

## NEXT-GEN Digital



### PS Audio PerfectWave DAC II, PerfectWave Memory Player, and eLyric Music Player

#### A Different Breed of Music Server

Anthony H. Cordesman

Let me begin with the bottom line: The PS Audio PerfectWave DAC II and PerfectWave Memory Player have evolved into a cutting-edge digital front end. They have competition, but competition that rivals them in quality is substantially more expensive or lacking in the same features. The DAC II has an outstanding ability to play back the highest sampling-rate material and get the best out of the older CDs that contain almost all of the world's best performances. Most strikingly, the DAC II joins a handful of more expensive units in reducing traces of harshness in digital sound to the point where even the most demanding acoustic instruments like the violin, flute, and piano sound as musical as the recording permits.

#### Sound Quality

I fully recognize, however, that what I find a near-breakthrough in sound quality is dependent to some extent on personal taste. To me, however, the sound quality of the PS Audio PerfectWave DAC II and PerfectWave Memory Player has some overwhelming advantages I've only heard from a few digital front ends. I really don't want female voice to slightly harden unless the vocalist is seeking that effect. I want the clarinet to remain as musical as it does in a live performance, and the flute to provide energy and musical detail without becoming even slightly shrill. I want

the full range and energy of the stringed instruments with all of their natural warmth and without the slight edge I have heard all too often in digital equipment in the past.

Again, recording permitting, I want to hear the piano as that particular brand and model of piano sounds live, without the same slight hardening of the upper octaves and with the full warmth of a given make of grand piano clearly coming through. If the sound engineer is good enough to get the trumpet right, I want to hear that sound and not some slight change in sound character. I'll settle for the soundstage actually on the recording—if there is one—rather than having the DAC add a bit of its own soundstage character to every recording played through it.

Moreover, if you happen to be a serious music collector—and I'm up to around 9000 albums on both my computer and my Sooloos—I don't want a front end that highlights the strengths in one kind of recording at the cost of exaggerating or creating weaknesses in others.

After listening to several hundred recordings, it is this balanced, natural musicality that makes me praise the PS Audio PerfectWave DAC II so much, regardless of whether I listen to CDs through the PerfectWave Memory Player, or music streamed through my computer using PS Audio's eLyric music player or my Sooloos. It does reveal the recording—warts and all—but never at the cost of musical

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realism or favoring one approach to recording over another.

The PerfectWave DAC II and PerfectWave Memory Player not only met all of the above tests; they were excellent in handling recordings of full orchestra, large bands, and grand opera. They got the best out of recordings from the softest to the loudest passages without softening forward recordings to more of a mid-hall sound and without brightening up recordings that had a natural mid-hall acoustic. If you have one of those days where you really want to hear a Beethoven symphony at full natural volume—or to thoroughly depress yourself by wallowing in Mahler while he leads you into a mass fog of high-volume schmaltz—the DAC II is a real pleasure at either extreme of volume and dynamics.

I should also stress the extent to which the PerfectWave DAC II and Memory Player get the best out of older recordings as well as the new high sampling rates available from CD, or downloadable from some DVDs. You can find pages worth of technical explanation of why these products minimize the problems with jitter and filtering on the PS Audio Web site, but the key lies in their effect. Many DACs and CD players are less than kind to the first decade or so of CDs, and some seem to have trouble even with the streamed versions of Klemperer, Reiner, Walter, Von Karajan, and recordings dating back to the 1940s and 1950s. The same with jazz. The older Armstrong and Ellington recordings can suffer as much as their classical counterparts. The PS Audio PerfectWave DAC II and Memory Player are as musical with older recording as possible without being forgiving.

They also do a superb job of reproducing the most advanced stereo digital recordings. If you are experimenting with higher sampling rates, you will hear the differences between given bit and frequency rates if they actually exist. With the exception of a few firms like AIX, Chesky, Channel 2L, and Reference Recordings, this often is not the case. Yet, I do find the best 96/24 recordings sound consistently better in every respect, and that some 176/24, and 192/24 recordings sound even better.

The PS Audio PerfectWave DAC II did as good a job of resolving the sonic differences between the same recordings at different sampling rates. You can hear this for yourself if you download 2L's free special bit-rate evaluation files from its Web site. The DAC II made it all too clear, however, that simply raising the frequency and bit rate do not, by themselves, increase sound quality and they can be a real rip-off at prices that almost beg for audio piracy.

### OVERVIEW

The complete PerfectWave system comprises the PerfectWave Memory Player, PerfectWave DAC II, PerfectWave Network Bridge (a slide-in card for the DAC that turns the system into a network-connected music server), and eLyric server software. Together, the PerfectWave Music Group is capable of playing back bit-perfect high-resolution digital audio from hard disk, USB flash, NAS, the Cloud, CD, and DVD media. Audio data up to 192kHz/32-bit can be delivered to the system via WAN, LAN, I<sup>2</sup>S, S/PDIF, USB, and AES/EBU.



### PerfectWave Memory Player

Turning to the technical side, the easiest product to review is the PerfectWave Memory Player that sells for \$3995. This is a CD and DVD (not DVD-A) transport with a range of digital outputs, including a special I<sup>2</sup>S connection to provide the best possible sound quality into the PerfectWave DAC II. The Bridge is a slide-in board that allows you to connect the PerfectWave to a network (wired or wireless) to decode streaming audio. You can find all of the tech specs on the PS Audio Web site, but I asked Paul McGowan, the head of PS Audio to try to put its advantages and features in simpler terms and he came up with the following explanation:

“Put in a CD, start to play a track. As it is playing, press the eject icon and remove the CD or DVD. It will continue playing for up to about 30 seconds without the disc in. You can even remove it and put it back in and it’ll carry on without hesitation.

“Why does this matter? Because every CD player that isn’t a memory player is basically streaming off the disc directly and this means two things: The player must use predictive error correction on the fly, and the clock, which eventually runs the DAC, is not fixed (and cannot be fixed) and therefore jittered. Only a fixed, low-jitter clock will give you the zero-jitter results you want. CD transport clocks must be variable because the data coming off the disc in real time is varying in speed by many parts per million faster and slower—otherwise you would have data under-run and over-run.

“In the PWT Memory Player that is never an issue because you are never streaming directly from the disc. Instead, the data are taken from the disc and placed into a large buffer called the Digital Lens. It is large enough to make up for any over-run or

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under-run situations and therefore can be outputted by a fixed, low-jitter clock. Add to that our I<sup>2</sup>S output and you have a jitter-free transport.

“Lastly, error correction: Because of the built-in Digital Lens, we have the ability to read many times to get it right. This is the same method used when EAC [*Exact Audio Copy, a CD ripping program*] is incorporated to rip a CD with perfection not using predictive error correction. The PWT can read up to 80 attempts to get a valid block comparison of the data before going to the next block. Once a perfect match is achieved, the approved data are sent to the memory buffer and the next block of data is read. This read-many-times error correction method is only possible with a memory player.”

## Sound Quality of the PerfectWave Memory Player

I used the XLR and coax digital outputs of the PerfectWave Memory Player into a wide range of DACs, including top of the line products from EMM Labs and Meridian. I used both test CDs and a wide range of music on both CD and high-sampling-rate DVDs, including the superb DVDs [*the HRx format that stores high-res WAV files on DVD*] from Reference Recordings and some 192/24 direct copies of masters from a friend who records music professionally. I got sound quality equal to the best competing transport outputs I have heard at any price, although I scarcely can claim to have surveyed anything like the full range.

Accordingly, I recommend the PerfectWave Memory Player on an “as good as I’ve ever heard,” and a “perfect match for the DAC II” basis. I also like the fact it can download the album cover, and there is much to be said for the ability to play high-resolution WAV files directly from DVD if they ever are marketed in any numbers.

The sound of the CD transport of my EMM Labs XDS1 was as good with CD, however, and digital streaming out of my computer was as good in listening to stored CDs using the DAC II and the PS audio eLyric music system. My Sooloos Control 15 output was also as good with CD, and the sound of CD using the digital output of an Oppo player into the DAC II came close. I’d buy the Memory Player if I had the money, but the sonic differences are usually small, and I’ve found that the different sound character of different DACs often completely masks the difference in the sound of digital transports unless I use a defective CD.

## PerfectWave DAC II

The PS Audio PerfectWave DAC II is a different story. My reaction to the original PerfectWave DAC was “very good but scarcely outstanding” in that it did not provide a solution to the problems I still heard in playing back my recordings and favorite music on most other top digital front ends. As should be clear from my previous praise, however, the DAC II is an outstanding buy, even at \$3995, and is one of the most musical front ends available at any price. It also can handle 24/192 hi-res recordings with ease, is a full digital preamp with a volume and balance control, and has both RCA and XLR outputs

From a practical viewpoint, the PerfectWave DAC II is capable of giving you a musical streaming and storage system using eLyric that allows you to use your computer and any hard drive to store your music, as well as access to a world of digital “radio” stations

via Internet Radio. You can use an iPad as a smart control device, and your computer to edit the metadata on your music library.

You can read your own way through the technical data on the PS Audio Web site, but I again asked Paul McGowan to provide additional detail to help you understand both the design rationale behind the DAC II and the reasons for its sound quality.

“The original goal of the PWD was to build a new class of product in a crowded world of traditional products left over from the CD world of Red Book audio—some great but none addressing the brave new world approaching of high-resolution network-based media and beyond. The world would soon need something entirely new, a product we call a Media DAC, and the PWD showed the high-end community where it needed to go—and continues to do that today.

“The PWD was a state-of-the-art DAC differentiated by several new concepts that created this new class of product: high-resolution audio, jitter-free performance without the use of a sample-rate converter, and two new jitter-free high-resolution inputs—I<sup>2</sup>S through HDMI and TCP/IP over Ethernet. The sonic advantages of these three radically new concepts would be apparent quickly when coupled with our 20 years of knowledge of how to build DACs and analog output stages.

“Our first step was to design a state-of-the-art DAC. To accomplish this we divided the innards into three separate disciplines: digital input board, analog output board, and power supply. Digital inputs are tricky devils and need to be handled with a lot of care and respect. One of the core tenants of PS digital products is our attention to the details when it comes to managing and routing digital signals before they are converted to analog. On the Mark II digital input board we focused on

## SPECS & PRICING

### PerfectWave DAC II

**Inputs:** Two I<sup>2</sup>S over HDMI, one USB, one TosLink optical, one coax S/PDIF, one XLR AES/EBU, one optional Ethernet

**Outputs:** One RCA, one XLR balanced

**Resolutions supported:** 44.1kHz, 48kHz, 88.2kHz, 96kHz, 176.4 kHz, 192kHz, 32-bit asynchronous all inputs

**Dimensions:** 17" x 4" x 14"

**Weight:** 22.4 lbs.

**Price:** \$3995

**Outputs:** One XLR AES/EBU, one coax S/PDIF, one TosLink optical, one I<sup>2</sup>S over HDMI

**Formats supported:** CD Red Book, DVD WAV up to 192kHz 24-bit

**Dimensions:** 17" x 4" x 14"

**Weight:** 22.4 lbs.

**Price:** \$3995

### Network Bridge

**Price:** \$799

### PS AUDIO

4826 Sterling Drive  
Boulder, Colorado 80301  
(720) 406-8946  
psaudio.com

### PerfectWave Memory Player

**Inputs:** One Ethernet, one DC power trigger, one RS232 control



three primary areas: power supply—there are 11 individual low noise/high-speed regulators on the digital input board alone; low-noise, low-jitter signal-travel—we use analog gates and switches throughout all digital audio paths eliminating the inherent jitter and noise caused by traditional saturated logic gates; and timing—the PWD is asynchronous through the use of multiple low-jitter low-noise fixed clocks and intelligent buffers throughout the digital signal path.

“Once you get a proper low-noise, low-jitter signal available for decoding and conversion to analog, the majority of sound quality issues are all left to the DAC and the analog process at the output. Over the years we have learned that even the best DAC chips in the world sound great only if coupled to output analog filters and amplification chains that enhance and complement the DAC chip’s strengths and weaknesses. Designing such analog stages is a complicated dance that can only be achieved through careful listening and years of empirical design experience.

“The last step is the PerfectWave Bridge and its associated eLyric Controller and eLyric Server, the components of which form the final leg of the Media DAC category we introduced. All digital-audio schemes require the same four basic elements: a player, controller, server, and source. Even the traditional CD player has the same requirements, they are just built into the CD player because of its mature status in development and not quite so apparent as separate elements—but they are there. The infancy of streaming audio in the high-end—and the resulting disparate immature elements that need to be cobbled together to make it work—is what blinds us to the similarity in technological requirements.

“The Bridge was one of the very first of its kind. Simultaneously with the launch of the Bridge, only Linn Audio had a product that could stream high-resolution audio (high-resolution defined as 96kHz and above)—and even today, there aren’t many products and system out there that fully support 192kHz/32-bit audio. The Bridge is rare among those that can.

“To make sure the Bridge provides the expected level of performance, convenience, and sound-quality expectations our customers (and we) have, it was necessary for us to design and supply at least two more of the four necessary elements, the controller and the server. These products are part of our software services called eLyric.”

I am not endorsing Paul’s comments. I lack the technical and manufacturing expertise to do so. It should be clear to any reader of TAS that Boulder, Meridian, EMM Labs, and other top DAC designers and manufacturers make different choices, but it should be equally clear that these choices really matter. At a minimum, they illustrate in depth just how complicated getting the best sound out of digital equipment really is, and why taking a high-end approach is so important.

As for practical details, I had no problems in using the DAC II, no glitches in linking it to other digital transports, and no problems in hooking it up to my home Ethernet system. Break-in was minimal, although it did improve slightly in sound quality over time. I did find the front-panel display and controls to be a bit counterintuitive, but I also found this to be irrelevant; the remote control is self-explanatory and very easy to use.

More importantly, I found the DAC II had a sonic advantage I did not anticipate. It has both a volume and a balance control. As

long as the gain is set above the halfway mark, the digital volume control does not affect sound quality, and its impact was minimal even at lower volume settings. Moreover, the balance control can be set with extreme precision, and used to help lock in imaging and soundstaging from the listening position with ease. In short, the DAC II can act as a full digital preamp.

This won’t help analog fans—at least until someone makes a truly neutral phono-to-digital preamp. It does, however, allow you to eliminate the preamp and at least one set of interconnects, and this really does make a difference.

It will scarcely come as a shock to any experienced TAS reader that everything you put into the system has a coloration. This coloration can be extremely low with equipment as good as the Pass XP-20 preamp or the new EMM Labs Pre-2 preamp, which is one of the most transparent units I’ve ever heard. The same is true of using an extra set of top-of-the-line AudioQuest and Kimber interconnects. Taking the preamp and a set of interconnects out of the chain of components, however, did provide slightly more detail and better low-level contrasts. The DAC II is one of the few DACs that allows you to do this, which also makes it a special bargain to anyone who does not need phono. You also can spend a lot more on a DAC or the rest of your system if you don’t have to buy a preamp.

### **eLyric Music Management System**

The DAC II and its Bridge allow you to use the DAC II as part of a full computer-music system. This capability is critical in today’s high-end world. I could not recommend the PerfectWave DAC II and PerfectWave Memory Player if they did not provide the ability to load and manage a large collection of music on my computer system.

In fact, I now regard any DAC or expensive CD player that does not have such features as a museum piece. There is a case for keeping your existing CDs until it is clear that some better way of loading them onto your computer isn’t in the offing, but there is no case for buying a digital front end that does not provide the option of streaming your music, of being able to use your DAC in a carefully integrated computer-music storage system, and of being able to manage your music with an iPad or similar device.

I don’t have the space to get into all of the features of eLyric. Once again, you can search it out on the Web. The practical punchline is that a combination of the DAC II, eLyric, and a control device like the iPad can manage an extremely large music collection with ease. I used it with a library over 9000 CDs, DVDs, and downloaded “albums” on a regular 4TB hard drive.

The system provided easy setup and was consistently reliable. However, eLyric is still evolving in some respects. Minor problems did include a few false identifications of the “cover art” to given “albums,” some rare dropouts of given bands on recordings with really bad metadata, and infuriating pop-up instructions for eLyric that I could not print out or turn into PDFs.

The ability to edit the metadata on classical and older recordings was good, however, and the eLyric is designed so that reviews and background data on the recording become available in a number of cases. (This editing ability is crucial with large collections.)

If you are serious collector, the metadata for many recordings are so bad that you are going to do a lot of editing to store your

collection in ways where you can easily retrieve them and use your entire collection with maximum flexibility. If you cannot edit the metadata easily, you will face a particularly serious nightmare in properly storing recordings of opera and on multi-disc sets. This, however, is the fault of an incredibly negligent recording industry. No storage system can correct for the large number of digital recordings with missing or false metadata, and the fact I have yet to find a single major label that seems to check its metadata with any care or consistency.

The benefits of storing your music also massively outweigh the inconveniences. eLyric, Sooloos, and the other better music storage-and-control software offer you incredible ability to search by conductor, orchestra, composer, and type of music once you do store your collection. There is no risk of physical damage if you back up your collection once you store it, and you not only can instantly access your entire collection and create your own music collections for background listening, you can become an instant “musicologist.”

You can compare performances down to listening to individual movements or key songs and passages with increased ease once you have organized your collection to taste. Throw in instant access to much of the world’s history of recorded music on-line in anywhere from 44.1k/16-bit sampling up. (It is all too clear that CD’s future is limited. In fact, the sooner CD dies, and is replaced by hi-res on computer, the better!)

### Summing Up

To go back to where I began, I have no hesitation in recommending the PS Audio PerfectWave DAC II and PerfectWave Memory Player as some of the best-sounding and most functional high-

end equipment I’ve reviewed. But there are some tradeoffs involved. The eLyric music storage-and-streaming system is fully functional, but its features are still being revised. The PerfectWave Memory Player does play hi-res WAV files directly from DVD but does not play DVD-As or SACDs. The preamp features of the DAC II make it an excellent digital preamp as well as a DAC, but it has no analog input for phono, and PS Audio is just beginning to think about a digital phono front end.

Moreover, if price is no consideration, I would still prefer the ergonomics of my Sooloos system. I use the Sooloos 15 with the EMM Labs XDS1 as a DAC as my primary reference. This is, however, an extremely expensive system, and the sound quality of the PerfectWave DAC II and PerfectWave Memory Player using eLyric comes very close, and is sometimes better with hi-res recordings.

At the same time, PS Audio PerfectWave DAC II is so great an improvement over the original DAC that it highlights the fact that digital front ends, software, and firmware are evolving so fast that no reviewer can be sure that the product he or she reviews isn’t improved by the time the review is printed, and there is no way to firmly know how to rank a given digital front end against the others.

The key point from a consumer viewpoint is that PS Audio PerfectWave DAC II and PerfectWave Memory Player are superb sounding products. They demonstrate that the days when CD dominated digital music, and digital sound was “impure and imperfect forever,” are long over. I would make listening to these units an essential part of buying a digital front end at anywhere near their price range—or even at prices twice their cost or more. **tas**