

## CD PLAYER/DAC

SACD/digital media transport/DAC combination  
 Made by: PS Audio, Boulder, Colorado  
 Supplied by: Signature Audio Systems  
 Telephone: 07738 007776  
 Web: www.psaudio.com; www.signaturesystems.co.uk  
 Price(s): £6000/£5500

AUDIO  
FILE

# PS Audio DS Memory Player/ PW DirectStream DAC

Claiming to be 'the last digital front-end you will ever need', can this combination of wide-ranging compatibility and ongoing upgrades match up to that ambition?

Review: **Andrew Everard** Lab: **Paul Miller**

The ever-evolving digital audio landscape has made buyers wary and manufacturers jumpy. It seems that each time a company launches a 'definitive', future-proofed product, some new format or twist pops up for its moment in the sun as the 'must-have' way to store and play music. However, some manufacturers handle this problem better than others, thanks to designs able to deal with every known format of the moment, and having either modular construction or firmware upgradability to keep up with changes.

That's certainly the case with the PS Audio duo here. Both the £6000 DirectStream Memory player and the £5500 DirectStream DAC have been improved during their short lives, and there's no sign that the running upgrades, mainly in the form of ongoing firmware updates, are slowing down.

## ALL FLAVOURS

That's reassuring for buyers of what are, after all, not inexpensive units, but the Boulder, Colorado-based company makes the bold claim that this combination is 'the last digital front-end you will ever need'. OK, so we've heard all that before but on paper at least, the PS Audio combo looks to have the specification to back up that statement, and the company certainly has shown it has the digital chops to instil a degree of confidence in this area.

So what sets the DirectStream Memory Player and DAC ahead of the crowd, aside from the provision of quaint, old-fashioned disc playback in the streaming age? OK, I tease a bit, but then I have to admit that in my current set-up, discs are typically things

to be ripped from, rather than played directly. Certainly, younger acquaintances view loading a physical carrier into a player as almost as outmoded as playing records used to be before it became hip – or is that hipster? – all over again.

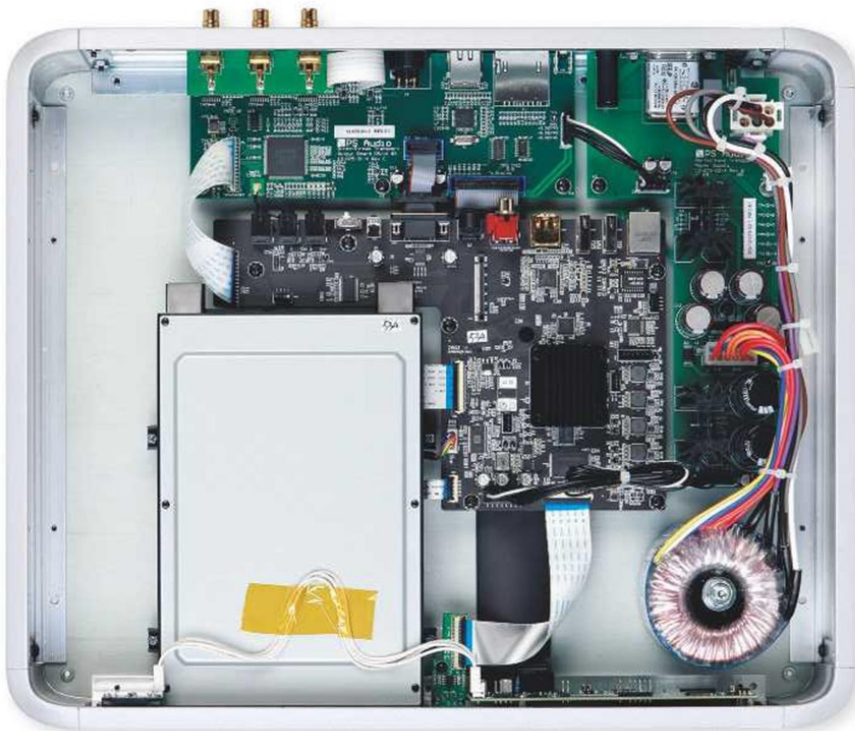
As the name suggests, the DirectStream Memory Player is much more than just a disc transport – or perhaps, more to the point, it treats discs as just so much more memory. It will seemingly play every flavour of CD, SACD, DVD-R/RW, AVCHD and HRx discs, not to mention FLAC, APE, WMA, MP3, M4A, AAC, DTS, AC3, WAV, DSF, MKA, PCM and OGG music files from discs or via the front panel USB input. Yes, it also has a network connection, though it won't play music from a network

source, but rather uses this connectivity to access album artwork in real time when content is played, and to allow the player to be controlled by a computer using the company's 'My PS' protocol.

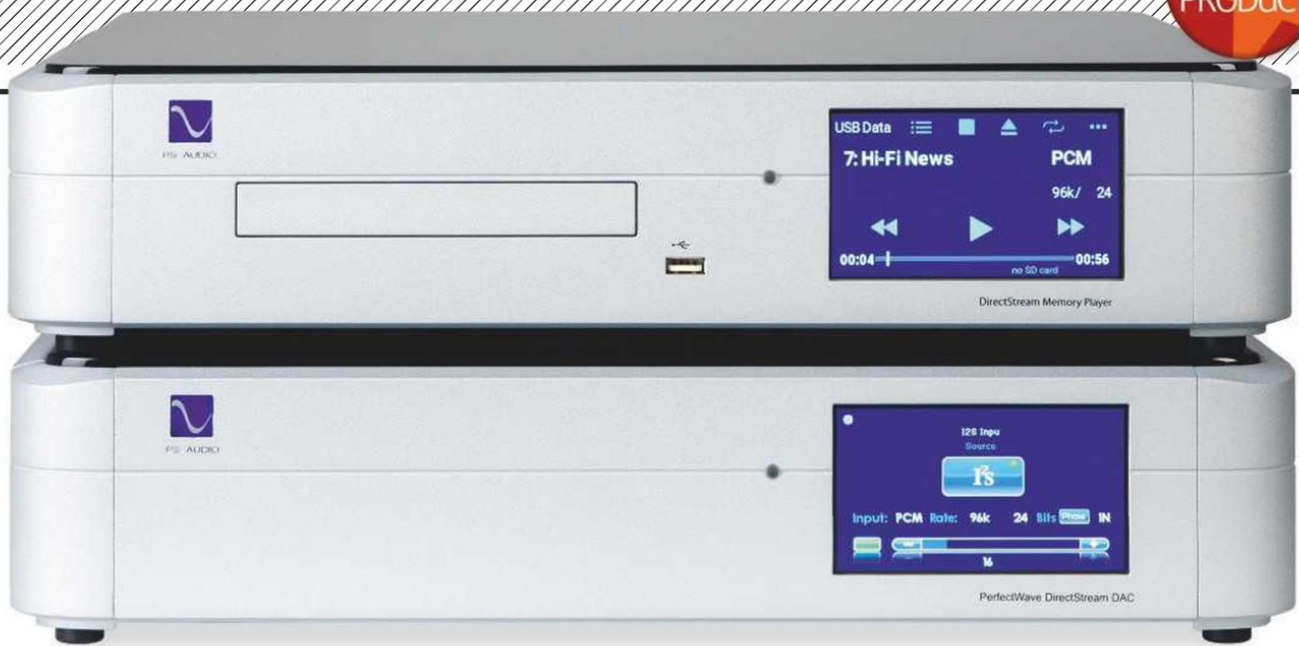
## DIGITAL CONNECTIONS

Almost as remarkable as the wide-ranging format capability is the Memory Player's output provision. Of course it's digital only, but it goes a long way beyond the norm by not only offering digital output from SACDs, and indeed multichannel digital output, but also doing so with an I<sup>2</sup>S interface designed to service the same inputs on the DAC.

The problem with SACD is that the format itself precludes digital output



**RIGHT:** The DirectStream Memory player uses an OPPO-based universal transport platform [black PCB, centre] with only the drive and serial ports connected. The linear PSU [far right] and digital output formatting is PS Audio's own



as part of its copy protection regime. Dedicated SACD players may have offered a digital output, but this has always been restricted to playback from the CD-quality 'Red Book' layer of hybrid discs, and one of the only ways around this has been to use a universal Blu-ray player via HDMI into a suitable AV receiver.

By going for an I<sup>2</sup>S connection, PS Audio has been able to preserve the encryption between transport and DAC while still getting the SACD data out of the transport as a native 1-bit bitstream.

And of course maintain the I<sup>2</sup>S advantage of carrying the clock signal on a separate connection from the datastream, rather than mixing the two together as happens in S/PDIF and AES/EBU interfaces.

The Memory Player has S/PDIF and AES/EBU outputs, of course, but the serious stuff uses PS Audio's proprietary HDMI-based I<sup>2</sup>S connection, with three sockets

*'Discs are typically things to be ripped from, not played'*

carrying front L/R, surround L/R and centre/subwoofer channels for use in surround systems. An HDMI cable, with its 19 cores, easily allows the carriage of both digital data and clock signals, though it must be pointed out that the connection only uses HDMI connectivity, and isn't to

the HDMI standard. So you can't connect the Memory Player into an AV receiver/processor with a conventional HDMI input.

The Memory Player also uses the company's so-called Digital Lens technology, originally

debuted in its PerfectWave Transport [*HFN* Aug '09], to isolate and buffer the output from the disc-reading section. Here it uses a large-scale FPGA to provide what PS Audio describes as 'a segmented structure including intelligent RAM, two-way isolated communication with the drive, and nearfield output latches controlled by an ultra-low jitter fixed clock' – a development

**ABOVE:** Input switching and all other functions are enabled via the touchscreen panels and accompanying IR remote. Operation is slick – note USB slot for playback, below disc-drawer

of the original's relatively simple buffer between disc-reading and digital output.

### MESSAGE RECEIVED

Also featured here is a fully analogue power supply, in place of the more common switch mode option. A toroidal transformer with three galvanically isolated windings feeds the trio of power sections, each with its own regulation and capacitor storage banks, and then further regulation for power supplies offering both smoothness and low impedance.

And all that's just the transport! The DAC, meanwhile, is fully 'on message' when it comes to the latest developments in digital audio – a testament to PS Audio's policy of continual upgrades, available free to existing owners [see boxout, below left]. The short version, however, is that while the 1-bit/DSD DAC technology here may be familiar – from the PerfectWave DAC [*HFN* Aug '14] and the more recent DirectStream Jr [*HFN* Jun '16] – thanks to the FPGA at the heart of the design, carrying the software handling the digital conversion, updates in both facilities and performance have been made available.

All of which, plus the addition of the £799 PS Audio Bridge II, the company's add-on network card slotted into the rear panel, means the DirectStream DAC can now do just about everything any user could sensibly want it to. Apart from accepting digital data in I<sup>2</sup>S format from the Memory Player, via one of its two HDMI-socket inputs, it can also be connected to a computer, via an asynchronous USB ➔

### NEW DACS FOR OLD

The idea behind PS Audio's ongoing upgrade programme is two-fold: one, extra functionality can be added when required; and two, as the company puts it, it's possible for owners to effectively get 'a new DAC for free', as the core operating system (OS) is replaced via a download and an SD card. In 2016, the company released its Torrey OS update, enabling those DirectStream DACs equipped with a Bridge II interface to act as a Roon endpoint. This was followed in June 2017 by the Huron OS, bringing further sound quality improvements by tackling jitter and noise, while a simultaneous Bridge II update allowed the DAC both to access Tidal and decode MQA files. RedCloud, launched at the end of last year and also known as FPGA131, is described by PS Audio as the DirectStream range's 'single biggest improvement yet'. Digital designer Ted Smith [see sidebar, p39], leading the launch of Huron, promises 'blacker backgrounds, greater instrument weight, improved image separation [and] far lower noise.' Why 'RedCloud'? It's named after a Colorado 'fourteener' – one of the 58 peaks in the state over 14,000ft.

## SACD PLAYER/DAC



**ABOVE:** No DAC chips here – instead the DS DAC employs a Xilinx Spartan 6 FPGA, running custom code, to handle all input processing, upsampling and conversion [top left]. The Network Bridge II card, enabling PS Audio's streaming facility, lies above the linear PSU [far right]

Type B socket and also has 'conventional' XLR, coaxial and optical digital inputs.

And via the Bridge II it can act as a network streaming client under the control of a tablet or phone, connected to the home network and running third party software such as mConnect or PlugPlayer, streaming from a computer or NAS running UPnP server software. And thanks to recent upgrades, it can now handle full MQA, Tidal, Spotify, vTuner radio and Qobuz, as well as being Roon-ready.

Files at up to 352.8kHz/24-bit and DSD128 can be handled via the I<sup>2</sup>S (HDMI) and USB inputs, with the DAC being entirely DSD-based. All inputs are resolved into what is, in effect, a DSD128 datastream that's pushed out via a transformer, this combining the functions of low-pass filtering and galvanic isolation. Thanks to a choice of fixed or variable outputs on both single-ended and balanced sockets, the DirectStream DAC can also function as a digital preamp.

### CHINK-FREE ARMOUR

For all the 'complex simplicity' on offer here – that combination of easy to understand units with wide-ranging

compatibility – the abiding first impression of the Memory Player/DAC pairing is that it does everything you ask of it supremely well. The sheer scope of this duo meant I spent longer with it than I do with many a product, just to have time to explore everything it could do, but I can safely say that there was no sense of slogging through all the inputs and services looking for a chink of weakness.

Instead it was matter of revelling in the cleanly-detailed, dynamic and powerful delivery of everything from Spotify streams and Internet radio stations all the way up to double-DSD recordings. And it must be said, set all the hi-res stuff aside for a moment, that it's a pleasure to immerse yourself in just how good this pairing can make standard Red Book CD sound, whether the audio is derived from a physical disc or a digital rip on computer, USB storage or NAS.

Playing 'Visions Of China' from Japan's *Tin Drum* album [Virgin CDV2209] was a delight, the sinuous rhythm section sounding at once tight and fluid, and David Sylvian's voice crisply rendered in its mannered fragility. I'm not sure I've ever heard this album sound so good. ➔

*'It levels the playing field between all digital sources'*

### TED SMITH

One of the things that sets PS Audio apart is the extraordinary levels of communication between the company and its customers. Founder Paul McGowan and his team use social media to keep users informed of developments with unprecedented behind-the-scenes insights.

Designer Ted Smith not only defines the brand's 'digital path' but is a key part of this communication. Having spent time at Microsoft and Google – he describes his brief tenure at the latter as 'a learning experience' – he designed his own high-end DSD-based DAC in 2008, the core of the product you see here, and joined PS Audio in 2011.

Smith is refreshingly candid in his discussion with users regarding PS Audio's digital journey. For example, he explains that the current operating system delivers 'much whiter background noise, greatly helping those who listen at lower volume levels. The system's analogue background noise floor hasn't changed (that would require a change in hardware) but the cause of the *digital* noise changing with each release has been fixed, reducing distortion at all levels'.

And what's coming next? With admirable candour, Smith told customers recently that 'I've mostly been doing other things. One of the ideas didn't pan out, but my subconscious is ruminating! One idea I've had works on paper, but does nothing in the FPGA – I'm still not sure if it's because I have a bug in the FPGA or a bug in the simulation. All in all, it's about normal progress...'



## SACD PLAYER/DAC



**ABOVE:** Memory Player [top] includes HDMI sockets for I<sup>2</sup>S data transmission [right] and the network connection for artwork download. SD card slot on both units is used for updates while the optional Network Bridge II card installs next to power socket

Furthermore switching between the same content at CD quality and in DSD, not to mention accessing it via USB-B, network streaming or using Roon, reveals there's really not much in it when played through the DirectStream Player/DAC.

### DEFINITION AND DYNAMICS

Similarly, explore the hard-hitting, multilayered percussion of The Rhythm Devils' *The Apocalypse Now Sessions* [Rykodisc RCD 10109], Mickey Hart's sub-soundtrack for Coppola's Vietnam epic, and the sheer definition and dynamics of the DirectStream Player/DAC is much in evidence, from the 'this is going to end badly' jungle ambience of 'Street Gang' through to the disquieting, slamming drumming of 'The Beast'.

What this duo does is level the playing field between all of the digital sources with which you confront it, making them all equally enjoyable, and switching seamlessly between them. Indeed, if ever there was a 'whatever you've got, it can play it' digital front-end, this is it.

Not that it does a 'silk purse' job on recordings – faced with audiophile darling Melody Gardot's recent *Live In Europe* set [Verve Records B0027919-2; 96kHz/24-bit], there's not much that can be done with the singer's swallowed, affected vocals, even though the recording itself sounds reasonable enough. The DirectStream Player/

DAC just sounds true to the recording, which is as it should be, revealing the strange vocal quality in all its oddness, and still not making what she's singing any clearer.

However, give it a fine recording, such as horn player Ben Goldscheider's *Debut* [Willowhayne Records WHR045; 192kHz/24-bit] or Ning Feng's masterful set of *Bach Sonatas And Partitas For Solo Violin* [Channel Classics CCS 39018; DSD128], and it can bring on the sonic fireworks, with wonderful instrumental texturing, presence and depth, conjuring up a real 'close your eyes and the performance is there' effect.

But that's the essence of PS Audio's DirectStream Memory Player and DAC: they're all about delivering the best of whatever your chosen digital listening has to give, rather than imposing any corporate gloss on affairs. ☺

### HI-FI NEWS VERDICT

PS Audio's digital offering has always been impressive, but recent upgrades have lifted the DirectStream DAC, in particular, into another league of great flexibility and scintillating sound. The Media Player is a versatile partner in crime, with SACD playback enhanced by that proprietary digital link. Moreover, the 'upgradability' of the system is very reassuring when making an investment on this scale.

Sound Quality: 88%

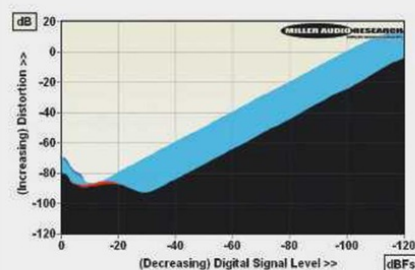


## LAB REPORT

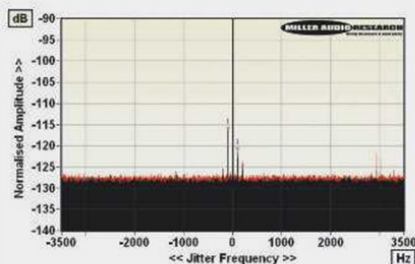
### PS AUDIO DS MEMORY PLAYER/DAC

Hi-Fi News has kept pace with the development of PS Audio's bespoke transport/DAC solution since the original PerfectWave combination was launched nearly a decade ago [HFN Aug '09]. The adoption of Ted Smith's oversampling/DSD DAC technology, which operates at 112.9MHz (20x 'DSD64') and downconverts data to 5.6MHz/1-bit (DSD128), was unveiled in the first DirectStream DAC [HFN Aug '14], and this 2018 version shows clear upgrades. The impulse response still shows extended pre/post ripples in the time domain and, because this is a DSD converter, there remains an increase in (white) noise through the audioband itself, reducing the A-wtd S/N ratio to a '16-bit' 96.4dB. Jitter is effectively masked, with just a pair of sidebands at 70psec (S/PDIF)/62psec (I<sup>2</sup>S) exposed [see Graph 2, below].

I pointed out in our original review that the DS DAC's bandwidth was limited to -16.7dB/50kHz regardless of sample rate and this has been redressed here – the DAC still has a slightly rolled-off bass (-0.15dB/20Hz) but HF extension now reaches out to -1.05dB/45kHz and -9.7dB/90kHz with 96kHz and 192kHz media, respectively. Moreover, its high frequency performance is markedly improved in other areas: ultrasonic requantisation noise is reduced by at least 25dB (60-100kHz) while 20kHz distortion is down from 0.006% to 0.003% at -10dBfs and 0.01% to 0.004% at -30dBfs. The transformer-coupled output increases THD at low frequencies (though 0.1%/20Hz is much reduced over earlier models). Interesting, THD over the top 20dB of the available dynamic range is fractionally lower (~1dB) via the Memory Player/DAC's I<sup>2</sup>S connection (which retains its clock) than if driving the DAC directly via S/PDIF [see Graph 1]. PM



**ABOVE:** Distortion vs. 48kHz/24-bit digital signal level over a 120dB dynamic range (1kHz via S/PDIF, red; via I<sup>2</sup>S, black and 20kHz via S/PDIF, purple; via I<sup>2</sup>S, cyan)



**ABOVE:** High resolution 48kHz/24-bit jitter spectra (S/PDIF, red; I<sup>2</sup>S via Memory Player/USB drive, black)

### HI-FI NEWS SPECIFICATIONS

Maximum output level / Impedance	2.83Vrms / 145-149ohm (XLR)
A-wtd S/N ratio (S/PDIF / I <sup>2</sup> S)	96.4dB / 96.3dB
Distortion (1kHz, 0dBfs/-30dBfs)	0.015% / 0.0019%
Distortion & Noise (20kHz, 0dBfs/-30dBfs)	0.031% / 0.0042%
Freq. resp. (20Hz-20kHz/45kHz/90kHz)	-0.2 to -0.1dB/-1.1dB/-9.7dB
Digital jitter (48kHz via S/PDIF / I <sup>2</sup> S)	70psec / 62psec
Resolution @ -110dB	±0.1dB
Power consumption (Player/DAC)	11/28W (1W standby)
Dimensions (WHD, each) / Weight (total)	430x100x360mm / 33kg