dCS Vivaldi DAC Review

June 15, 2014

I think it is fair to say that in the eighteen or so months it has been on the market, the dCS Vivaldi has taken the ultra high-end DAC market by storm. It has been comprehensively reviewed by the audio print publications, and adopted by many of the major audio manufacturers, particularly loudspeaker companies, as their reference DAC. It was used by more than half a dozen exhibitors at both RMAF and CES this past year. It is most often demoed in its four box "stack" configuration, comprised of the Vivaldi DAC ($34,999), the SACD Transport ($39,999), the Upsampler ($19,999) and the Word Clock ($13,499). Now $108,500 is a lot of money by anyone's reckoning, and a clear barrier to entry, both financially and psychologically, but it is unnecessary to go all-in at the outset. An increasing number of audiophiles, particularly those who have shifted from silver discs to hard disks for digital playback, have elected to dip their toes in the water by initially purchasing only the DAC.

After listening to scores of DACs, and reviewing a dozen, last year I made the dCS Debussy my reference. Why? You can read my full impressions here, but in a word: refinement. At the end of my review I rather naively wondered how the Vivaldi could best it. Well, I had the good fortune to find out when John Quick, sales manager for dCS North America, came for a twice postponed visit, and not wanting to arrive empty-handed, brought along a Vivaldi DAC. Not initially destined for my listening room, but rather for audition in the Ralston Listening Library and Archive at the University of the South, it remained unpacked in my entry way for 24 hours. I exercised great restraint by not stealthily breaking it open and putting it in my system in the middle of the night for an after-hours audition. John was surprised. So was I.

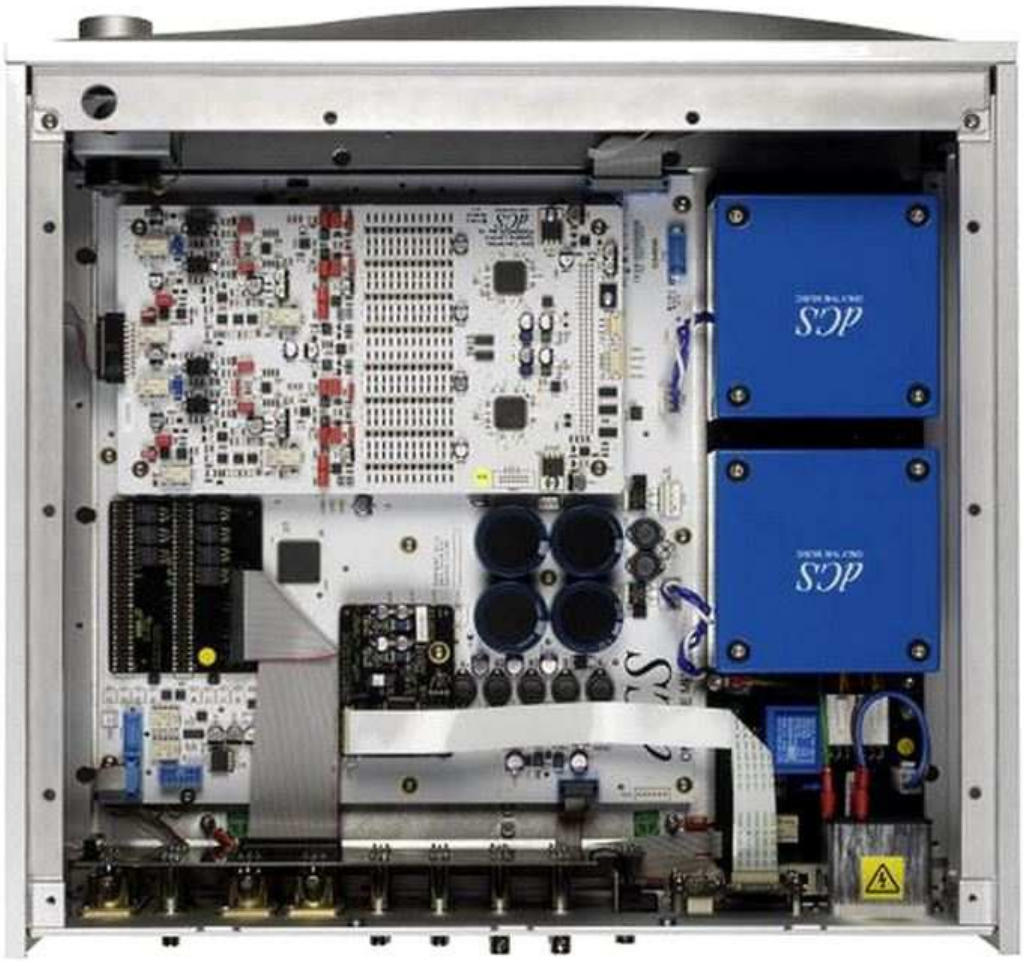
I have written extensively about the Ralston Listening Library and Archive, particularly in relation to Peter McGrath's installation and setup of the Wilson Audio Alexandria, Series II loudspeakers, and their subsequent replacement with the Alexandria XLFs. John Marks wrote an excellent introduction to the room here. The quick version is that the Ralston Listening Library and Archive is a custom built listening facility comprising a dedicated main listening room, a student listening area, and a reading area, to house and playback Father William Ralston's

comprehensive and carefully curated collection of approximately 15,000 classical LPs and another 15,000 classical CDs, and a vast collection of scores (including an original score of Verdi's Othello) and other scholarly materials, all of which Father Ralston bequeathed to the University. The equipment in the Ralston listening room is detailed at the end of this review. We have not yet finally settled on a reference DAC for the system, although for the past year we have been using the Bricasti M1, which I reviewed here, to great effect and with great satisfaction. John Quick was kind enough to provide a Vivaldi for an extended audition in our continuing quest.

Description and Setup

Before jumping into my listening impressions, a few words about the Vivaldi DAC itself. The Vivaldi DAC is large as DACs go, measuring 17.5″ wide by 17.2″ deep by 6″ high, and weighing in at over 35 pounds. Its size is offset by its elegantly designed, sculpted aluminum casework. I'm told that the fascia is carefully CNC-milled from a single 16kg ingot. The front panel controls are spartan though, comprising a soft, but high resolution, color display, five buttons, and a rotary control. The display is logically segmented into four areas corresponding to input, sampling frequency and bit depth, filter selection, and volume. Additional icons appear when their functions are selected. An IR receiver for remote operation is hidden behind the display face. The five buttons control power, menu, filter selection (up to six are available), input selection, and mute. The rotary control sets volume in 0.5db increments, balance in 0.1db increments, and menu options.

Around back, there are four AES digital inputs which can be configured for single or dual wire operation, three S/PDIF inputs (two on RCA and one on BNC), a Toslink input, a dual-BNC SDIF-2 input, a USB input, and four BNC word clock connectors for interfacing with other components of the Vivaldi stack or professional gear. Both balanced and unbalanced independently buffered analog outputs are available. A choice of 2v or 6v output is available for system matching. There is also an RS232 serial port for testing, control system interfacing, and customizing the names of the inputs if desired, and a combination IEC power inlet, fuse holder, and power switch.



Without going into too much detail (I'll quickly get in over my head), the Vivaldi, like its Debussy, Puccini, Paganini, and Scarlatti stable mates, does not rely on an off-the-shelf DAC chip which costs a few dollars in bulk, and is quickly superseded. Instead, the decoding and processing are handled by a single high-speed FPGA (field programmable gate array), 200x more powerful than the pair of the same devices used in the Scarlatti, that mates to dCS's proprietary, discrete "Ring DAC" configuration. This has a major advantage: the Vivaldi does not immediately become obsolete upon the introduction of new DAC chips, but rather can be upgraded at any time through software. It is the reason the other DACs in dCS's lineup have remained current and competitive for all these years. As a result, the Vivaldi can be considered a long-term investment rather than simply an annual purchase. That's good news when $35,000 is involved.

All data presented to the Ring DAC is upsampled and oversampled to 5 bits at either 2.822MHz/sec or 3.07MHz/sec, a.k.a. Ring DAC format. For the Vivaldi, dCS has enhanced its Ring DAC topology in a number of ways. One example can be found in the Ring DAC's output current sources that present the raw analog signal to the discrete output stage. In the Debussy, for example, the digital data stream is decoded to drive 22 quad latches (the current sources), in a balanced differential configuration, which are rotated randomly, so that any mismatch appears as

a small amount of de-correlated extra noise that can be effectively removed by filtering, rather than as distortion. In the Vivaldi, dCS has replaced the quad latches with 96 discrete latches (a matrix of 2×48), which measurably decreases on-chip crosstalk and thus jitter, and increases channel separation and dynamic range. These are not merely esoteric intellectual exercises. The results are immediately audible.

Also, don't overlook the value of on-board volume control. With the Vivaldi, in an all digital system, there may be no need for a separate preamplifier. In fact, you may be better off without one (unless you are using your preamplifier as a tone control to fix something else in your system). In the Ralston listening room, following a back and forth comparison, we bypassed the upper-echelon Ayre KX-R preamplifier and drove the Ayre MX-R monoblocks directly, achieving better resolution of low-level detail without sacrificing dynamics. I have been driving the Pass Labs XA100.5 monoblocks in my system directly from the Debussy from the outset, and did the same with the Vivaldi. Obviating the need for a preamplifier makes the Vivaldi a better value than its price alone would suggest.

Setup was simple. For the Ralston listening room, I connected a MacBook Pro to the USB input and a Sony XA5400ES SACD to S/PDIF Input 1. Likewise, for my system, I connected my Mac Mini to the USB input and my Meridian G08 CD player to S/PDIF Input 1. No further configuration was necessary (though a plethora of options are available through the menu). The Vivaldi DAC automatically locked onto PCM computer files from 44.1/16 to 192/24, and DSD 64. Sampling rates of 352.8 and 384Khz are supported over dual AES pairs. When DSD 128 files become generally available (I, for one, am not holding my breath that that will happen anytime soon), compatibility is a software upgrade away.

The default filter value is Filter 1, which has the best rejection of Nyquist images and the sharpest high frequency roll-off. Filters 2-4 have more relaxed roll-off and better transient response. Filter 5 is a minimum phase or "apodising" filter with no pre-ringing. Filter 6 is a new asymmetrical filter with exceptionally low pre- and post-ringing. Four separate filters are available for DSD sources that progressively limit the high-frequency bandwidth for system matching, and the Vivaldi will remember your favorite filter for each sample rate. Ultimately, the choice of filter is a personal preference and may change depending on the source material. The ability to fine-tune the sound of the Vivaldi for your system and listening expectations is a godsend.

Listening

This review is based on four extended listening sessions in the Ralston listening room; the first with John Quick; the second with Lowell Graham, whose name many of you will recognize as the former conductor of the United States Air Force Band and current head of the Music Department at the University of Texas at El Paso, whose album *Winds of War and Peace* was recorded in the 1980s by Dave Wilson on his custom Studer Ultralinear 1″ reel to reel machine, transferred to DSD, and played back as the centerpiece of Wilson Audio's demo of the XLFs and pair of Thor subwoofers at RMAF 2013; and the third and fourth private listening sessions with my good friend Thomas "Tam" Carlson, who is an English Professor at the University, and the

moving force behind the creation and ongoing operation of the Ralston facility. In addition, at the end of Tam's extended audition, I had the good fortune to have the Vivaldi in my system for continuous listening for several days before I finally manned-up and returned it.

The listening session with John Quick focused primarily on many of Peter McGrath's high resolution recordings played back over USB from a MacBook Pro; the session with Lowell Graham focused on his own recordings on CD over S/PDIF using a Sony XA5400ES SACD player as a transport; and my private listening sessions at the Ralston listening room covered a wide range of recordings on CD. I listened to CDs, high resolution PCM recordings, and DSD files in my own system.

Since accurate and life-like reproduction of piano is fiendishly difficult, let's start with a Peter McGrath high resolution recording of *Prelude No. 24 in D minor* from Shostakovich's *Preludes and Fugues, Op. 87*. But first a confession. When I started out on my journey into classical music forty years ago, I would have thought these *Preludes and Fugues* were only so much noodling and banging on a piano for (at least) two reasons: I had *very* limited exposure to and appreciation for the extended classical repertoire, and my hi-fi system, while actually pretty good for a young kid fresh out of high school, was not nearly resolving enough to meaningfully reveal the complex harmonic textures that make these works so compelling. I have since made some progress on both fronts, though much remains to be done. I heartily recommend them to you for both their intellectual and emotional content. Don't give up on them on first listen. Then turn to *Books I* and *II* of Bach's *The Well Tempered Clavier*, each of which also contains 24 preludes and fugues, for a fascinating juxtaposition.

With five decades of listening experience behind him, Tam feels that the Shostakovich is the most realistic recording of a piano he has ever heard. It's hard to disagree. The same can be said for virtually all of Peter McGrath's work, especially those performances, like this one, which were captured by Peter's prized custom Grado omnidirectional microphones. *Prelude No. 24*, composed in early 1951 and considered by many to be Shostakovich's greatest work for piano, has a very slow opening tempo, and in the first theme uses the sustain pedal liberally, giving the piano a big, ringing sound. This also means that the individual notes are allowed to decay naturally, and that series of notes overlap one another creating complex harmonics. This is one aspect that the Vivaldi excels at, with its phenomenal low level resolution extending the decay all the way to silence, rather than artificially truncating it, which is what you hear in lesser playback systems. The harmonies invoked in the very low level decay tails add a richness and complexity to the sound which is breathtaking. In addition, the sense of ambiance and hall size is augmented, placing the piano in a holographic reproduction of the concert hall. This is about three and a half minutes of the most achingly beautiful music you are ever likely to hear.

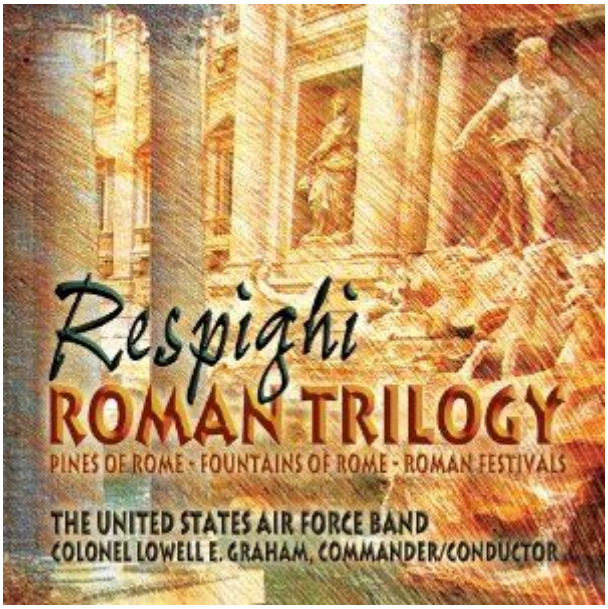
Another of Peter's recordings is that of the Paris Trio performing one of Haydn's *String Trios, Opus 32*. The most striking things initially are the velveteen like sheen of the violin strings, the bloom that radiates from the cello, and the clearly wooden sound of the piano's soundboard. As you listen carefully, you can pick up little clues as to the exact placement of the instruments, like soft intakes of breath before the violinist begins a challenging passage, or the pianist shifting on his bench (and by this I mean the rather subtle sound as his weight shifts, rather than the sound of the bench creaking) as he moves his hands from the left side of the keyboard to the right. These

aural markers are not distractions; instead, they contribute to the sense of space and aliveness of the performance. In addition, this fine resolution reveals the emotional shading of tones and subtle variations in the striking of piano strings when being played pianissimo. Together, they imbue the music with a sense of edge-of-seat anticipation.

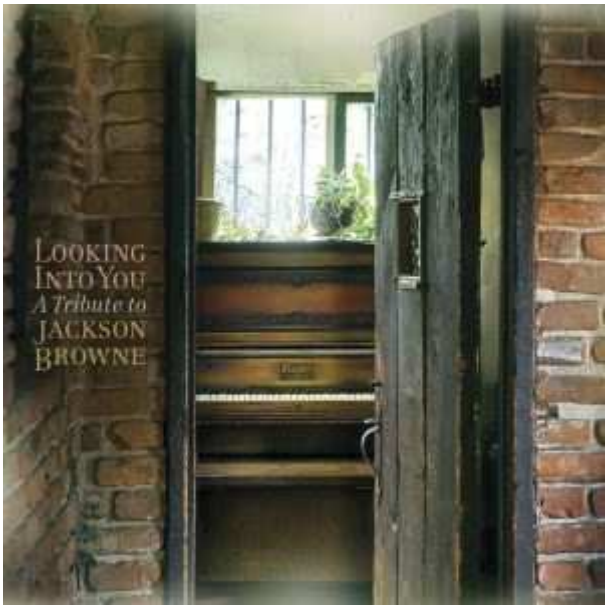
Maria Callas has an exquisite voice; unfortunately, to my knowledge, there are no exquisite digital recordings of it, at least in the technical sense. In my experience, they are all too bright, often making her forte high notes cringe-worthy, and are plagued with tape hiss. It is often difficult to listen past these imperfections. I have heard this many times with a variety of DACs in the Ralston listening room, including those from AURALiC, Ayre, Bricasti, and Meitner, among others. We confirmed it again with the Bricasti with Callas singing the aria *In quelle trine morbide* from Puccini's *Manon Lescaut*. Then we put the Vivaldi in the system. I was shocked, The tape hiss was barely noticeable. In addition, when the offending passages were about to arrive, I tensed up. It was completely unnecessary. The Vivaldi handled them beautifully. Nary a wince. You might think both ameliorations were the result of a roll-off of the high frequencies. I don't think so. High frequencies were not missing on these or any other recordings. I don't know how dCS managed this trick; magic I suppose. More likely a flawless handling of timing and timbre in the upper midrange and lower treble. I noted during my listening sessions that this improvement was also applicable to many CDs from the early days of digital which I once thought, per force, sounded harsh and edgy.

Another bit of magic was with soundstage depth. This was a mono recording, so the center image was completely stable. With the Bricasti, Callas sounded as if she were standing next to the accompanying piano. With the Vivaldi, she took three steps forward. No exaggeration. Air around the instruments nothing; this was physical space around the performers. And I mean no slight to the Bricasti. It is a superb DAC. Granted, the Vivaldi is four times as expensive, but it unequivocally demonstrates just what is possible with the state of the art. This layering of the soundstage is consistent with my listening notes on other recordings as well. It is among the most

endearing qualities of the Vivaldi, and contributes significantly to the aural image seemingly floating in space between and behind your loudspeakers, space which, if you didn't know better, you'd think you could get up and walk around in.



I thought I was pretty familiar with Ottorino Respighi's three tone poems collectively known as the *Roman Trilogy* (*Fountains of Roman, Pines of Rome, Roman Festivals*). Nothing prepared me, however, for the sound of it as beautifully orchestrated by Lawrence Odom for the United States Air Force Band under the baton of Lowell Graham, and I don't mean in a John Philip Sousa kind of way. The *Roman Trilogy* became a completely different piece of music, in many ways better, or at least more engaging, than its original orchestration for a full symphony orchestra. It was at once familiar, yet unfamiliar, and always full of surprises. For example, in the opening movement of *Roman Festivals* (premiered in 1929 by Arturo Toscanini and the New York Philharmonic at Carnegie Hall), the setting is the Roman Circus, and there are deep bass drum whacks, which at an appropriate volume hit you in the chest, and shiny trumpet fanfares which spread out over a wide soundstage depicting the enormous scale of the venue, before the trombones signal the entry of the gladiatorial combatants, the woodwinds create tension at the display of Christian martyrs, and the tubas mimic the roar of lions. Exciting stuff which the Vivaldi reproduces with great drama. The second movement is diametrically opposed, with soft, delicate woodwinds, sparsely orchestrated, evoking pilgrims at prayer. Here low level ambiance retrieval lays the wind band (and solo piano toward the end) out before you in a very nearly visual manner. The third movement is a serenade with an alternating rollicking and serene sense. Here the pluck and strum of the mandolin jumps out at you life-like. The final movement is a playful exchange of brass and woodwinds, percussion and piccolo, mimicking revelers celebrating. Pinpoint imaging floats above the underling bass line. Fantastic stuff. I heartily recommend this recording to you.



I could go on for pages as I have notes from dozens of CDs, but I'll close with a selection from the popular music genre. Jackson Browne was one of the most iconic singer-songwriters of the 1970s. I mean you don't have a tribute album dedicated to you if you are not iconic, right? That's exactly what happened earlier this Spring when more than 20 artists got together and recorded the choicest of Jackson Browne's songs on an album entitled *Looking Into You*. The first cut is that of *These Days*, with Don Henley doing a pretty convincing imitation of Jackson Browne's tonal qualities and vocal inflections. I thought I had accidentally cued up my *Best of Jackson Browne* album. Upon comparison though, Don Henley has a definite twang. The song opens with a few simple strums of light gauge guitar strings with a medium pick. It's easy to tell with the Vivaldi. The instruments were spread nicely between the speakers, though center-centric, resulting in a somewhat laterally constricted soundstage, which nevertheless seemed an entirely natural presentation. On the next cut, *Everywhere I Go*, there was no mistaking Bonnie Raitt's distinctive voice, or her equally distinctive blues style, which includes the liberal use of a Hammond B3. Bob Schneider contributed a remarkable rendition of *Running on Empty*, with a loosely tuned, and therefore deeper than usual, kick drum and shakers keeping the beat. The sound of the drum invokes the cliched description of accurate sound of the skin of the drum head. It can't be helped. Lyle Lovett appears on two cuts, *Our Lady of the Well* and *Rosie*. *Rosie* is, of course, the most readily identified, and it goes without saying Lyle Lovett's voice is unmistakable, and is here recorded with an immediacy more like his early work than his later, more thickly arranged albums. He is accompanied predominately by Matt Rollings on a closely miked, but great sounding, piano, with drums, bass, and electric guitar filling in the accents and filling out the space. Having seen Lyle Lovett in concert on a couple of occasions, it was easy to imagine him being present in the room. If you are a Jackson Browne fan, this is a must have double album, though I don't think it is available on vinyl. That's okay; the Vivaldi brings out the best in your CD collection. It really is quite astonishing how great those silver discs can sound in the right hands.

Although I have not gone into any detail about the Vivaldi's performance with DSD files, rest assured that they all work faultlessly and sound phenomenal. I played files from 2L, Acoustic Sounds, Blue Coast Records, and Channel Classics, as well as files ripped from SACDs, and they were immediately recognized and locked onto, and playback began without the slightest hiccup. It was just another day at the office for the Vivaldi. No conversion to PCM, upsampling, downsampling, or sidesampling going on. Just as God intended it. Revelatory really.

Conclusion

The Vivaldi DAC is a stunning achievement. It elevated the Ralston listening room system to new and unexpected heights, and wrought significant improvements even in my more modest system. It breathes new life into the contention that the source is the most important component in your hi-fi. Even if the Vivaldi DAC is outside your financial comfort zone, I encourage you to audition it (or, better yet, the entire four box system) at your local dealer or the next trade show so that you will have a reference for what is possible in digital playback. The only problem is that it is hard to go back once you know what you are missing. It is unabashedly a desert island component. Personally, I am one lottery win away from making the dCS Vivaldi the centerpiece of my system. Wish me luck.

- *Frank Berryman*

Specifications

• Converter Type: dCS proprietary Ring DAC™ topology
• Digital Inputs:

- USB 2.0 interface on a type B connector. Operates in asynchronous mode, will accept PCM data up to 24 bits at 44.1, 48, 88.2, 96, 176.4 & 192kS/s and DoP (DSD over PCM). Can operate in USB Audio Class 1 or Class 2 mode.
- 4x AES/EBU on 3-pin female XLR connectors. Each will accept up to 24 bit PCM at 32, 44.1, 48, 88.2, 96, 176.4 & 192kS/s & DoP OR 2x Dual AES pairs at 88.2, 96, 176.4, 192, 352.8, 384kS/s & DoP plus dCS encrypted DSD.
- 3x SPDIF on 2x RCA Phono and 1x BNC connectors. Each will accept up to 24 bit PCM at 32, 44.1, 48, 88.2, 96, 176.4, 192kS/s and DoP.
- 1x SPDIF optical on a Toslink connector, will accept up to 24 bit PCM at 32, 44.1, 48, 88.2 & 96kS/s.
- 1x SDIF-2 interface on 2x BNC connectors, will accept up to 24 bit PCM at 32, 44.1, 48, 88.2 & 96kS/s or SDIF-2 DSD (auto-selected). If the unit is not in Master mode this interface requires a compatible Word Clock input, locked to the data rate.

• Analog Outputs:

- Output Levels: 2V rms or 6V rms on all outputs for a full-scale input, set in the menu.
- Balanced Outputs: 1 stereo pair on 2x 3-pin male XLR connectors (pin 2 = hot, pin 3 = cold). These outputs are electronically balanced and floating, the signal balance ratio at 1kHz is better than 40dB, Output impedance is 3Ω, maximum load is 600Ω (a 10kΩ-100kΩ load is recommended).
- Unbalanced Outputs: 1 stereo pair on 2x RCA Phono connectors. Output impedance is 52Ω, maximum load is 600Ω (a 10kΩ-100kΩ load is recommended).

• Word Clock I/O:

- 3x Word Clock inputs on 3x BNC connectors, accept standard Word Clock at 32, 44.1, 48, 88.2, 96, 176.4 or 192kHz. The data rate can be the same as the clock rate or an exact multiple (0.125x, 0.25x, 0.5x, 1x, 2x, 4x, 8x) of the clock rate. Sensitive to TTL levels.
- Word Clock output on 1x BNC connector. In Master mode, a TTL-compatible 44.1kHz Word Clock is available.

• Residual Noise: Better than -113dB0 @ 20Hz-20kHz unweighted (6V Setting)
• L-R crosstalk: Better than -115dB0, 20-20kHz
• Spurious Responses: Better than -105dB0 @ 20-20kHz
• Filters: A choice of filters give different trade offs between Nyquist image rejection and phase response.
• Software Updates: Loaded from CD-R or via USB interface
• Local Control: dCS Premium Remote supplied as standard. RS232 (controlled by a third party device).
• Power Supply: Factory set for 100, 115, 220 or 230V AC, 49-62Hz
• Power Consumption: 23 Watts typical/30 Watts maximum.
• Dimensions (WxDxH): 444mm (17.5”) x 435mm (17.2”) x 151mm (/6.0”) high.
• Weight: 16.2 kg (35.65 lbs)

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Associated Equipment

The Ralston Listening Library and Archive System:

Analog Sources: Ayre/Bauer DPS; VPI Classic 2; Koetsu Coralstone; Miyajima Shilabe and Mono BE; Ayre P-5xe
Digital Sources: Ayre DX-5; MacBook Pro; Weiss INT202; Bricasti M1; Sony XA-5400ES
Preamplifier: Ayre KX-R
Power Amplifier: Ayre MX-R
Loudspeakers: Wilson Alexandria XLF
Cables: Ayre Signature Series; Cardas Clear
Accessories: Grand Prix Silverstone rack; EquiTech 10WQ balanced power system; Ayre L-5xe power conditioners

Editor's System:

Analog Source: VPI Scout; Dynavector 20X2; Musical Surroundings Phonomena II
Digital Sources: Meridian G08; Mac Mini; dCS Debussy; Audirvana Plus
Preamplifier: Meridian G02
Power Amplifiers: Pass Labs XA100.5
Loudspeakers: Magnepan 1.7s
Analog Cables: Kimber Select KS1016 and KS1116
Digital Cables: Kimber Select KS2020 and KS2436 USB
Speaker Cables: Kimber Select KS6063 and KS9033
Power Cables: Kimber PK10G and PK14G
Accessories: Audience aR2p power conditioner