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DIGITAL PLAYBACK SYSTEM

"Roberta Flack has Lou Gehrig's disease and can no longer sing," Béla, my visiting friend, yelled from the guest bedroom. The news rekindled in me the same mixture of sadness and foreboding I get every time I read about the decline or death of an iconic musician who rose to fame during my aeonian youth.

The next day, Béla announced he was about to use my Audeze LCD-X headphones and AudioQuest DragonFly Cobalt to play Flack's "The First Time Ever I Saw Your Face," which he'd ripped to his laptop. "Honey," I replied, "forget about your computer. Let's listen to this in the music room. I've seldom heard that song since the early '70s, when I played it through crappy components."

Soon we were seated in front of a system comprising a Stromtank S 2500 Quantum MKII battery-powered regenerator, Roon-equipped Innuos Statement NextGen music server, D'Agostino Momentum HD preamp and Progression M550 monoblocks, and Wilson Alexia V loudspeakers.

Instead of my reference Rossini Apex and Clock, I was using a dCS Vivaldi Apex DAC ($46,500), in for review. Together with a Vivaldi Upsampler Plus ($25,500) and Vivaldi Master Clock ($19,500), the Vivaldi Apex DAC had been singing in my system for close to three weeks. I thought I had a fair sense of what it can do.

Searching Roon revealed two remasterings of "The First Time Ever I Saw Your Face." The first, on *The Very Best of Roberta Flack*, issued in 2006, was streamable in 16/44.1 MQA. The second, on *First Take*, was released in 2020 and is available in 24/192 MQA. What self-respecting audiophile could resist comparing the two?

Within seconds after hitting play on the 2006 remaster, what I thought would be a lovely opportunity to wax nostalgic morphed into something far deeper. The first few bars of the song grabbed us like nothing else we'd listened to over the past 10 days. Flack's complete calm, unwavering focus, and unapologetic intimacy took our breath away. The soundstage was wide, the silence profound, the presentation pristine. The beauty of Flack's voice and passion, enhanced by John Pizzarelli's guitar, Ron Carter's bass, and Ray Lucas's drums, transformed the music room into a holy sanctuary. Toward the end of the first verse, right before "To the dark and the endless skies," I rose long enough to turn off the lights. We sat together in silence, barely breathing. When the song ended, the only words I could utter were, "Let's listen to the 2020 mastering."

The tighter and better-defined double bass, the mesmerizing delicacy of Pizzarelli's guitar, and fine detail that was lost in 2006 when the tape hiss was filtered out gripped us even more.

I thought I had already discovered everything the Vivaldi DAC could deliver. Yet here, on a simple track from which I expected little more than lovely singing, it had opened our hearts and

SPECIFICATIONS

Description Three-box networked upsampling D/A processing system with volume control and remote. Vivaldi Apex DAC features dCS proprietary Ring DAC topology with a choice of 3MHz or 6MHz operation. Analog outputs: 1 pair balanced on XLR. Output levels: 0.2V, 0.6V, 2V, 6V RMS for full-scale input, set in the menu. Output impedance: 3Ω. Minimum load: 600Ω (10–100kohm recommended); 1 pair unbalanced on RCA. Output levels: 0.2V, 0.6V, 2V, 6V RMS for full-scale input, set in the menu. Output impedance: 52 ohms. Minimum load: 600 ohms (10–100k ohm recommended). Digital inputs: USB 2.0 on B-type connector, accepts 24/44.1–384kHz PCM, DSD64 & 128 in DoP; 4 AES3 inputs on 3-pin female XLR accept 24/32–192khz PCM & DSD64 in DoP; 2 Dual AES pairs accept 24/88.2–384kHz PCM, DSD64 & 128 in DoP; 2 S/PDIF on RCA accept 24/32–192kHz PCM & DSD64 in DoP; 1 S/PDIF on BNC accepts 24/32-192kHz PCM & DSD64 in DoP; 1 S/PDIF on TosLink accepts 24/32–96kHz PCM; 1 SDIF-2 interface on 2 BNC accepts 24/32–96kS/s PCM or SDIF-2 DSD (auto selected); this interface requires a compatible word clock input locked to the correct data rate. Three word clock Inputs on BNC accept standard Word Clock at 32, 44.1, 48, 88.2, 96, 176.4 or 192kHz. Data rate can be the same as the clock rate or an exact multiple. One word clock output on BNC. With Sync Mode set to Master, a TTL-compatible 44.1kHz word clock is output. In Universal Master mode, a 38.4kHz word clock is output for use with the Vivaldi Upsampler. Residual noise: Better than -113dB, 20Hz–20kHz unweighted (6V setting). L/R crosstalk: < –115dB, 20–20kHz. Spurious responses: < –105dB, 20–20kHz. Filters, PCM: 4 give different trade-offs between image rejection and phase response. 2 extra filters at 44.1, 176.4, 192, 352.8, and 384kS/s. DSD: 4 progressively reduce out-of-audio band noise; Filter 5 has improved transient response
DAC dimensions 6" (151mm) H × 17.5" (444mm) W × 17.2" (435mm) D. Weight: 35.65lb (16.2kg).
Finish Silver, black.
Serial numbers of units reviewed DAC: VDC9328; Upsampler Plus: VPP59070; Master Clock: VCK57721.
Price DAC: $46,500; Upsampler Plus with Ethernet network port: $25,000; Master Clock: $19,500. Approximate number of dealers: 24. Warranty: three years parts and labor for original owner. dCS-installed Apex upgrade for owners of Vivaldi DACs and Vivaldi One: $9000.
Manufacturer dCS (Data Conversion Systems), Ltd.,
Unit 1, Buckingway Business Park, Anderson Rd., Swavesey, Cambridge CB24 4AE, England, UK.
US distributor: Data Conversion Systems Americas, LLC, PNC Bank Bldg., 300 Delaware Ave., Suite 210, Wilmington, DE 19801, USA.
Tel: (302) 473-9050.
Web: dcsaudio.com.

transformed a visit from an old friend, dampened by dual COVID diagnoses, into a rare opportunity for spiritual communion. We sat in awe of music's magic.

A Vivaldi Apex trinity: DAC, Upsampler Plus, Master Clock

Released in 2012, the Vivaldi DAC was the first product in dCS's new line of two-channel D/A converters, which today includes the Vivaldi Apex, Rossini Apex, Bartók, and Lina headphone system. The Vivaldi was always intended as a state-of-the-art multibox system in which one box was devoted solely to D/A conversion; upsampling, streaming, file playback, and CD/SACD transport functions have always been relegated to other Vivaldi boxes.

I spent a very good year with the original Vivaldi DAC—I moaned when it went back to dCS—and had it long enough to review its major (2.0) upgrade. I vividly recall the differences between Rossini 2.0 and Vivaldi 2.0. The Vivaldi had a virtually boundless soundstage with weightier images and stronger, better-defined bass, and it delivered musical texture palpably. The trio arrangement of "Wachet auf, ruft uns die Stimme" ("Awake, calls the voice to us") on Yo-Yo Ma, Chris Thile, and Edgar Meyer's *Bach Trios* (24/96 MQA, Nonesuch/Tidal) left me marveling at the complex overtones of Ma's cello, the warmth and weight of Meyer's double bass, and the contrast between the initial pluck of a string and its mellower resonant decay. That timbral transition may not be audible distinctly in live music,[1] but it *is* captured by the microphone. On a fine system, it can bring us closer to the music and the artist.

During my time with the pre-Apex Vivaldi DAC, I didn't have the Vivaldi upsampler, so I was limited to auditioning PCM files at their native resolution, while the Rossini upsampled them automatically to DXD or DSD: user's choice.[2] Nonetheless, 16/44.1 on the Vivaldi sounded more detailed and involving than PCM upsampled to DXD on the Rossini; the Vivaldi's realism was uncanny.

This limitation was now removed, as John Giolas, dCS's vice president of sales and marketing, sent me the Vivaldi Upsampler Plus. I would finally be able to hear files at the same resolution via the Rossini Apex and the Vivaldi Apex system. The Apex revision had raised Rossini's bass response to Vivaldi levels; would the Vivaldi Apex's bass be even better? What other improvements might it offer?

dCS also sent the Vivaldi Master Clock. I could have made do with the Rossini Clock—the sonic differences between the two are reportedly small—but pairing the Rossini Clock with the Vivaldi Apex DAC would have required changing clock cables every time I transitioned from 44.1kHz and its multiples to 48kHz and its multiples. Since I wanted to switch quickly between files so that impressions were still fresh, the Vivaldi Master Clock was essential.

Together, the two-piece Rossini Apex DAC/Clock and the three-piece Vivaldi Apex DAC/Clock/Upsampler filled my eight-shelf, double-width Grand Prix Monza rack to capacity. There was no room for a transport. No big deal. I haven't played silver discs at

PHOTO BY DAVID DUPUY

1 Often it is, though. It depends on the performance (including the size of the ensemble and the complexity of the music), the venue, and where you are sitting.

2 There are two exceptions to the Rossini Apex DAC's and the Vivaldi Upsampler's automatic upsampling of file resolution (to DXD, DSD, or DSDx2, according to user preference). DSD remains in the same resolution as the original file, and MQA files are never upsampled beyond their ultimate MQA resolution due to stipulations in MQA's protocol. I have always favored DXD upsampling over the two other options. This remains unchanged with the advent of Apex. What has changed, after much coaxing from John Giolas, is my preference for the Map 3 mapping protocol over Map 1. I've also returned to the 2V output setting because D'Agostino has determined that it works best with my reference Momentum HD preamplifier.

home for over a year. Why bother when I can stream and store millions of files and rip CDs losslessly? SACDs are still viable, whether in stereo or multichannel, but one can just as easily play native DSD64 files, or the PCM files from which many SACDs are derived. I see no reason to continue to acquire and play CDs beyond the desire to collect, feel, and hold—legitimate motivations but not musical ones. I would rather hear and feel the greater texture, color, nuance, and soundstage realized with hi-rez files.

Hales expounds on linearity

Considering the component prices of the Vivaldi Apex system, some readers may turn green with envy, red with anger, or some sickly amalgam of the two colors. Add the cost of the three aftermarket power cables, five or six clock cables, at least one set of dual AES3 cables, USB and Ethernet cables, and equipment supports and some readers may require medical intervention.

Others will note the identical specs for the Rossini Apex and Vivaldi Apex and be skeptical that they sound different. They do.

To find out *why* they do, and more, I Zoomed with Giolas, Managing Director David Steven, and Director of Product Development Chris Hales. We began with fundamentals. Rather than rehash the copious information about dCS's analog Ring DAC technology and Apex upgrade I included in our October 2022 Rossini Apex review,[3] I asked the men to summarize what they thought is most important about the Apex hardware upgrade.

"The Ring DAC, Apex, and dCS's philosophy are about achieving linearity or neutrality," Hales said. "You can look at our goal in a number of different ways, but it's basically to reproduce the original recording as faithfully as physics permits.

"The whole Ring DAC architecture is very much about linearity, especially at low signal levels, where a lot of other DAC architectures lose out. That's where the signal starts fading away and you hear some unpleasant artifacts."

Hales began the Apex Project during the early stages of the COVID lockdown. Forced to work at home, he brought some test equipment with him to see what he could accomplish. Convinced that dCS had done as much as it could via software updates to improve linearity, he decided to consider possible limitations in dCS's analog circuitry. He never had a specific product in mind—he did not visualize Apex in his head and then try to figure out how to get there—but when he thought he'd found something worth pursuing, he put it on a board so that everyone could listen.

The resulting upgrade, which included reconfiguring and enhancing many components in the main Ring DAC, adjusting component layout on the Ring DAC circuit board, and installing an all-new analog output board, significantly lowered the noisefloor and reduced second-harmonic distortion by more than 12dB.

"With every product that we make, our team's objective is to create a sound design that measures as we need it to be," Steven said. "Then we listen to it. During [what became] the Apex process, Chris developed three or four prototypes. Each time, we listened to see if we connected to the music more. That's what we're talking about when we contrast Vivaldi to Rossini. As hard as it is to explain, Vivaldi seems to have more emotional impact."

For my Rossini Apex review, Giolas said, "The linearity of our DACs is so [much higher than] the industry norm, we've had to create our own test equipment to measure it." I asked Hales if John Atkinson would be able to detect what he and his team measured during the Apex project.

"I believe he has the Audio Precision 555, which is the best machine on the market," he replied. "Still, some of the harmonics we examine remain below the residual of that machine. So, he can get closer than most people, but he still won't be able to measure the whole story.

3 See review in Vol.45 No.10, stereophile.com/content/dcs-rossini-apex-da-processor.

MEASUREMENTS

I measured the dCS Vivaldi Apex with my Audio Precision SYS2722 system,[1] repeating some measurements with the higher-performance APx500. I performed the testing with the AES3 and USB inputs. The Vivaldi's AES3 input accepted data sampled at all rates up to 192kHz, and the dual-AES3 input will accept data sampled at rates up 384kHz. With the Vivaldi Apex set to USB Class 1, Apple's AudioMIDI utility indicated that the maximum sample rate for USB data was 96kHz. With it set to Class 2, the dCS processor accepted 16- and 24-bit integer data via USB sampled at all rates from 44.1kHz to 384kHz. Apple's USB Prober app identified the Vivaldi Apex as "dCS Vivaldi DAC USB Class 2" from "Data Conversion Systems Ltd" and confirmed that the USB port operates in the optimal isochronous asynchronous mode.

For the measurements, the dCS Vivaldi Apex's output level was set to 6V, the volume control set to its maximum, and the mapping algorithm set to Map 3, which was how it had been set when I unpacked the processor. With the Phase set to positive, the Vivaldi's analog outputs preserved absolute polarity (ie, were noninverting) from both digital inputs. The maximum output can be set to "6V," "2V," "0.6V," and "0.2V." With full-scale 1kHz data and the volume control set to its maximum, I measured 6.03V, 2.04V, 603mV, and 204mV from the balanced outputs and very slightly lower voltages from the single-ended outputs. The balanced output impedance was an extremely low 1.3 ohms from 20Hz to 20kHz. The single-ended output impedance was 51 ohms at all audio frequencies.

The Vivaldi Apex offers a choice of six reconstruction filters. All six filters are functional with data having a sample rate of 44.1, 48, 176.4, and 192kHz, but, as with the

1 See stereophile.com/content/measurements-maps-precision.

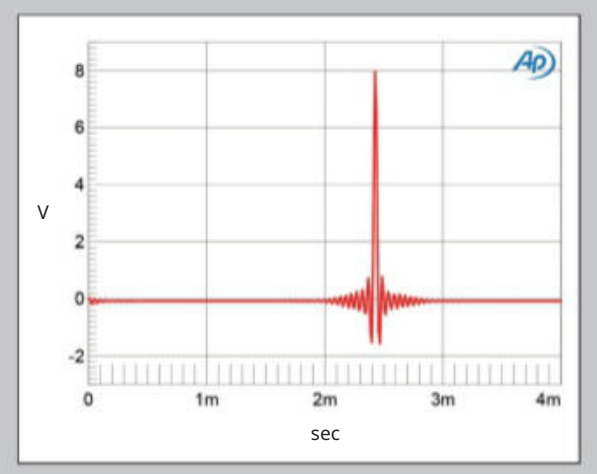


Fig.1 dCS Vivaldi Apex, F1, impulse response (one sample at 0dBFS, 44.1kHz sampling, 4ms time window).

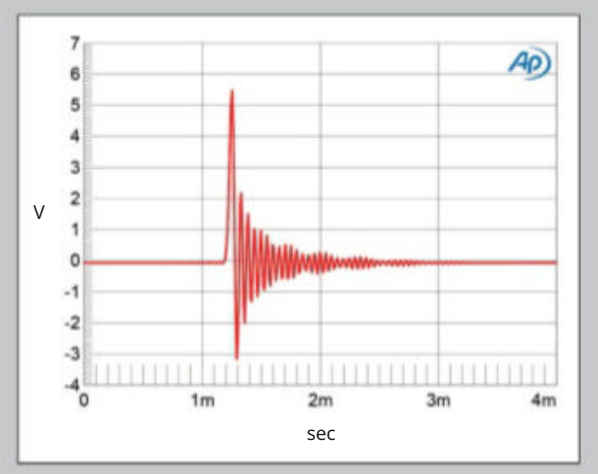


Fig.2 dCS Vivaldi Apex, F5, impulse response (one sample at 0dBFS, 44.1kHz sampling, 4ms time window).

"A DAC receives a digital code and outputs an analog voltage. Whatever the output voltage is for a code of 1, we'd expect the output for a code of 2 to be exactly double and the output for a code of 4 to double again. Ideally, if you were to plot the output voltage for each input code on a graph, all the points would fall on a straight line; they would be linear. In reality, however, the points won't form a perfectly straight line. Depending on the system, the points may form a curve of some sort, or the line may have jumps in it or one or more points which are out of line.

"The most immediate effect of this deviation is that it adds harmonics to a signal, effectively altering its timbre. Imagine dragging your fingernail back and forth across the face of a perfectly flat mirror. If it is perfectly flat, your nail glides smoothly over the mirror and makes no sound. But if there's a scratch on the surface, every time your finger goes over the scratch, it makes a noise. For one back-and-forth movement, you get two clicks, at twice the frequency of your back-and-forth movement. So, a second harmonic has been created.

"Things get even worse when there are two signal frequencies, as there almost always are with music. This nonlinearity creates both harmonics (i.e., signals at exact multiples of the input frequency) and signals at the sum and difference of the two frequencies. This is really bad news! Musical instruments generate their own harmonics in exact multiples of their fundamental frequency—it's one of the ways we differentiate one instrument from another—so any harmonics generated by nonlinearity are at least musically plausible, whereas sum and difference frequencies most definitely aren't. Consider a note at 100Hz and another a perfect fifth above it, at 150Hz. Here, the sum frequency caused by nonlinearity would be at 250Hz, which is neither a multiple of 100Hz nor of 150Hz, and so would

measurements, continued

Rossini Apex JVS reviewed in October 2022 and the original Vivaldi Michael Fremer reviewed in January 2014,[2] only the first four (F1–F4) operate with data sampled at 88.2 and 96kHz. Fig.1 shows the F1 filter's impulse response with 44.1kHz data; the F6 filter's impulse response was identical. It is typical of a linear-phase reconstruction filter, with equal amounts of ringing before and after the single sample at 0dBFS. Filters F2, F3, and F4 also had linear-phase impulse responses but with progressively smaller amounts of ringing. F5 was different. Its impulse response was a minimum-phase type, with all the ringing following the single full-scale sample (fig.2).

With 44.1kHz white-noise data, F1, F5, and F6 are apodizing types, rolling off rapidly above the audioband (fig.3, magenta and red traces) and reaching full stop-band attenuation at 22.05kHz. F2, F3, and F4 offered progressively slower ultrasonic rolloffs with 44.1kHz data, with F4 not reaching full stop-band attenuation until 30kHz (fig.4). With a 19.1kHz tone at –3dBFS (cyan, blue; with the tone at 0dBFS, many aliasing products were present in the audioband with this filter), the slow rolloff means that the aliased image at 25kHz was only suppressed by 12dB. The harmonics associated with the 19.1kHz tone were all extremely low in level, however.

2 The Rossini Apex's measured performance can be found at stereophile.com/content/dcs-rossini-apex-da-processor-measurements and the original Vivaldi's measured performance at stereophile.com/content/dcs-vivaldi-digital-playback-system-measurements.

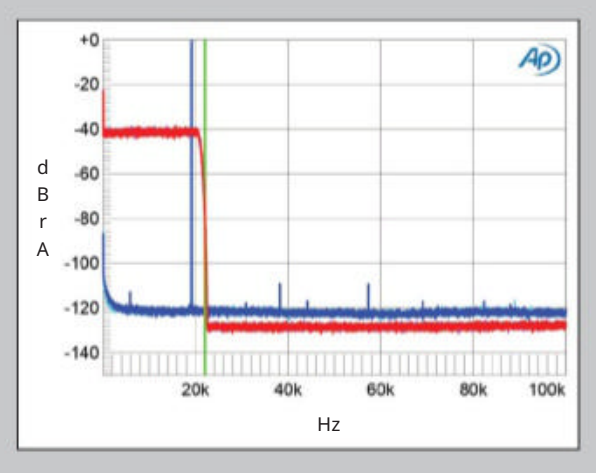


Fig.3 dCS Vivaldi Apex, F1, wideband spectrum of white noise at –4dBFS (left channel red, right magenta) and 19.1kHz tone at 0dBFS (left blue, right cyan) into 100k ohms with data sampled at 44.1kHz (20dB/vertical div.).

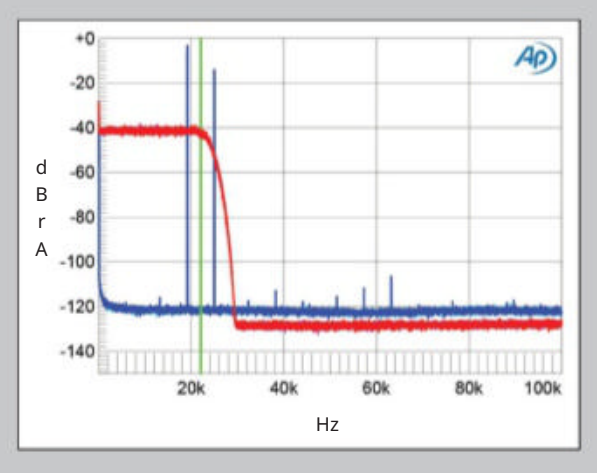


Fig.4 dCS Vivaldi Apex, F4, wideband spectrum of white noise at –4dBFS (left channel red, right magenta) and 19.1kHz tone at –3dBFS (left blue, right cyan) into 100k ohms with data sampled at 44.1kHz (20dB/vertical div.).

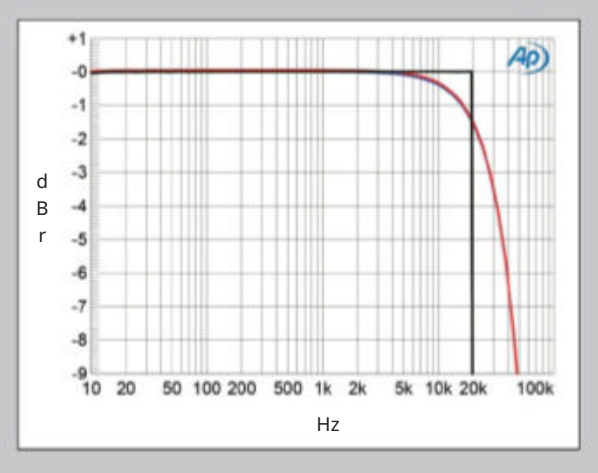


Fig.5 dCS Vivaldi Apex, F5, frequency response at –12dBFS into 100k ohms with data sampled at: 44.1kHz (left channel green, right gray) and 192kHz (left blue, right red) (1dB/vertical div.).

sound quite unmusical.

"There's a whole lot more to nonlinearity. Some cases sound much worse than others. The D/A process is particularly susceptible to some of the most objectionable. Regardless, the basic principle holds: Nonlinearity will create frequency components not present in the original material. Nonlinearity is something anyone who strives for neutrality in their equipment will try to avoid."

Multichassis yet holistic

Hales surprised me by saying that while the DAC core of the Vivaldi and Rossini Apex is "remarkably similar"—they use the same analog board—Vivaldi's digital system is "completely different." The Vivaldi Apex contains an earlier generation FPGA (field programmable gate array), a highly flexible logic device. Although Vivaldi's FPGA requires more supporting electronics and firmware, the Vivaldi DAC has more space internal than the one-piece Rossini (which incorporates streaming and upsampling functions). This allows greater flexibility in transformer positioning, component isolation, and what can be done with I/O and the control board itself. Moreover, the Vivaldi's control board is bigger than the Rossini's, allowing critical components to be more distant from "noisy things."

"Vivaldi's hardware represents a much more ambitious approach to D/A conversion than the Rossini's digital processing platform," Giolas said. "Vivaldi's multichassis approach, with its different power supplies, enables us to dedicate more real estate to the task at hand, exercise far more control over the interactions of different parts of the circuitry, and perform more sophisticated processing in the D-to-D portion of the upsampler. The Vivaldi DAC can do more in the analog domain and more signal management. Dozens and dozens of little things add up to the performance advantage of Vivaldi over Rossini."

"What's unique about dCS is our very holistic approach to electronics," Hales said. "A lot of tech guys will say, 'Oh yeah, ... it's all about the power supply or speed or current or whatever.' But it's not. It's not about any one device; it's about everything. You need everything working as well as you can make it for a product to perform optimally. So, rather than focus on one particular thing, we try to make everything as good as we can."

Steven elaborated on that holistic approach in the design of the Vivaldi and Rossini Apex DACs. "The challenge was to translate the technology in Vivaldi's four boxes into Rossini's much smaller footprint, driven by a single FPGA, without constraining the product or dialing it down. Vivaldi's multibox architecture gave us a bit more freedom with positioning and isolation. Chris was able to filter out a lot of the things that happen when you have lots of PCBs doing different jobs in a single box. This is why the DACs sound similar yet different."

Acknowledging that Vivaldi is a more complex product, Hales said, "As much as I'm a great believer in keeping things simple, to do something better you sometimes have to make it more complicated. The Ring DAC is a perfect example of this approach. No one designed the Ring DAC because they wanted to make it simple and elegant; we created the Ring DAC because it is palpably better than other approaches. That's where the sophistication comes in. If something needs to be more complicated for a better result, that's

measurements, continued

The F1 filter's frequency response with data sampled at 44.1, 96, and 192kHz (not shown) was flat to just below half of each sample rate, with then a fast rolloff. The rolloffs were slower and started progressively earlier with F2, F3, and F4. F5 gave a sharp rolloff with 44.1kHz data (fig.5, green and gray traces) but a slower rolloff with 192kHz data (blue, red), reaching –6dB at 40kHz.

Channel separation (not shown) was superb, at >125dB in both directions below 3kHz, decreasing to a still excellent 113dB at the top of the audioband. The low-frequency noisefloor (fig.6) was free of power supply–related spuriae, and random noise was very low in level.

The red trace in fig.7 plots the error in the analog output level with Map 3 as a 24-bit, 1kHz digital tone stepped down from 0dBFS to –140dBFS. The amplitude error is negligible until the signal lies below –135dBFS, which implies very high resolution.[3] Repeating this test with Maps 1 and 2 gave identical results. An increase from 16 bits to 24 bits with dithered data representing a 1kHz tone at –90dBFS (fig.8) dropped the dCS Vivaldi Apex's noise-floor by 25dB, which implies a very high resolution: at least 20 bits. When I played undithered data representing a tone at exactly –90.31dBFS, the waveform was symmetrical, the three DC voltage levels described by the data cleanly resolved (not shown). Repeating the measurement with undithered 24-bit data gave a well-formed sinewave (also not shown).

The dCS Vivaldi Apex produced such low levels of harmonic distortion that I needed to use the higher-resolution APx500 analyzer to examine its behavior. With a full-scale 1kHz tone and the Vivaldi set to output its highest level of 6V, the

3 For a good if not great result with this test, see fig.5 in my Rotel DT-6000 Follow-Up elsewhere in this issue.

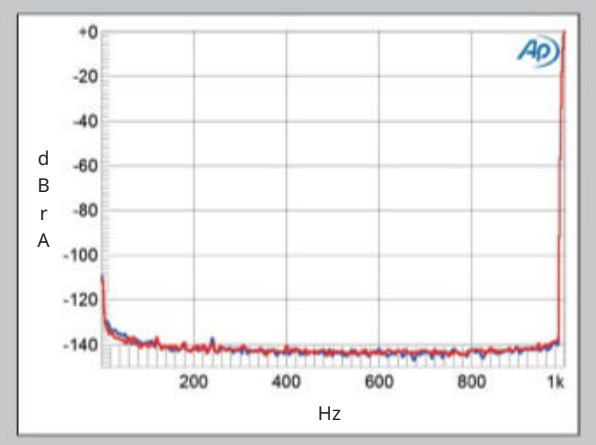


Fig.6 dCS Vivaldi Apex, balanced output, spectrum with noise and spuriae of dithered 1kHz tone at 0dBFS with 24-bit data (left channel blue, right red) (20dB/vertical div.).

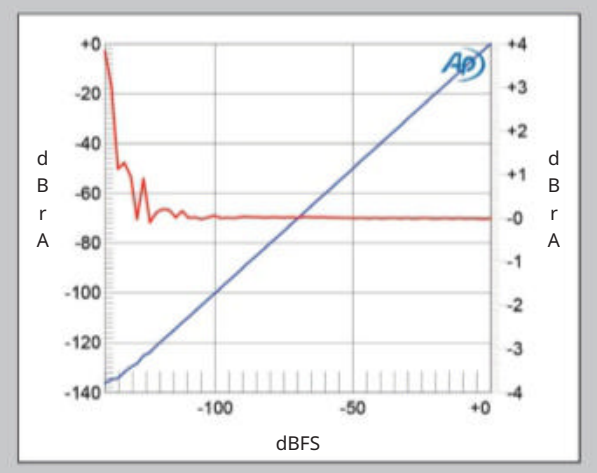


Fig.7 dCS Vivaldi Apex, Map 3, left channel, 1kHz output level vs 24-bit data level in dBFS (blue, 20dB/vertical div.); linearity error (red, 1dB/small vertical div.).

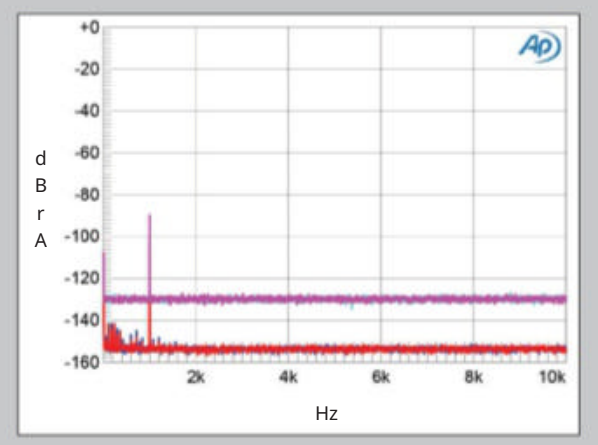
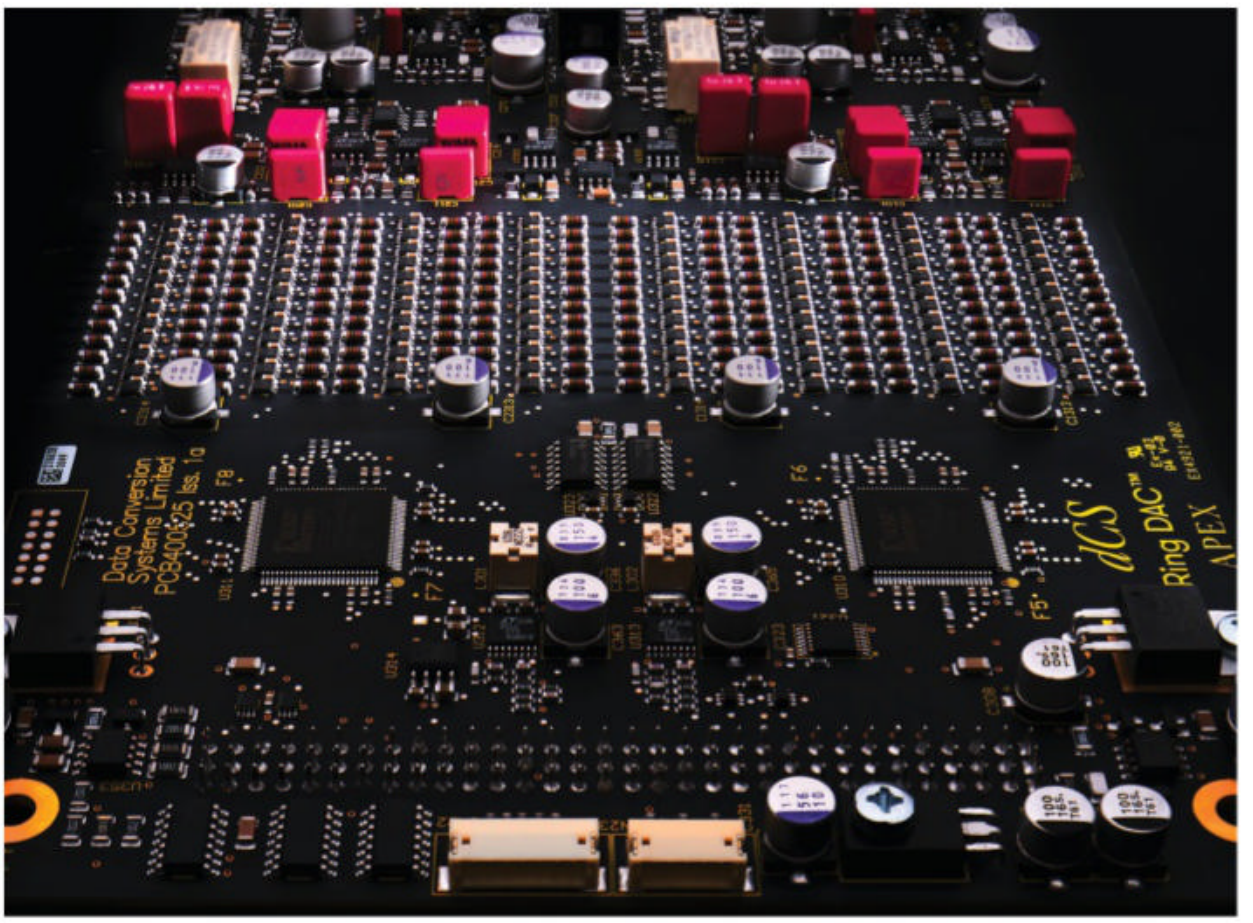


Fig.8 dCS Vivaldi Apex, spectrum with noise and spuriae of dithered 1kHz tone at –90dBFS with: 16-bit data (left channel cyan, right magenta), 24-bit data (left blue, right red) (20dB/vertical div.).

what we do. We don't just take the line of least resistance, however attractive that often is."

In summation, Steven said, "If you trace the performance of the initial Vivaldi system to where we are now, there's light years of difference. I'm really proud that we're able to offer Apex to existing dCS owners. It would have been really easy to spin out the upgrade as a new product with a new name, but we feel strongly that people invest in dCS because they intend to own it for a long time. So, if we can offer upgrades to existing units and support customers on their musical journey, that's best. We hope to roll out Apex in Bartók in 2023 as well."



Preparing to listen

With Giolas temporarily grounded by COVID, installation of the Vivaldi was entrusted to Definitive Audio's Gary Bruestle. We began by respacing a shelf on the Grand Prix Monza to accommodate three Vivaldi components plus equipment supports.

Lately, an Innuos Statement Next-Gen music server running Roon has been handling file playback on my system. I wanted to sample the Innuos proprietary playback software (which I'll discuss in a future follow-up review), but it wasn't yet equipped to work with the Vivaldi Apex DAC. Because Innuos prefers USB to Ethernet as its optimal way of sending files to DACs, we installed a USB cable between the Innuos Statement and the Vivaldi Upsampler and Ethernet cables between the Nordost QNet Ethernet switch, Innuos, and Vivaldi Upsampler Plus. Switching cables between the Vivaldi and Rossini Apex DACs and Clocks while maintaining distance between interconnects and power cables during comparisons was loads of fun.

measurements, continued

THD+noise measured just 0.00026%! The third harmonic was the highest in level at a vanishingly low –127dB (0.00005%), even into the punishing 600 ohm load (fig.9). The level of intermodulation distortion with an equal mix of 19 and 20kHz tones with a peak level of –3dBFS was also vanishingly low. Aliased images of the primary tones appeared above the audioband with the slowest-rolloff F4 filter (fig.10), but the only intermodulation product visible in this graph, the second-order difference product at 1kHz, lay at –130dB (0.00003%).

Fig.11 shows the spectrum of the Vivaldi Apex's output when it was fed high-level, undithered, 16-bit J-Test data via AES3. The odd-order harmonics of the undithered low-frequency, LSB-level squarewave lie at the correct levels, indicated by the sloping green line, and the noisefloor between the sidebands is extremely low. Repeating the test with 24-bit J-Test data with both AES3 and USB data (not shown) gave a similarly accurate result.

Like its Vivaldi predecessor and the Rossini Apex, the dCS Vivaldi Apex features superb measured performance.—**John Atkinson**

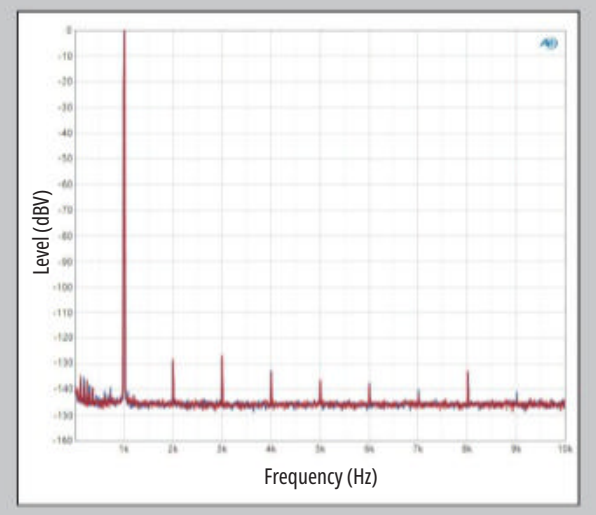


Fig.9 dCS Vivaldi Apex, balanced output, 24-bit data, spectrum of 1kHz sinewave, 10Hz–10kHz, at 0dBFS into 600 ohms (left channel blue, right red; linear frequency scale).

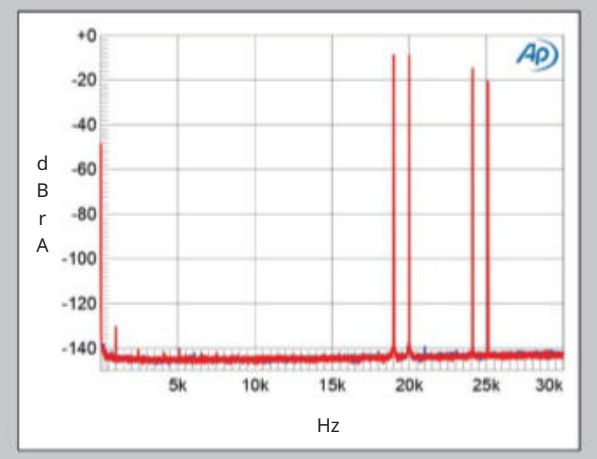


Fig.10 dCS Vivaldi Apex, balanced output, F4, 24-bit data, HF intermodulation spectrum, DC–30kHz, 19+20kHz at –3dBFS into 100k ohms, 44.1kHz data (left channel blue, right red; linear frequency scale).

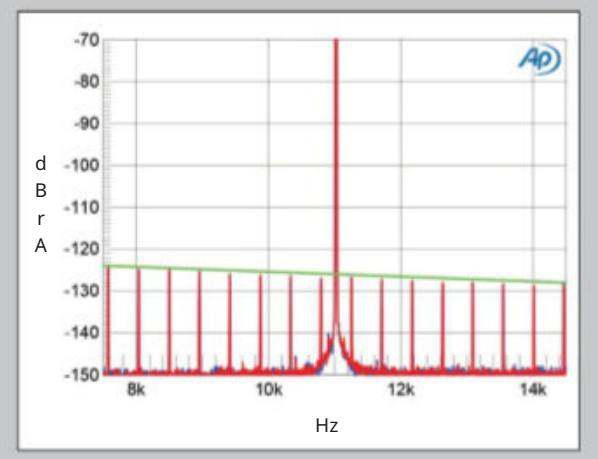


Fig.11 dCS Vivaldi Apex, high-resolution jitter spectrum of analog output signal, 11.025kHz at –6dBFS, sampled at 44.1kHz with LSB toggled at 229.6875Hz: 16-bit AES3 data (left channel blue, right red). Center frequency of trace, 11.025kHz; frequency range, ±3.5kHz.

Gasp!

Every month, I welcome fresh opportunities to find the right words to convey what I feel when I sit before my system, close my eyes, and listen to great music. But there are times when reactions are so extreme, the awe so overpowering, that eloquence cedes to one-word (or even nonword) exclamations.

Beginning with the Brahms Double Concerto with violinist Anne-Sophie Mutter and cellist Pablo Ferrández, backed by the Czech Philharmonic under Manfred Honeck (24/96 WAV, Sony/Qobuz), my eyes widened as I struggled to take in the size and weight of what I was hearing. I was struck dumb by the impact of that sound and in disbelief at experiencing it in my own music room (and not from a prime seat in a concert hall). I could only utter a single, elemental word: Wow! Was this how gaggles of awestruck teenagers felt standing in front of a gyrating Elvis Presley, screaming? Is this what young women felt at a concert by Liszt? Brahms never attained that kind of popularity, but the deep sense of loss and longing found in much of his music speaks to my every cell. When Brahms's music gets the performance and recording it deserves and is played on a proper sound system, I am catapulted to lonelier times but also transported by beauty to bliss.

Caroline Shaw's superbly recorded *The Wheel* (24/192 WAV, Alpha 881), our February Recording of the Month, provided another indication that something unique was happening with the Vivaldi Apex. I've written at length about the importance to me of air and space in music reproduction. I've rarely experienced as convincing a depiction of these attributes as in Vivaldi's rendering of this album's "Boris Kerner" for cello and flowerpots. As the timbres and pitches of flowerpots changed in color and intensity, and images shifted position in the soundstage, fantastical images flashed be-

fore my eyes. This wasn't a case of being transported to the venue. The excitement was right here in my listening room, where, more than ever, I wanted to stay for a long, long time.

I had to return to *The Wheel* several times after we decided to expand my original 300-word review into a full-page Recording of the Month piece. As I played it and other music I've never used before in a review, I experienced a newfound ease and flow in the music that made listening a joy.

Compared to Rossini Apex

Two days after my friend, who was staying with us, tested positive for COVID, I awoke to an "uh oh" mix of mild symptoms and internal alerts. I immediately resolved to quarantine myself in the music room, return to reference tracks, and spend as much time as required comparing the Vivaldi Apex/Upsampler Plus/Clock system to the Rossini Apex and its Clock. Only after putting the Vivaldi trio to the test would I subject *myself* to testing. I listened as if my life depended on it.

First, I streamed part of the second movement of Shostakovich Symphony No.11 from the DG recording *Dimitri Shostakovich Symphonies Nos. 4 & 11* with Andris Nelsons conducting the Boston Symphony Orchestra (24/96 Qobuz and 24/96 MQA Tidal). This movement builds from a sense of foreboding to an assaultive barrage before settling into chilling silence. It would try any system.

The Vivaldi Apex's depiction of dark and turbulent music in particular was superior to any I've experienced on my system. The air around the snare drum, the clarity of individual instruments in the cello and double-bass sections, the profundity of silences—all amazed me. In contrast, the Rossini Apex depiction seemed lighter and less substantial, with smaller images. The emotional impact of the Vivaldi's pounding bass drum dwarfed the Rossini's. String entrances were less vivid via the smaller single-box DAC, the midrange wasn't as rich, and the top was a mite brighter and noisier. Remember, in my experience at least, the Rossini Apex DAC is unrivaled in its price range, and it ain't cheap.

On *Echo*, with soprano Ruby Hughes and pianist/composer Huw Watkins (24/96 WAV, BIS 2568), the piano seemed smaller with the Rossini, and Hughes's voice had a brighter edge. Turning to Lou Harrison's *Concerto for Violin and Percussion Orchestra* (24/48 FLAC, Qobuz/Hyperion)—a fabulous, gamelan-inspired composition that caused one attendee at AXPONA to storm out of the room yelling "That is not music! Next time play music!"—the soundstage created by the Rossini lacked the Vivaldi Apex's ultimate openness. On Patricia Barber's *Clique* (32/352.8 WAV) and *Higher* (24/352.8 MQA, Tidal), bass was less immediate and less rich, colors less saturated, Barber's voice less distinct.

Let's switch to positives. On Diana Krall's "Autumn in New York" from *This Dream of You* (24/44.1 MQA, Impulse!/Tidal), the Vivaldi Apex rendered the guitar larger and more colorful. The Vivaldi Apex conveyed Krall's intimate delivery as though she were singing to me alone, and her voice seemed lifelike. In Grant Green's title track from *Idle Moments* (24/192, Blue Note/Qobuz), every instrument seemed larger, clearer, and more impactful via the Vivaldi.

I wasn't feeling up to rock music, but I ventured as far as the first tracks of Roger Waters's *Amused to Death* (24/192 MQA, Columbia/Tidal) and was wowed again by the Vivaldi Apex's ability to harness detail in service to emotion. In Yosi Horikawa's fascinating, gimmicky "Bubbles"[4] (16/44.1, Tidal), I felt surrounded by the dropping balls at the beginning—uncanny. In "Twilight Song," from bassist Charlie Hayden and pianist Kenny Barron's sublime live recording *Night and the City* (16/44.1, Verve/Qobuz), every note of the piano sounded like a precious pearl. And on Harmonia Mundi's wonderful period-instruments recording of Beethoven's *Archduke* Trio, with violinist Isabelle Faust, cellist Jean-Guihen Queyras, and pianist Alexander Melnikov, the sound was so natural and flowing that I closed my eyes and thanked the universe for the glory of it all.

ASSOCIATED EQUIPMENT

Digital sources dCS Rossini Apex DAC, Rossini Clock; Innuos Statement Next-Gen Music Server; Uptone Audio EtherREGEN with AfterDark Giesemann Emperor Double Crown Master Clock, and Nordost QNet Ethernet Switch, all powered by Nordost QSource linear power supplies (2); Small Green Computer Sonore Deluxe opticalModule, Linksys mesh router, and Arris modem, all powered by HDPlex 300 linear power supply; Apple 2017 iPad Pro.
Preamplifier Dan D'Agostino Momentum HD.
Power amplifiers Dan D'Agostino Progression M550 monoblocks.
Loudspeakers Wilson Audio Specialties Alexia V.
Cables Digital: Nordost Odin 1, Odin 2, and Valhalla 2 (USB and Ethernet), Frey 2 (USB adapter); AudioQuest WEL Signature, Wireworld Platinum Starlight Cat8 (Ethernet), OM1 62.5/125 multimode duplex (fiberoptic). Interconnect: Nordost Odin 2, AudioQuest Dragon. Speaker: Nordost Odin 2, AudioQuest Dragon. AC: Nordost Odin 2, Valhalla 2; AudioQuest Dragon and Firebird. Umbilical cords: Ghent Audio Canare for HDPlex 300 LPS; QSource Premium DC cables with Lemo terminations for QSources.
Accessories Grand Prix Monza 8-shelf double rack and amp stands, 1.5" Formula platform; Nordost 20-amp QB8, Titanium and Bronze Sort Kones, Sort Lifts; Stromtank S 2500 Quantum MKII power generator; AudioQuest Niagara 7000 and 5000 power conditioners, NRG Edison outlets, JitterBugs; ADD-Powr Sorcer X4; Wilson Audio Pedestals; A/V RoomService Polyflex Diffusers; Resolution Acoustics room treatment; Stillpoints Clouds (8), Aperture 1 (2), and Aperture 2 (2) acoustic treatments; HRS DPX-14545 Damping Plates; Stein Super Naturals and Music Blue Suns; Bybee Room Neutralizers; Absolare Stabilians.
Dedicated Listening Room 20' L × 16' W × 9'4" H.
—Jason Victor Serinus

Conclusion

If someone were to give me $100 for every review that extols "state-of-the-art" equipment, I'd have enough money to buy a house on the water with a music room fit for a queen. So, rather than falling into that trap, let's talk instead about music.

Recorded music has never sounded as full, rich, flowing, rewarding, and natural as with the Vivaldi Apex. It is rare, in a home listening room, to experience anew the full impact of great orchestral music heard in a concert hall. But the Vivaldi Apex DAC, Vivaldi Upsampler Plus, and Vivaldi Master Clock together have made that possible, repeatedly. I haven't heard every DAC on the market—certainly not in my listening room, where all other variables are known—but nothing I have encountered in stores or at shows has come close to the Vivaldi Apex. Every listening experience has been extraordinary. The finer and more concentrated an artist's focus, the finer the Vivaldi Apex system sounds. It conveys inspiration and genius like no other equipment I've heard.

I hope that you get to hear and enjoy it, in a system worthy of its company. If you're fortunate enough to own one, you will have read this review with a knowing smile. ■

4 Both "Bubbles" and Krall's voice were played by exhibitors at the 2022 Warsaw Audio Show. Reference tracks make the rounds.