



Digital Supremacy The dCS Paganini

By Jeff Dorgay

While many in the audio and music industries claim that we are near the end of shiny spinning discs and physical media in general, some of us aren't ready to give them up quite yet. The analog LP has had a steady resurgence, but they still aren't being produced in anywhere near the numbers of their heyday. The moral of the story is not to count out a format that you might think is dead. At least not yet. Even if the powers that be stop producing compact discs and SACD's tomorrow, there are still a tremendous amount of used CD's on the market, and with prices at an all time low, it's a great time to be adding to your digital collection.

The past few years of CD production have been bright and compressed more often than not, but I have heard more than my share of well-produced CDs. For the ultimate sound junkie, there have been excellent remasters from DCC, MoFi and a few other labels that offer positively stellar results from the standard redbook format.

Even though world-class analog is highly enticing, not everything is available on LP. If you have a fairly large collection of CDs, I'm guessing you are still intrigued about extracting the maximum from the music you already own and cherish.

I came to appreciate world-class CD players about four years ago when I stepped up to the original Meridian 808 and later the Naim CD555, which was my reference digital player until the Paganini entered my realm. Even though world-class analog is highly enticing, not everything is available on LP. If you have a fairly large collection of CDs, I'm guessing you are still intrigued about extracting the maximum from the music you already own and cherish.

For those that can't quite stretch to the complete dCS Scarlatti system (MSRP \$79,996) the full four-box Paganini system featured here will only set you back about \$54,000. Certainly a major expenditure, but it's not as outrageous as it might seem initially, and you can purchase the four components individually and work your way up, if you will. The PTT transport, which plays CD and SACD discs, has an MSRP of \$16,999; the PDC DAC, \$17,999; the PUP Upsampler, \$10,499; and the PCK clock \$7,999.

While the Paganini shares the same DAC board as the Scarlatti and most of the same electronics, the higher priced model features even more robust power supplies (with completely separate digital and analog supplies in the DAC, along with better vibration isolation. An even higher quality transport mechanism is featured as well. Seriously, though, you really need the whole stack, but that's just the devil's advocate speaking. Or you could buy a new Porsche Boxster S. Hmm.

The Paganini stack might just be built more solidly than a Porsche Boxster S, though. The casework is machined from heavy-duty aluminum and the front panels are machined from solid billet. While this does make for

a very attractive appearance, it serves dual duty by providing a mechanically stable environment for the sensitive components within. The Paganini components are available in silver and black anodized finish.

The full Paganini system makes perfect sense for the person who has abandoned analog completely, as the DAC has a variable output that works extremely well, eliminating the need for a separate line stage. Configured for every possible digital source, you could utilize a music server, computer and even a Wadia dock with iPod/iPad to complete your system; just add the power amplifier and speakers of your choice. Thanks to balanced and single outputs, the Paganini will be compatible with whatever your configuration might be.

Most current digital disc players and DAC's make use of one of a few available chipsets to convert the digital bits to analog information to feed your system. While there are a few arguments on which chipset provides the optimum performance, dCS takes a different route entirely.

The system uses a large group of Field Programmable Gate Arrays (FPGA) along with another batch of DSP chips that work together with dCS' own software to convert the digital signal to analog. This makes for a much more obsolescence-proof digital front end because most upgrades can be done via a software upgrade. Should the need for a hardware upgrade occur, even these can be easily performed thanks to the internal modular construction. Think of the Paganini as an investment in your digital future and hopefully the last digital front end you would ever have to buy. *(continued)*





A Myriad of Inputs and Outputs

The Paganini system allows connection of almost anything in your digital world except those devices with ST Optical or Toslink. There is a fully asynchronous USB input, a pair of SPDIF RCA inputs, a pair of AES/EBU XLR inputs and a pair of IEEE 1394 (fire-wire) inputs that are reserved for DSD inputs and are only compatible with dCS equipment. There is also an input for a word clock, which we will discuss later. Needless to say, you should be able to plug whatever is at your disposal into the Paganini without reservation.

One pair of RCA analog outputs and one pair of XLR balanced outputs are also available, and both sets feature variable output level that can be configured for a maximum level of either two or six volts. Should you be using the Paganini stack as your preamplifier as well, this will allow you to optimize the output level to get maximum useful range from the volume control in your system. Both sets of outputs are individually buffered so they can drive separate sources. This is a bonus for me in a test situation, being able to use the Paganini in both of my systems as a reference component.

Setup

The four-box Paganini is *not* a plug-and-play device. All four boxes must be interconnected with a variety of cables that need to be connected very specifically. Fortunately, the Paganini is supplied with excellent manuals, but if there was ever a case where you must *read the damn instructions before you begin*, this is it. No worries, your dCS dealer will provide full setup and instruct you on operation, but keep that manual handy. Once everything is in place, power up the stack and verify that you have all of the components working in harmony, or you will not get

the full magic that the Paganini can deliver. Shortly after the stack is powered up, a thermometer symbol lights on the front panel of the clock to let you know that it is thermally stable. I found the dCS stack to sound its absolute best after being powered up for a full 24 hours.

Because this is such an extensive digital component, we will cover it one box at a time and discuss the changes that adding each subsequent box makes to the overall system sound. It is also worth noting that there are four to six different digital filter schemes at your disposal, depending on which mode you are listening to the DAC. *(continued)*

The Transport

Only you can decide whether the added \$17k expenditure for a separate transport is worth it, but after living with the Paganini for the better part of a year, and comparing it to a number of music server and computer sources, I still feel that the most realistic playback came from the transport, at least with redbook and SACD.

Near the end of the review period, dCS U.S. importer John Quick stopped by with his highly modified Macintosh G5 server, loaded with a wide collection of 24bit/192khz music and a high-zoom RME sound card. Quick was armed with the latest version of Amarra, the playback engine that optimizes a Macintosh computer for digital audio playback. I found the most unique feature of the new

release to be its memory playback function, which allows the user to load any number of tracks into the computers RAM (random access memory) so that it was no longer dependant on the hard drive for playback. Using the extreme high-resolution files, not only was the playback quality on par with the transport, it was in some cases better than my analog front end.

As physical media draws near the end of its product lifetime, the actual mechanism used inside the box should be of great concern to anyone purchasing a disc spinner at this price point. When visiting the dCS factory earlier this year, I saw the massively overbuilt Esoteric mechanism used inside the dCS transport. This mechanism acknowledged by many to be one of the best-built in the industry. *(continued)*





The Paganini DAC

If you thought the analog world was a fast track to analysis paralysis and a severe case of indecision, the different filter choices available with the Paganini DAC (and the various upsampling rates available with the Paganini Upsampler) might just drive you to drink. However, drinking too much will negate the effectiveness of the filter choices, so perhaps in the end, this might be the best approach!

All kidding aside, the dCS manual says that in PCM mode, the first four filters “offer different tradeoffs between the Nyquist image rejection and transient response.” For those not completely familiar with digital signal processing, this all relates to how the DAC processes high-frequency signal information above 20kHz, usually half the limit of the sample rate. (In the case of the original redbook CD, this was 44.1kHz,

which theoretically limited the upper frequency limit of CDs to 22.05kHz)

Various manufacturers have utilized different filtering methods over the years, but the Paganini gives you a number of different options from which to choose. For straight PCM sources fed into the DAC, filter 1 is said to have the best rejection of unwanted Nyquist images and the sharpest rolloff, resulting in the poorest transient response of the four. This sounds a lot like the traditional “brickwall” filter that early CD players utilized. Filter 2 is suited more for classical music, and they say Filters 3 and 4 are more suited for rock music. Two more filter operations are available when you feed data to the Paganini DAC 176.4 and 192kHz: Filter 5 is a gaussian style filter and Filter 6 has the lowest amount of digital pre-ringing, which sounds much like the apodizing filters that have become

popular. When feeding the DAC a DSD datastream from SACD or the upsampler, 4 different filters are available, each progressively limiting output bandwidth for system matching.

All of the digital inputs for now are limited to 24bit/96 kHz data streams, but using the dual-channel AES ports together allows for a full 24 bit/192kHz data stream to be imported natively. Using this with the soundcard of the G5 was one of the most amazing ways to experience digital playback that the Paganini has to offer. It is worth noting that dCS was the co-inventor of the professional Dual-AES interface.

Listening tests confirmed dCS’ impressions of the various filters approach, but the differences between them were slightly subtler than initially expected. This DAC does a great job no matter where you happen to have it set and I would compare

these differences to slight adjustments on your turntable. Think of settling on a filter combination similar to getting the VTA and VTF exactly right on an analog setup.

The hidden key to the power of the dCS DAC is their proprietary five-bit Ring DAC that runs at the native DSD sampling rate. The traditional DSD format has always been a “one-bit” decoding scheme at 2.822 mhz, but dCS takes it a step further and processes all incoming data to a five-bit word length running at the same sample rate of DSD – providing essentially the same benefit that upsampling provides to the PCM data stream; digital artifacts are taken further upstream. The result is the most natural-sounding SACD playback I’ve ever experienced, but this becomes even more important as we discuss the next box in the Paganini chain. *(continued)*

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The Upsampler

There are plenty of arguments for and against upsampling digital data, but the strongest reason in favor of this technology is that when the original 44.1kHz data stream is multiplied to a higher frequency rate, the artifacts resulting from the filtering operation are much higher in frequency as well, and further away from the threshold of human hearing.

Like the filter combinations on the DAC, the Paganini upsampler allows you to upsample your incoming data to 88.2, 96, 176.4, 192kHz and DSD resolution.

Again, plenty of arguments abound as to which multiple of the original is the most effective at relaying the ultimate musical experience and you can spend days if not months investigating the options at your disposal. I know I did. Which one is the best? Read on.

Because dCS takes a more-thorough approach to DSD processing than anyone else, again with all data coming into the DAC converted to their five-bit upsampled DSD rate, this ended up being my favorite way of using the Paganini on all but 24bit/192kHz sources.

All arguments aside, I remain amazed at how much more natural my standard redbook discs and 16/44 content from the Sooloos music server sounds when upsampled to DSD resolution. Almost all of the grain and HF harshness is gone and again, a well-recorded disc could easily fool me into thinking that I was listening to native high-res files or even analog.

As exciting as this was, I was flabbergasted by how well upsampling to DSD worked with 128kb/sec Rhapsody files played through the Paganini. Granted,

this is a bit wacky, using a \$54,000 player to play low-res files, but since many of you may be using a music server, computer or Squeezebox, it's nice to know you can incorporate this into your Paganini with excellent results.

At this stage, the three-box Paganini was on par with my Naim CD555 when playing redbook discs, with an advantage when playing DSD or 24bit/192kHz files. But the best was yet to come when the last box in the chain was added.

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The Master Clock – Four is a Charm

Adding the word clock to the equation is what takes the Paganini from great to sublime. I was not prepared for the difference that adding this additional box to the mix would bring to the presentation. While I am greatly oversimplifying things, the master clock connects to both the DAC and the Transport (just the DAC if you are not using the transport) and syncs everything in the system, virtually eliminating jitter. Just as you would use an external phono stage to optimize your phono system's performance, the master clock is an even higher-accuracy clock than the one inside the DAC, concentrating on just that function.

An added benefit is that the master clock has six BNC outputs and you only need two for the Paganini stack. So if you have another digital source that could benefit from an external clock, you can use it with the Paganini clock as well. This is something that will come in handy with future upgrades to my reference system, I'm sure.

White papers aside, the master clock is the crucial piece in the digital puzzle, taking my experience with digital playback considerably further than I had experienced. Once you've made the necessary connections and power up the clock, the "sync" light in the transport will now be visible, and there is a change in the DAC display indicating that the clock is now active.

While the Paganini sounded fantastic at this point, engaging the clock gave the whole presentation a much more tonally rich feel. In essence, redbook playback was now knocking on the door of the best analog and in many ways, high-resolution digital playback was superior. Tough words, I know. Listening to the 24/96 copy of Neil Young's *Harvest*, and comparing it with the recently remastered version (mastered by Chris Bellman), the high-res digital copy had a more open, spacious presentation and was smoother at the top of the HF range. This was truly impressive digital playback! I had a similar experience with the rest of the high-resolution files in my music collection, and this was the first time in months that my

turntables started collecting dust.

The added bonus, for those of you with a large collection of rare vinyl, the digital captures that I had made with my Nagra LB studio recorder and the new Burmester 100 phono preamplifier (which features a built-in 24/192 ADC) were virtually indistinguishable from the vinyl playback. If you are still in love with analog and would like to put less wear and tear on irreplaceable records, the full Paganini system will reveal all of the magic of your analog front end, provided you have equally high-quality digital capture. Even 24/96 comes dramatically close, and this is how I've been enjoying a lot of the Music Matters Blue Note series, on my Naim HDX music server through the Paganini.

The Overall Sound

Once acclimated to the four-box Paganini, it was virtually impossible to listen to other digital sources, and it's frightening to think that the Scarlatti would reveal even *more* music. If described in just one word, it would be "natural." Provided that the source material is of equally stunning quality, the Paganini will provide musical playback that leaves you with no excuses.

It nailed flawlessly every aspect of playback that I could throw at it. Dynamics were powerful and controlled. Classical music lovers, especially those with large SACD collections, would be amazed at the sheer weight the Paganini brings to the table as well as the tonal accuracy. I'm convinced that the oversampling DSD functionality has much to do with this.

While I could go on and on listing the nuance in this bit of music versus that, ad infinitum, suffice to say that the Paganini combines the best of the digital and analog worlds. It has the smoothness and fine texture of the best analog reproduction combined with the additional range and lower noise floor of the best digital reproduction. You truly need to experience a demo of this player, if it is within your financial reach. Fifteen seconds into your favorite disc will tell you more than I've been able to in this entire review.

Additional Sources

As mentioned earlier, the Squeezebox touch worked very well with the Paganini, though this was merely used for investigation. Most of my music-based listening is with the Sooloos and the rest with the Naim HDX. If it appeals to the geekier side of your personality, I feel that a heavily modified Mac (or possibly PC) using the Dual AES connection, strictly fed 24bit/192khz files, will provide the ultimate in musical reproduction. I also was very pleased using a standard Mac Mini via USB.

While USB is currently limited to 24/96 resolution for now, dCS is currently developing a software and hardware upgrade that will allow 24/192 resolution via the USB port, and we will report on that as soon as it is in place with my Paganini. So stay tuned. *(continued)*

Conclusion

Having listened to a lot of great digital over the past few years, I have to put the Paganini at the top of my list. I've only listened to the Scarlatti at the dCS factory and did not have a Paganini side by side to compare, so for now, the four-box Paganini system represents the most musical experience I've had yet with digital, and the Naim CD555 was a tough act to follow.

While I have tried to be as comprehensive as possible in exploring all of the possible combinations, I feel that there are still a few I've undoubtedly missed. Other than upgrading the stock power cords to four Python CX cords from Shunyata and giving the Paganini stack its own dedicated AC circuit with a Running Springs Haley power conditioner, I haven't even begun to address the possible performance gains resulting in optimizing every one of the cables involved in this highly complex digital-playback system. So I feel there is still more performance to be had here. Stay tuned to the TONEAudio website because we will have updates as we discover more about this player.

Though the price of admission is very high, in the context of a reference system that is well into the six-figure range, I still marvel at how musical this combination remains. It has not only redefined what I've come to believe is possible with digital playback, it has prompted me to make some serious upgrades to the analog side of my system as well. While the

Paganini stack can be as simple or complicated to use as your level of OCD will allow, keep in mind that you can narrow it down to one or two settings that will work in all situations. You will either love it or it will drive you to madness.

And those tiny buttons will not help your situation, especially if you order your Paganini stack in silver; they are nearly impossible to read, even with reading glasses. As you can see from the photos, the black models have silver writing, which makes it much easier to discern. Many dCS dealers are delivering them with universal remotes for the more technologically challenged, and this is probably a good idea. My only suggestion to dCS going forward would be to allow the stack to be operated in either a default mode or allow you to program all of the settings in a memory, like the power driver's seat in a Lexus or Mercedes. I guarantee that your kids and audiophile friends will not be able to resist the urge to diddle all those buttons, and it could take you a while to get back to your preferred settings.

In the end, tiny buttons be damned. Listening to the dCS Paganini stack is a truly awesome musical experience. If you have a large collection of high-resolution files, you could go a long time, perhaps forever, without spinning a record again; it's that good. We are proud to award the dCS Paganini our Product of the Year in the digital category for 2010. ●

The dCS Paganini System

MSRP:

PTT Transport - \$16,999

PDC DAC - \$17,999

PUP Upsampler - \$10,499

PCK Clock - \$7,999

MANUFACTURER

Main office
www.dcsLtd.co.uk

US Distributor
www.temposales.com

PERIPHERALS

Preamplifier Burmester 011

Power Amplifier
Burmester 911 mk. 3

Speakers GamuT S9

Add. Dig. Sources Sooloos Control 10, Squeezebox Touch, MacBook Pro, Mac Mini, Wadia 170i and 171i

Analog Source Spiral Groove SG-2/Triplanar/Lyra Skala/ARC REF Phono 2

Cable Shunyata Aurora I/C, Shunyata Stratos SP speaker cable

Power Running Springs Haley, Maxim and Dmitri power conditioners, RSA Mongoose power cords, Shunyata Python CX power cords

Accessories Burmester and Quadraspire Racks, Shunyata Dark Field Cable Elevators, Furutech DeMag

