — including which ones were real and which were synthesized — whilst at the same time being mesmerized by the hypnotic vocal from Victoria Legrand. Whereas lesser players present Beach House's trademark sound as a sonic wall, the Rossini Apex revealed it as a seemingly endless sonic garden, with aural delights as far deep as the ear could hear.

To test out the dCS's low-frequency response, I turned to Black Country, New Road's excellently recorded album 'Ants From Up There', which will unfortunately be the last to feature the undeniable talents of Isaac Wood, whose vocal delivery is so instantly recognizable that if you hadn't already picked music as being composed by BCNR, you'd know from the moment he opened his mouth. Tyler Hyde's bass guitar sound is depthy and resonant, and the dCS reproduced it wonderfully well, as it also did with May Kershaw's timely interjections with marimba and glockenspiel. Charlie Wayne's drum kit was another standout sonic masterpiece, with the dCS able to communicate that elusive 'you are there' listening experience.

A new favourite low-frequency tester is 'The Boy Named If', released by Elvis Costello and the Imposters. I confess that the first time I heard opening track *Farewell OK*, I thought maybe someone had dropped an early Beatles track in by accident, but it all turns more Costello-ish when the title

CONTACT DETAILS

Brand: dCS
Model: Rossini Apex CD Player/Streamer
RRP: $49,995
Warranty: One Year
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NSW 2040
T: (02) 9561 0799
E: sales@advanceaudio.com.au
W: www.advanceaudio.com.au

- Unrivalled performance
- Mosaic control
- Upgradeable
- Total UK build

- CD-only transport
- Slow filter selection

track spins in. Despite this, the sound seems to have been deliberately crafted to seem like it's from an earlier era — particularly whatever keyboardist Steve Nieve is using for an organ sound, and the unique sound of Pete Thomas's kit. And what about that double bass sound on *Trick Out The Truth*? Wow! Truth be told, TBNI is not only my new favourite low-frequency tester, it's also my new favourite Costello album. Brilliant!

Whereas I can hear the differences between different filters, I actually find it difficult to choose preferences between them. It's a bit like me and my relationship with different wines: I can taste the differences between different vintages, but I often can't actually decide which I like the most, so maybe I'm just indecisive. With the dCS Rossini Apex, however, I found it easier to make decisions, something that was presumably enabled by the purity of the sonic delivery.

CONCLUSION

If you are reading this review I am sure I don't have to explain the law of diminishing returns to you. So yes, you can certainly get performance and sound quality that's within a whisker of what you'll experience from this dCS CD player/streamer for a whole lot less money than dCS is asking for it, but you won't be getting exactly the same performance and sound quality… just close to it. And whether or not close enough is good enough for you is something that only you can decide! ***Greg Borrowman***

dCS Rossini Apex CD Player/Streamer — Laboratory Test Results

Analogue Section	Result	Units/Comment
Output Voltage (2 volt output setting)	2.0449 / 2.0433	volts (Left Ch/ Right Ch)
Frequency Response	See Graph	dB (20Hz – 20kHz)
Channel Separation	138 / 140 / 127	dB at 16Hz / 1kHz / 20kHz
THD+N	0.001	@ 1kHz @ 0dBFS
Channel Balance	0.007	@ 1kHz @ 0dBFS
Channel Phase	0.01 / 0.00 / 0.01	degrees at 16Hz / 1kHz / 20kHz
Group Delay	180 / 5.35	degrees (1–20kHz / 20–1kHz)
Signal-to-Noise Ratio (No Pre-emph)	110dB / 115dB	dB (unweighted/weighted)
De-Emphasis Error	0.37 / 3.53 / 9.03	at 1kHz / 4kHz / 16kHz
Linearity Error @ –60.00dB / –70.00dB	0.01 / 0.05	dB (Test Signal Not Dithered)
Linearity Error @ –80.59dB / –85.24dB	0.03 / 0.00	dB (Test Signal Not Dithered)
Linearity Error @ –89.46dB / –91.24dB	0.05 / 0.07	dB (Test Signal Not Dithered)
Linearity Error @ –80.70dB / –90.31dB	0.08 / 0.04	dB (Test Signal Dithered)
Power Consumption	0.04/ 27.3	watts (Standby / On)
Mains Voltage During Testing	235 – 246	(Minimum – Maximum)

Readers interested in a full technical appraisal of the performance of the Rossini Apex CD player/streamer should continue on and read the LABORATORY REPORT published on the following pages. Readers should note that the results mentioned in the report, tabulated in performance charts and/or displayed using graphsand/orphotographsshouldbeconstrued as applying only to the specific sample tested.

LABORATORY TEST RESULTS

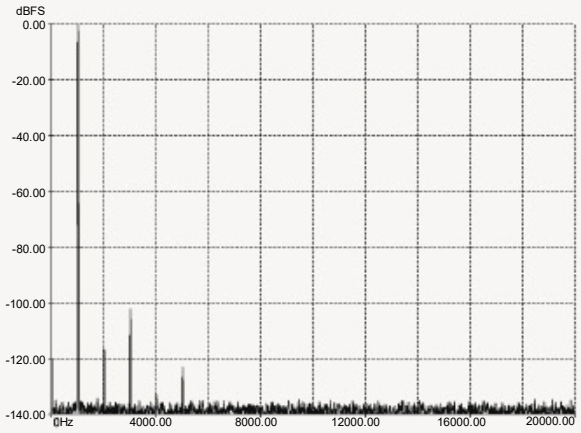
Newport Test Labs used standard 'Red Book' 16-bit/44.1kHz test signals to assess the performance of the Rossini Apex CD player/streamer, primarily because music at this digital quality is the most likely to be replayed by consumers using it. But for those of you who are using higher-resolution digital signals, look forward to even better performance than the superb performance reported here.

Graph 1 shows distortion for a 1kHz signal at 0dBFS, and the first thing that's obvious is that the noise floor is 140dB down right across the audio spectrum. There appears to be a tiny bit of noise at the mains frequency (50Hz), but no harmonics. Excellent performance. Also excellent is the lack of harmonic distortion present. The second harmonic at 2kHz is 118dB down (0.00012%), the third at 3kHz is 103dB down (0.0007%), the fourth at 4kHz is 130dB down (0.00003%) and the fifth is 124dB down (0.00006%). It's vanishingly low distortion that would not even be remotely audible.

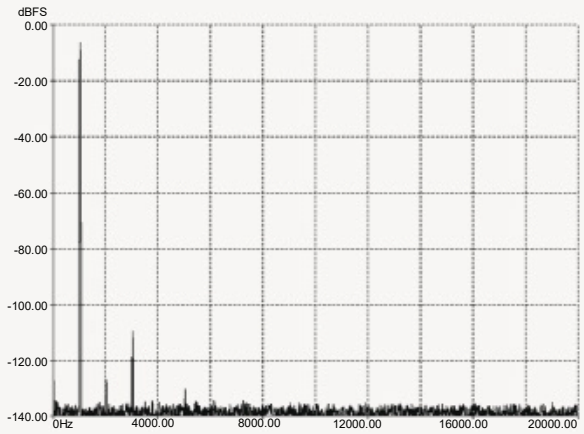
Tested using the same test frequency, but at a level of –6dB, performance improves even further, as you can see, with the second harmonic coming in at –128dB (0.00003%), the third harmonic at –109dB (0.00035%). The fourth harmonic (if there is one!) is buried in the noise floor down at –140dB, while the fifth is now at –132dB (0.00002%). Again, none of these distortion components would be audible at all. The dCS Rossini Apex CD delivers a super-clean analogue reconstruction from a digital signal.

At a level of –10dBFS, the noise floor becomes a little lumpier, showing an increase in background noise, but it's

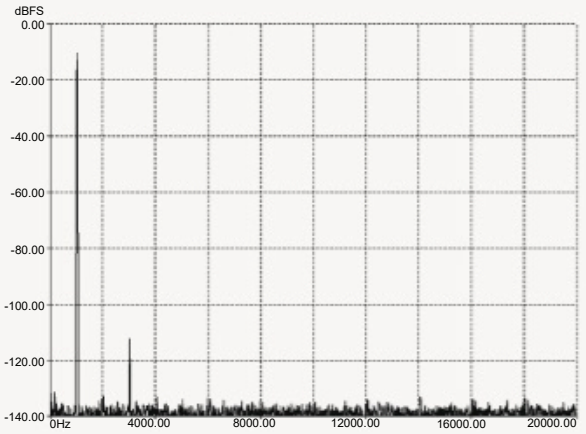
LAB REPORT



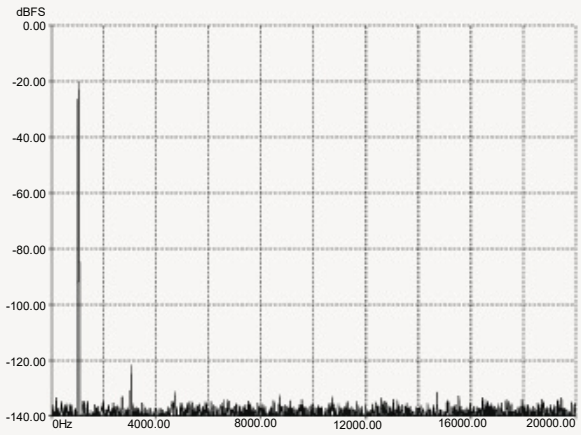
Graph 1: THD + N for a 1kHz signal at 0dBFS.



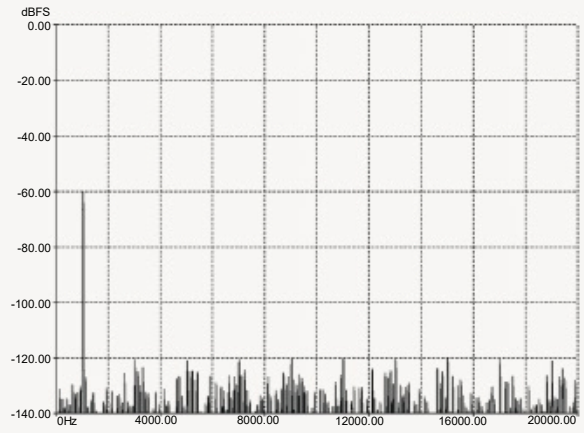
Graph 2: THD + N for a 1kHz signal at -6dBFS.



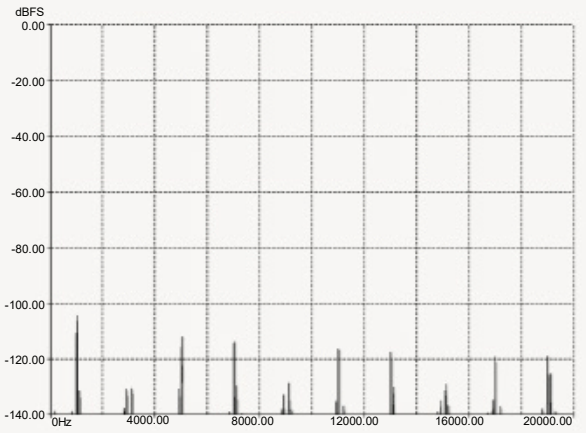
Graph 3: THD + N for a 1kHz signal at -10dBFS.



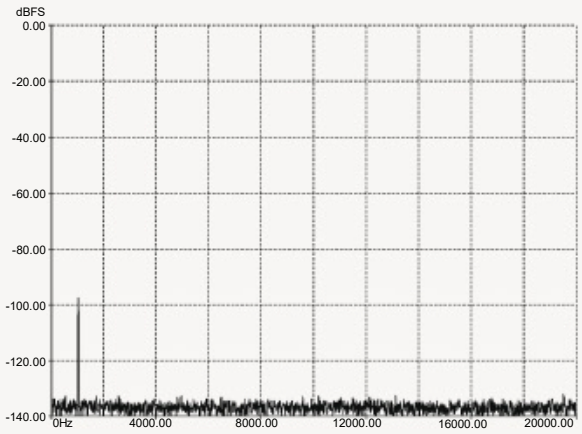
Graph 4: THD + N for a 1kHz signal at -20dBFS.



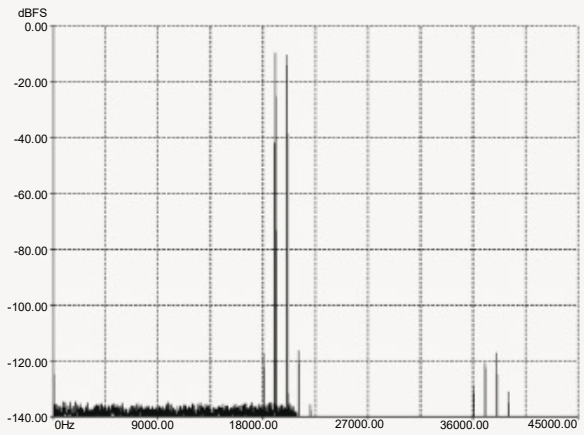
Graph 5: THD + N for a 1kHz signal at -60dBFS.



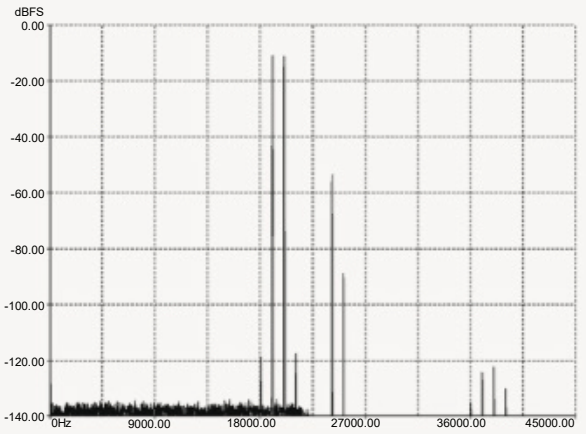
Graph 6: THD + N for a 1kHz signal at -90dBFS (test signal not dithered).



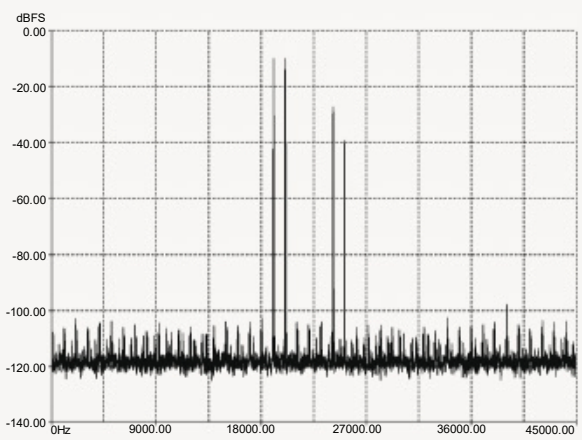
Graph 7: THD + N for a 1kHz signal at -90dBFS (test signal dithered).



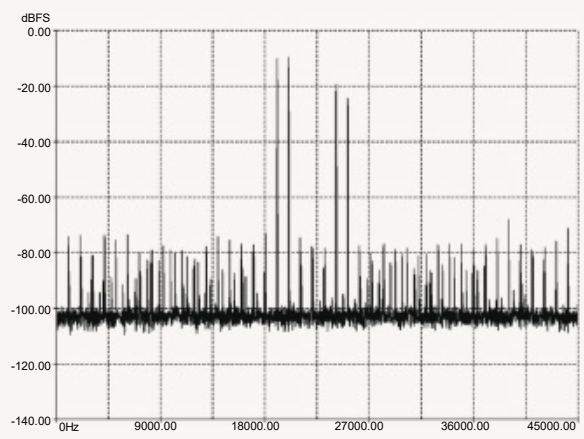
Graph 8: Effect of Filter 1 on CCIF Intermodulation (19/20kHz) twintone test signals.



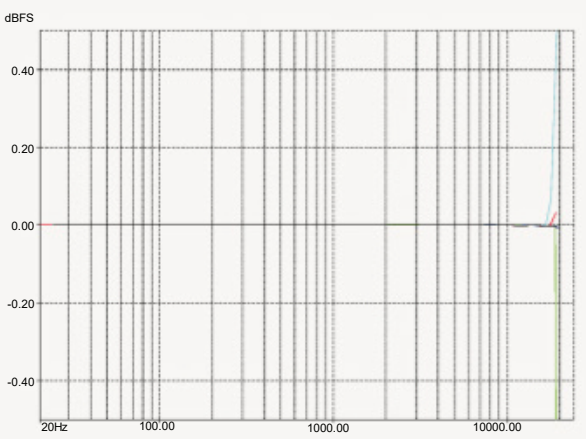
Graph 9: Effect of Filter 2 on CCIF Intermodulation (19/20kHz) twintone test signals.



Graph 10: Effect of Filter 3 on CCIF Intermodulation (19/20kHz) twintone test signals.



Graph 11: Effect of Filter 4 on CCIF Intermodulation (19/20kHz) twintone test signals.



Graph 12: Frequency Response (RB) Filt 1&2 (green), Filt 3 (red), Filt 4 (Blue), Filt 5&6 (black).

The tabulated results shown in the Laboratory Test Result chart are uniformly excellent, amongst the very best I have seen

still pretty much nailed down at –140dB, and although there is a trace of a second harmonic distortion component, it's down at –135dB (0.00001%), leaving only the third harmonic standing, at a level of –111dB (0.00028%). There are traces of sampling-related artefacts apparent on the noise floor, but these would not affect the sound.

Graph 4 shows the distortion performance of the Rossini Apex at a level of –20dBFS, which is likely the level where most music signals will average out, and there's only a single third harmonic distortion component visible at –122dB (0.00007%). This is an astoundingly good result, not least because the noise floor is still down at –140dB and there are almost no sampling-related artefacts present.

At a recorded level of –60dB (Graph 5), quantization errors creep into the output, as you can spy, but they're fewer than I am used to seeing and all are more than 120dB down (0.0001%). These errors are introduced because the test signal Newport Test Labs used is not dithered. You can see the effect of dithering in the next two graphs displayed, which is why all digital music

signals (as distinct from test signals!) are dithered. (Dithering removes quantization errors from the decoding process).

Graph 6 shows a 1kHz sine wave at –90dBFS where the test signal has not been dithered, and despite this lack of dithering the dCS Rossini Apex is still delivering an excellent result. The noise floor is well below –140dB and even the highest quantization errors are more than 110dB down (0.00031%). Graph 7 shows the same 1kHz/–90dBFS signal, but this time it's been dithered. You can see that the quantization errors have disappeared completely, there's no distortion in the signal whatsoever, and the only trade-off is that the noise floor is once again at –140dB. This is, once again, a truly superb performance.

Graphs 8 through 11 show the effect of your choice of filter on an intermodulation test signal comprised of two sine waves — one at 19kHz and another at 20kHz, each at a level of –6dBFS. They seem to suggest that while Filters 1 and 2 are essentially benign, Filters 3 and 4 appear to impact on sound quality if high-level, high frequency signals are present.

Graph 12 shows that the frequency response of the Rossini Apex is ruler flat across the audio band for all filter types, with the only differences occurring in the very highest frequencies, above 18kHz, where the black traces are Filters 5 and 6, the green trace is both Filters 1 and 2, the red trace is Filter 3 and the Blue trace is Filter 4. Note the enhanced vertical scale of the graph: the top is +0.5dB and the bottom is –0.5dB!

Oscillograms of the various filters' effects on a 1kHz square wave showed that all except Filter 5 are oversampling types, exhibiting almost identical amounts of time-reversed ringing.

The tabulated results shown in the Laboratory Test Result chart are uniformly excellent, amongst the very best I have seen. As I said in the introduction to this section, this is an example of simply superb measured performance!

Steve Holding