



TRINITY ELECTRONIC DESIGN TRINITY DAC

DIGITAL-TO-ANALOGUE CONVERTER

Reviewer Edgar Kramer

Over the last few years the greatest growth product in high-end audio — and the most talked about — has been the digital-to-analogue converter (DAC). The lower end of audio has seen surges in soundbars and headphones, where the market is so grossly proportioned that obscene multi-million-dollar deals with famous rappers and artists are almost commonplace, while the budget end of DAC-philia has seen the spawning of countless little Delta-Sigma wonders from previously unheard of brands, some of them aiming for points of difference by featuring hybrid valve circuits, unusual chassis design, all manner of bling and more.

But at the top end of town, true innovation and sonic excellence — resulting from large budget design freedom — is common. Indeed, these pages (and those of previous issues) are

graced with several examples that illustrate what can be achieved when restrictions are removed.

Makers of top-end DAC products have a number of directions available to them in order to extend the performance and construction envelope above the budget fare. Without budget driven restrictions clever engineers can perform a number of refinements — even technical innovations — to power supplies, input/output circuitry, DAC implementation, signal paths and to internal electrical and vibrational isolation. What's more, designers can flaunt design flair in the high-grade and beautiful chassis, something that raises the price of admission considerably, but can also provide a solid platform for the internal circuitry. And then there's the element of pride of ownership, admiration of sophisticated industrial design and the overall experience of luxury commensurate with the asking price.

In the case of this review's subject, the new Trinity DAC from German manufacturer Trinity Electronic Design, all of the above elements are covered... and most particularly the reference to technical innovation.

MORE THAN JUST A TRINITY

At first sight the Trinity DAC would seem somehow unassuming. But inside its slimline casework

milled from solid aluminium lie the newest and best digital implementations company CEO, proprietor and principal engineer Dietmar Bräuer has yet devised. In fact, Bräuer has developed what is claimed to be a unique digital-to-analogue converter technology he calls LIANOTEC.

The kernel of the LIANOTEC architecture comes from rare state-of-the-art DAC implementations of the past. But Bräuer has taken that strong base and elevated it with some of his own ideas and techniques, summarising the core of LIANOTEC as follows.

"LIANOTEC is a unique topology that improves all the parameters of a D/A converter," he says. "It's a topology that is both impulse-optimised and frequency response-optimised since it has an ideal impulse response and, therefore, represents the epitome of interpolation techniques."

The principle of LIANOTEC (Linear Analogue Oversampling Technology) begins with the idea of multiple paralleled DACs — in this case the classic and outstandingly good-sounding multi-bit Burr Brown PCM 1704 — which are implemented in an analogue oversampling circuit. On a basic level, this interpolation technology parallels eight DAC chips to obtain analogue interpolation equivalent to eight times oversampling in the analogue

△ DECEIVINGLY SIMPLE-LOOKING, ALBEIT OF RATHER CLASSY APPEARANCE, THE TRINITY DAC PACKS THE COMPANY'S ADVANCED PROPRIETARY DIGITAL TECHNOLOGY.



domain. No messing with the digital data and, among other things, the architecture achieves far better impulse response and sideband/distortion suppression than the ubiquitous digital domain manipulation. The technology also negates the need to implement a low-pass filter with its inherent phase and ringing distortions.

Further refinements have been implemented in the way the Trinity DAC handles USB signals. A top-tier sealed oven Voltage Controlled Oven Controlled Xrystal Oscillator (VCOXO), accurate to 1ppb (parts per billion), reduces jitter to insignificant levels — quoted as a mere 28 femto seconds. Said asynchronous USB circuitry is galvanically isolated from potential computer inherent distortions while playback is at the native sample rate without the digital manipulation of Asynchronous Sample Rate Converters (ASRCs).

For those with a technical bent, all of these technology implementations are backed up by an impressively extensive group of charts and graphs which are offered at the Trinity website and also appear in the owner's manual.

The component itself is solidly constructed from a block of CNC-machined aluminium anodised in black. The chassis' thickness, solidity and circuit board layout are all aimed at minimising and isolating componentry from mechanical vibrations. Also for this purpose, the DAC includes three large chromed feet with a receptacle for fitting a ball bearing, while ceramic, ceramic/aluminium alloy, and two

different plastic alloys are included as further sonic fine-tuning.

The low profile fascia features a number of high quality buttons to toggle power on/off and switch the various inputs, and to activate LIANOTEC and two available filters that contour the sound for personal preference.

Connectivity includes inputs for Toslink, two S/PDIF coaxials and the USB. The DAC is balanced so only XLR connectors are provided for analogue outputs while two BNC connectors offer master clock outputs quoted at 44.1kHz for 22.5792MHz and 48kHz at 24,576MHz. The Trinity DAC is capable of supporting playback for audio files of between 44.1kHz and 192kHz sampling rates and 24-bit resolution.

The large switch-mode power supply allows AC global usage from 110 to 240V without having to disassemble or switch anything.

The Trinity DAC is delivered snugly fitted into tight foam cut-outs inside a military-standard Italian-made hard plastic case. Also provided are white cotton gloves (let's not get fingerprints on that lovely casework), a USB flash drive with Windows drivers (not needed for Mac) and sample-rate test files (also available from the company website for download), an adjustment tool and a cleaning cloth.

SONIC SPLENDOUR

The versatility of modern DACs allows for a number of digital (and sometimes even analogue) sources to be hooked up simultaneously. The USB input locked in to my MacBook (AIFF files via BitPerfect software) on the spot, trouble-free, ready to rock. Also connected to the DAC was the reference AMR CD-77.1 CD player as transport.

"From the first notes I knew this was something special..." may be a well-worn reviewer and user cliché, but it does actually sum up first impressions of many an outstanding component. And were I not approaching this from a different angle, I'd be using the same phrase. So let's just start with... Wow!



△ DIFFERENT ISOLATION 'BALL BEARING' INSERTS ARE PROVIDED FOR THE FEET IN A VARIETY OF MATERIALS. THESE PROVIDE AN AVENUE FOR FURTHER SONIC FINE-TUNING.



Whether rendering red book or high-res files, the Trinity DAC is an advanced, innovative and highly engineered instrument for digital playback...



Textures and more textures — the Trinity DAC served up a veritable colour chart of textured shades in a broad tonal palette giving instruments and vocals a centre-stage presence rarely heard in my system. Ditto for ambient information. The Trinity DAC will pull more room and recording venue information from zeros and ones than any other digital system I've encountered.

Live recordings vary in terms of ambient sound retrieval and, in my collection, the two best examples are Harry Belafonte's classic *Live at Carnegie Hall* and Ani DiFranco's *Living in Clip* (more specifically the track 'Amazing Grace'). The Trinity's information retrieval can transport you to the venue, put you in the best seat in the house, promise you a backstage pass and book you an intimate dinner with Ani and Harry. Yes, there's an astonishing level of detail on offer here, but it's all presented naturally and without undue flamboyance or frequency imbalances.

In this case, such excellence in low-level information is no doubt partly due to the so-called 'black background' phenomenon. There's a quietness... no, a *silence*, between the notes that presents music totally devoid of artefact or hash. This in turn provides additional benefits such as an extraordinary delivery of small transients like wispy, breathy vocal inflections and minutiae such as steel string and nail frisson.

And I would say, yet another by-product of such resolution is superlative instrumental separation. Complex mixes are totally open and free to breathe as individual strands that remain musically whole. It's a large and generous acoustic scale; a grandiose sonic landscape — should the rest of your system be up to it.

And yes, the Trinity DAC demands the very best in ancillaries. Sure, it will still perform its magic in very good systems but it fits right in with brethren at the highest of levels.

Other review must-mentions such as bass, midrange and treble quality interspersed with discussion on soundstaging and imaging seem almost trivial within the context of the elevated levels of tonality and ambience. Sure, those elements are also exemplary — the Trinity excels in its bass power, tautness and

depth while also being screamingly dynamic. The projected soundfield extends beyond the speakers' locations too. In fact, the more you listen, the more those analytical elements become moot; you are involved and hooked by the magnificence of the music and the poetic interpretation of the musicians.

CONCLUSION

The Trinity DAC sprang from left of field to be embraced (along with only a handful of stratospheric competitors) to start off with, by a wealthy and finger-on-the-pulse über high-end community in audio- and music-mad Hong Kong. It has since developed a global reputation that has audiophile tongues wagging.

Physically it's a deceptively unassuming component. But don't misinterpret its external message of minimalism. Every element of its construction has been thoroughly considered and researched. And the LIANOTEC architecture is a brilliant coup that bears fruitful benefits.

Whether rendering red book or high-res files, the Trinity DAC is an advanced, innovative and highly engineered instrument for digital playback. It's positioned at the highest levels currently achievable. A Godly Trinity indeed...

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△ RECENTLY UNVEILED AT MUNICH'S HIGH END SHOW, TRINITY'S NEW 'PC & DRIVE' COMPONENT SHOULD MAKE THE PERFECT MATCH FOR THE COMPANY'S DAC.

SPECIFICATIONS

TRINITY DAC

DIGITAL INPUTS: 2 × S/PDIF (75-ohms) RCA, Toslink, galvanic de-coupled asynchronous USB

ANALOGUE OUTPUT: XLR Balanced

MASTER CLOCK OUTPUTS: 44.1kHz × 512 (22.5792MHz) and 48kHz × 512 (24.576MHz)

FILE PLAYBACK SUPPORT: 44.1kHz-192kHz sampling rates and 24-bit resolution

DAC CHIP: 8 × Burr Brown PCM1704 DAC chips in parallel with proprietary LIANOTEC technology

PRICE: \$59,000

DIMENSIONS (WHD): 440 × 50 × 330mm

GROSS WEIGHT: 13.5kg in the supplied hard plastic carry case

WARRANTY: Two years

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