USB DAC with 'tube clock' and tube output
Made by: PrimaLuna, The Netherlands
Supplied by: Absolute Sounds Ltd
Telephone: 0208 971 3909
Web: www.primaluna-usa.com; www.absolutesounds.com
Price: £2888

AUDIO FILE

hi-fi news OUTSTANDING PRODUCT

PrimaLuna EVO 100 Tube DAC

PrimaLuna's minimalist, valve-equipped EVO 100 DAC may seem a throwback to the time when digital only meant CD, but the sonic performance is truly 21st century
Review: **Ken Kessler** Lab: **Paul Miller**

Two words spring to mind when examining PrimaLuna's EvoLution series EVO 100 DAC: 'old school'. Yes, a genre as seemingly new as digital has been around long enough to qualify for that mode of thinking. This unit is, I have been told emphatically, 'a DAC for purists', so £2888 gets you no wireless connections, no pandering to streaming, no headphone output, no level control. It is strictly a DAC in the original sense – a D/A converter-only and not one that doubles as a preamp or headphone amp.

The EVO 100 is a direct descendant of the earliest digital/tube hybrids. As far back as 35 years ago, industry innovator Neil Sinclair formed California Audio Labs and unleashed a CD player with a valve output section. So this is not a stretch, for I seem to recall PrimaLuna's parent company distributed CAL in the Netherlands. Is this why the EVO 100's sound reminded me of CAL's Tempest II CD player so vividly?

TUBE COMPLEMENT

Styled to match the company's amplifiers [*HFN* Apr '20], which all share the same layout, the EVO 100's chassis consists of a narrow-but-deep footprint of 279x404mm with a height of 191mm. The fascia is just 75mm high, in front of a horizontal surface containing two each of 5AR4, 12AU7 and 12AX7 valves, flanked by two big capacitors. Behind them is the cubist metal enclosure covering the transformers, but the look is sleek because of the clever, curved tube cage, one of the brand's signature touches (which has been removed for our pictures).

And another thing: the fit and finish are exceptional – far from the days when PrimaLuna was a pioneering European brand manufacturing in China, and before its quality control matched the better Western production standards.

Precious few indicators tell you that this is of the 2020s, not the 1980s, but the clues are there. One is a beautifully-made, all-metal wand of a remote control (see p45), with display dimming, mute and source selection, matching the four individual buttons on the unit's fascia. Another is the cool blue look of the two displays, the top showing the selected input, the bottom the sampling rate. The latter adds a neat function: I am notoriously impatient about amp warm-up, but this almost ameliorates the wait as the display commences with a 60-second countdown from switch-on.

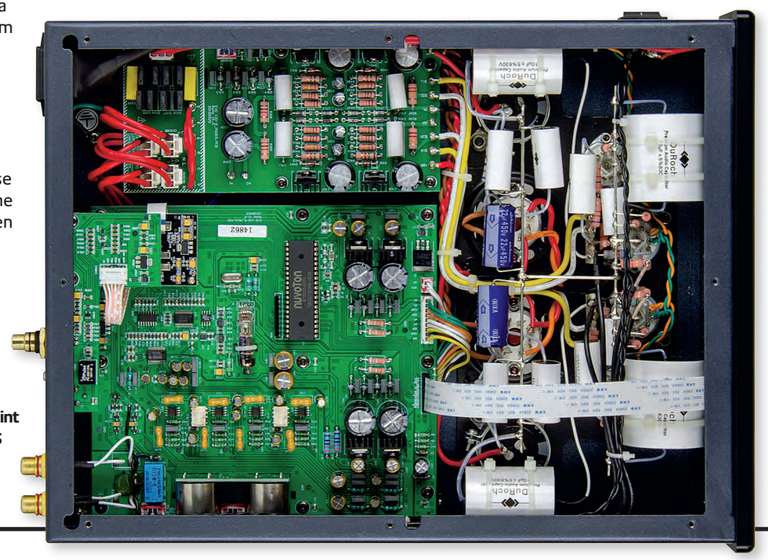
As is PrimaLuna practice, the on/off rocker switch is on the left side, while the back contains the necessary optical, coax and AES (XLR) legacy digital inputs plus USB-B for computer connection. As you can see, set-up is a piece of cake, and all was achieved without my bothering to read the instruction manual editor PM had mailed me. The only thing I had to determine was which coin-type battery was needed for the remote control handset.

SLICK OPERATION

If only everything worked as well and as swiftly as this unit. I tried the S/PDIF inputs using a Sony BDP-S370 Blu-ray player and my trusty Marantz CD12 transport, as well as assorted file sources via USB and my iMac. In the course of the listening, rates ranged from 44.1kHz to 192kHz, while downloads included assorted high-res WAVs and FLACs. Because I was so taken by the importance of the valve output section, I was almost forgetting how sophisticated is the digital processing [see PM's boxout, p43], wedded as I am to the 30-year-old Marantz DA-12 DAC for most of my reference listening to 'Red Book' CDs.

> 'There's more to it than adding a frisson of tube heat for effect'

Operationally, one cannot fault the EVO 100, once past one's contemporary expectations for the omitted features. Believe me, I wrestled with this conundrum for some time, finding it hard to recall the last DAC I tried which didn't accommodate headphones and which lacked a level control. I repeat this because it's necessary to put the EVO 100 in context. So, while this may smack of 'early digital' vis-à-vis facilities, the operation is a slick as any self-installing A/V product with HDMI.

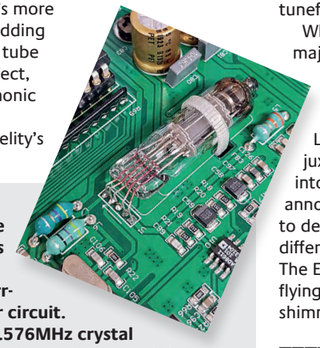


RIGHT: There's a mix of PCBs and point-to-point wiring for the tube stages [far right]. An XMOS USB solution [far left] feeds an SRC4192 and PCM1792 DAC combination [left]. The tube output is transformer-coupled [lower left]

LEFT: Lifting the protective/decorative cage reveals a pair of 12AX7 and 12AU7 triodes in the audio circuit and two large 5AR4 tube rectifiers in the DAC's power supply. The selected input and sample rate is revealed in two displays, below

BASKING IN THE GLOW

Two seconds: that's all it took to embark on my wander down a sonic Memory Lane – but with my destination of early tubed CD players, that might seem a hunt for clichés. 'Tube DAC' is too suggestive of a fat, rosy sound applied to mask the essence of digital clarity, in the way our entitled ancestors might have preferred splashing on cologne to bathing. Thus, while the first adjective to pop into your head will be 'warm' upon initial exposure to the EVO 100, there's more to it than adding a frisson of tube heat for effect, in the euphonic manner of Musical Fidelity's X-10 buffer [*HFN* Oct '96]. When the unit arrived, I was wallowing in the lushness of *Echo In The Canyon* [BMG 538493922], a CD curated by Bob Dylan's son, Jakob, who sings lead vocals on all tracks. Beautifully recorded, it serves up sublime musicianship and staggering harmonies, and Jakob has a tuneful voice unlike his dad.



What knocked me out was its opener, a majestic remake of 'Go Where You Wanna Go', with Jade Castrinos providing a powerful distaff voice which differs in texture from Dylan's much as does Lou Rawls' from Dianne Reeves. While juxtaposing two voices hardly delves into the areas where digital usually annoys, it speaks much of a device's ability to deal with the nuances that mean the difference between authentic and artificial. The EVO 100 DAC passed the test with flying colours, with an extra star for the shimmer of The Byrds-like jangling guitars.

TEEN TREASURES

Then there was Twinkle's *Girl In A Million* [RPM D545], a remastered CD set of her complete original recordings, CD 1 made in the all-analogue mid-1960s, with session men including Jimmy Page. Pure pop it may be, but Decca treated her to the best engineers, and the mono tracks for which she's best known – 'Terry', 'Golden Lights' and other teen treasures – were enough to reveal how this DAC deals with textures.

Her wispy vocals are delicate enough to require almost ineffable subtlety from the sound system, and listeners will delight in the air they possess. Whether via speakers or headphones, the mono recordings ➪

THE 'TUBE CLOCK'

Now dubbed the 'SuperTubeClock', the special sauce that governs the timing of data through PrimaLuna's XMOS-based USB input, SRC4192 asynchronous upsampler and PCM1792 DAC (both from TI, *née* Burr-Brown) is based around a tube rather than transistor circuit. This master clock is still referenced to a standard 24.576MHz crystal – the small metal can just visible at the bottom of the inset picture – while a miniature 6S6B triode is used in the subsequent widebandwidth oscillator. This same circuit, and the choice of monolithic 192kHz/24-bit DAC, now 14 years young, was first revealed in PrimaLuna's ProLogue Eight CD player [*HFN* Nov '08]. I discuss the performance differences with its EVO 100 Tube DAC in my Lab Report [see p45] but the 'tube clock' itself has also witnessed some refinement.

PrimaLuna's claims for the efficacy of the tube oscillator really boil down to the exceptionally wide frequency response of this signal generator and, thus, its ability to deliver a recognisable 'square' timing waveform with good edge definition. The absolute frequency accuracy is determined by the choice of crystal, and its mere +20ppm error is well within Class I tolerance. Jitter, in practice, is influenced by noise and other interference emanating from every corner of the digital circuit and is reduced from the 330psec measured with the ProLogue Eight to 160psec (48kHz) and 60psec (96kHz) in the EVO 100, with ±100Hz and ±200Hz PSU modulations the key components [Graph 2, p45]. PM

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ABOVE: Simplicity itself – four standard digital inputs are fitted including AES/EBU (XLR), S/PDIF (on RCA and optical) and USB-B for computer connection. Fixed, transformer-coupled analogue outputs are on single-ended (RCA) connections only

had a fatness that I like to think is an approximation of front-to-back depth. Whatever the case, the sensation was of hearing into the music, something not normally attributed to pop singles. The shocker was her later work on CD2.

Her 1970s recordings for Instant were engineered by a wizard, 'Days' recalling the 'Baroque Rock' of US band The Left Banke, thanks to the harpsichord. The EVO 100 showed such grace with this Fabergé egg of a track that I made a mental note to stop thinking in terms of euphonic coloration – the refuge/rationale of the anti-valve scoundrel.

DEAD RINGER

As the next track, 'Caroline', is a power rocker of 'Runaways-lite' percussive incessancy, I swiftly learned that the EVO 100 DAC understands attack, transient edges, convincing decay and other elements which surely contradict any belief that sticking tubes in a digital product simply masks nasties or dulls details. This converter does nothing to undermine the speed of digital. Quietness, however, is another matter, as I found when A/B'ing the track with a solid-state DAC.

LEFT: Slimline EVO remote selects between Coax/Opt, AES/EBU and USB inputs, with audio and display 'muting'

I just said I reject accusations of valves being the hi-fi world's equivalent of rose-coloured glasses. But there is no denying the noise floor is less subterranean than with conventional processors. Equally, I will point out that I could only detect this sensation of a low-level haze when listing through headphones. Ultimately, however, it was downloading and 'streaming' via USB that proved this DAC's worth.

Turning to wolfgang.com's vast selection of rare live gigs, I selected Warren Zevon in 1982 in Boston, for his rousing 'Werewolves Of London' at 48kHz. It proved massive in scale and sounding as it should: as if played via FM radio. Switching on Fidelia, I listened to the EVO 100 at 192kHz with a download of BB King's 'Sneakin' Around', a mono session of dubious sonic merit but musically a gem. I played it against the original LP, *The Great BB King* [United Records 728] and it was a dead ringer. I want an EVO 100.

HI-FI NEWS VERDICT

To say that I'm staggered by the EVO 100 is understatement, primarily because I wasn't expecting such undeniable musicality. This DAC has such a genteel way with whatever signal is fed to it that you'll be listening for hours longer than intended. It's an exercise in quality, usability and performance versus features and bling. If you're already tube-biased and in need of a high-end DAC, this is an irresistible bargain.

Sound Quality: 88%

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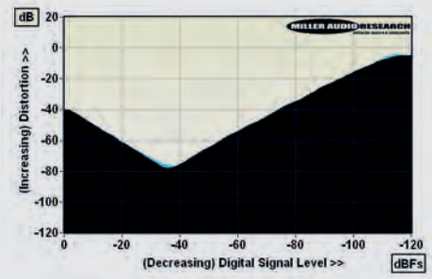
LAB REPORT

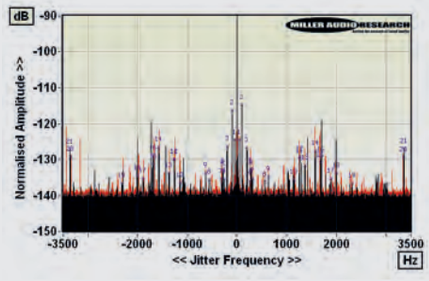
PRIMALUNA EVO 100 TUBE DAC

If ever an outboard DAC was a 'game of two halves', then this is it – based on the ProLogue Eight CD player [*HFN* Nov '08], the EVO 100 employs a tried-and-tested SRC4192/PCM1792 upsampler/DAC chipset to good effect but it's the transformer-coupled 12AX7/12AU7 triode output stage that dominates its subjective 'colour'. On the digital front, while PrimaLuna is still using this legacy DAC, with 'fast' linear phase digital filter, the suppression of stopband (alias) images is much improved over the Eight – from 29dB to 89dB here. Output is lifted from 1.88V to 2.15V but the A-wtd S/N ratio is boosted more significantly from just 95dB to 105dB even if low-level resolution remains comparable at ±0.5dB over a 100dB dynamic range and –3.5dB at –100dBFs. Jitter is reduced to a very limited 80psec PSU modulation with 96kHz/24-bit data [Graph 2 and boxout, p43].

Nevertheless, the 'sound' of the EVO 100 is dominated by its tube output. We have tested numerous tube-equipped preamps and DACs that demonstrate vanishingly low levels of distortion, so what follows must surely have been a deliberate engineering choice. Output impedance is excessively high at 2.38kohm through mid and treble, increasing further to 3.5kohm/100Hz and 12.1kohm/20Hz, suggesting the EVO 100 will be fairly cable and preamp-sensitive. As expected, the response falls away at bass frequencies to –0.16dB/100Hz and –1.6dB/20Hz but reaches out to +0.1dB/20kHz, –0.5dB/45kHz and –7.4dB/90kHz with 48kHz, 96kHz and 192kHz media, respectively. Distortion peaks at ~1% and then steadily falls to a minimum of 0.014% between –35dBFs and –40dBFs. By conventional standards these are high figures, but the levels and trend are impressively consistent with frequency [see Graph 1, below]. **PM**



ABOVE: Distortion vs. 48kHz/24-bit digital signal level over a 120dB dynamic range (1kHz, black; 20kHz, blue)



ABOVE: High resolution 24-bit jitter spectra via S/PDIF and USB inputs (48kHz, red w. markers; 96kHz, black)

HI-FI NEWS SPECIFICATIONS

Maximum output level / Impedance	2.15Vrms / 2.35-12.2kohm
A-wtd S/N ratio (S/PDIF / USB)	104.9dB / 105.0dB
Distortion (1kHz, 0dBFs/–30dBFs)	1.07% / 0.025%
Distortion & Noise (20kHz, 0dBFs/–30dBFs)	1.03% / 0.026%
Freq. resp. (20Hz-20kHz/45kHz/90kHz)	–1.6 to +0.1dB/–0.5dB/–7.4dB
Digital jitter (48kHz / 96kHz)	160psec / 80psec
Resolution (re. –100dBFs / –110dBFs)	±0.6dB / ±3.5dB
Power consumption	53W
Dimensions (WHD) / **Weight**	279x191x404mm / 13kg