



electromod
the sound connection

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TOPPING

Above Topping's innovative and versatile DX9 Discrete DAC/headphone amp

DAC's innovation: Topping DX9 Discrete

Eschewing chip-based DAC design for proprietary, discrete 1-bit decoding technology, Topping's brilliantly designed premium-level DAC/headphone amp sets new standards

Buckinghamshire, England – Digital audio specialist Topping has earned a global reputation for exemplary design and class-leading performance at accessible prices. With a range of DACs (Digital-to-Analogue Converters) and amplifiers starting at £100 and stretching towards £2,000, the company's products deliver exceptional value for money for both hi-fi systems and head-fi applications.

Topping's latest premium-level device, the DX9 Discrete – a fully balanced DAC, preamp and headphone amp in a smart, compact chassis – is now shipping to the UK via official distributor Electromod. It stands apart from any other device on the market thanks to an array of proprietary technologies, including Topping's 'PSRM' discrete 1-bit digital-to-analogue conversion architecture and 'NFCA' hybrid headphone amp circuitry. The result is a supremely versatile device delivering a remarkable sonic performance in a wide range of systems with headphones, speakers or both.

As well as having a clearly audible effect, this clever technology is also visible. The top of the DX9 Discrete's chassis incorporates a tempered glass window that reveals the circuitry beneath like a panoramic sunroof. The glass is etched to highlight each section and the circuitry illuminated with a gentle orange glow – visually impressive and fascinating too!

Design and build

Solidly built and perfectly proportioned, the DX9 Discrete's aluminium chassis measures 340x60x225mm (WxHxD) – small enough to fit comfortably on a desk, table or sideboard yet sufficiently large to ensure its impressive circuitry isn't compromised. A single multifunction rotary control sits centrally on the fascia, programmable for easy access to the functions its owner uses most often, flanked by a pair of crisp colour displays.

These 2-inch displays are highly configurable thanks to Topping's Aurora UI, with nine colour schemes, adjustable brightness and more. Users can choose to show data such as incoming file format, sample rate and volume level, or select a 'spectrum analyser' (FFT) display – one for each channel – to represent the audio signal's frequency components in real time. Another option displays classic VU-style meters, showing signal levels as the music plays and adding vintage appeal to this cutting-edge device.

The DX9 Discrete's classy look and feel is further complemented by a neat remote control, housed in a unibody, CNC-machined, high-density aluminium chassis with a fine sand-blasted finish.



Left Curved edges, twin displays and a glass top – the DX9 Discrete looks and feels every inch a premium product

PSRM – Topping's technical tour de force

Topping's DACs span a variety of sizes and, most interestingly, technical designs. While most brands select an off-the-shelf DAC chip from a single supplier to build their devices around, Topping has engineered a collection of technologies to suit different applications, customer preferences and price points. At the lower price tiers, several high-spec DAC chips are used from leading suppliers ESS Technology and AKM, carefully selected and masterfully implemented. The range also includes an 'R2R' DAC, using a ladder-like network of resistors instead of chips to convert digital signals to analogue.

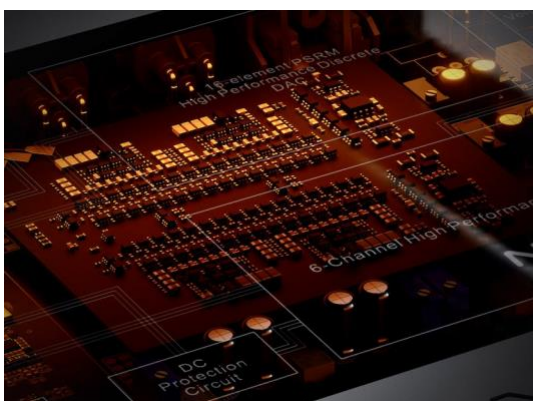
Several years ago, Topping began developing something completely different, specifically for its top-tier devices – a proprietary technology unlike anything seen in comparatively priced DACs. It's not an R2R design, nor does it use third-party off-the-shelf DAC chips. Instead, it's an innovative digital-to-analogue conversion technology with a discrete 1-bit architecture, designed and built entirely in-house – Topping calls this 'PSRM' (Precision Stream Reconstruction Matrix).

The DX9 Discrete represents the third iteration of Topping's PSRM technology, following 2024's D90 III Discrete and 2025's D900. While the D900 – a pure DAC/preamp with no integrated headphone amp – is PSRM's pinnacle with its 32-element architecture, the DX9 Discrete's refined 16-element implementation delivers an outstanding technical and subjective performance that sets it apart from other DAC/headphone amps on the market.

More about PSRM DAC technology

When DAC circuitry is described as 'discrete' – using individual electronic components for the conversion process rather than an integrated chip-based solution – it's usually assumed to be an R2R design. But PSRM is, essentially, a 1-bit delta-sigma DAC technology; while R2R uses a ladder of resistors to represent different bit values, PSRM uses a high-frequency 1-bit stream.

The process involves discrete 1-bit modules converting digital audio streams into analogue voltage by turning each audio sample into an ultra-fast train of 1-bit pulses. The density of this pulse train – the proportion of 'ones' versus 'zeros' – represents the instant waveform level; these pulses are then averaged/smoothed with an analogue reconstruction filter. While in essence this is a form of delta-sigma processing, the implementation, algorithms and circuit choices are unique to Topping.



Left The glass window and orange ambient lighting provides a clear view of Topping's unique PSRM DAC circuitry

By using independent voltage references and ultra-fast switching logic, PSRM isolates noise in a way that integrated chips simply can't. This is a remarkable engineering challenge for Topping to have mastered; discrete DAC circuitry that switches at such speed whilst maintaining an epically high signal-to-noise ratio is incredibly hard to achieve. Component tolerances and timing errors that chip manufacturers handle at the silicon level must instead be solved with individual parts on a PCB.

The DX9 Discrete's PSRM architecture is fully balanced, with 16 discrete elements (high-speed switching voltage references) for the left channel and 16 for the right, ensuring maximum channel separation and therefore lower crosstalk. During development, every component was rigorously tested to ensure that when combined they deliver an ultra-fast response while preserving the integrity of the original signal.

The PSRM circuitry's voltage reference supply is critical to the precision of the analogue output. Topping's digital switching logic operates at nanosecond speed with sharp rise/fall times – ideal for digital processing but prone to introducing noise into analogue audio signals. To counter this, Topping

developed a stable, noise-free, purely resistive output power supply, ensuring each DAC element performs with absolute accuracy. The resulting synergy between this and the switching logic enables the DX9 Discrete to reproduce the original audio signal with extreme fidelity, achieving a dynamic range and SNR (Signal-to-Noise Ratio) of 131dB.

Ultra-high resolution, ultra-low jitter

The DX9 Discrete packs in an impressive array of digital inputs, especially considering its compact size. Asynchronous USB, two optical and two coaxial inputs are joined by AES and IIS-LVDS (I²S) inputs using XLR and HDMI connectors respectively – both are high-quality, low-interference digital audio connections that can provide superior performance, especially over longer cable runs.

The USB and IIS-LVDS inputs support PCM audio to 32-bit/768kHz and native DSD512. The other cable inputs handle PCM to 24-bit/192kHz and DSD64. In other words, the DX9 Discrete processes all digital file formats – including the very highest of hi-res audio, now and in the future – without any sonic restriction.

Topping has included the convenience of device-to-device streaming via Bluetooth too. A comprehensive suite of high-definition Bluetooth codecs is supported, including LDAC and aptX Adaptive up to their maximum 24-bit/96kHz specifications, as well as aptX HD.



Left Digital audio is treated with utmost care prior to conversion to analogue

All these inputs are handled by high-quality specialised chipsets: an XMOS XU-316 for USB and IIS-LVDS; an AK4118 for optical, coaxial and AES; and a Qualcomm QCC5125 for Bluetooth. These chips combine with a dual-stage purification system that's unique to Topping, keeping the digital audio signal distortion-free before it reaches the D-to-A conversion stage.

This sophisticated dual-stage system eradicates Jitter – a timing error in digital audio signals that causes audible distortion – by pairing a precision clock with a CPLD (Complex Programmable Logic Device). A CPLD is a type of programmable chip that delivers more predictable timing (in a digital data sense) than an FPGA chip owing to the way it's constructed, making it ideal for timing-critical digital applications. This delivers jitter suppression that goes far deeper than other DACs, achieving jitter levels as low as -160dB and ensuring vocals and instruments are portrayed with exceptional definition.

Analogue output stage

The specialised circuitry developed in-house continues post-DAC, after the digital signal's conversion to analogue, including the I/V (Current-to-Voltage) conversion and volume control circuitry. I/V conversion is a necessary part of any DAC – it transforms the initial current output from the digital-to-analogue conversion process into the voltage signal required by an amplifier, so the amp in turn can drive a pair of headphones or speakers, and the quality of its implementation is critical to sound quality.

Topping has created a proprietary I/V conversion circuit to realise the full potential of its PSRM DAC architecture, combining low-distortion op-amps with discrete components to process signals with precision. This design unlocks the music's dynamic potential, ensuring an immersive sonic experience.

Following I/V conversion, a fully balanced hybrid relay-resistor network delivers ultra-precise volume control, eliminating channel imbalance at low volumes and ensuring pinpoint imaging. By combining relay switching with digital control, volume adjustment is achieved with lower distortion and superior noise immunity, reproducing music with greater purity, accuracy and dynamic realism.

Listeners have the option to route the audio signal to the DX9 Discrete's independent preamp stage (when connected to an amp or active speakers), or to the built-in headphone amp, or to both simultaneously. In each case, the signal's fully balanced form is maintained throughout.

Analogue output options are plentiful. For headphones, there are balanced outputs in 4.4mm and 4-pin XLR form, together with a single-ended 6.35mm socket. For amps and speakers, there are balanced XLR and single-ended RCA sockets labelled 'pre', and the same again labelled 'line out'. The former incorporates the volume control to feed a power amp or active speakers, while the latter delivers a fixed line-level output to connect to an integrated amp or preamp.



Left An array of digital input and analogue output options provide plenty of flexibility

NFCA headphone amplifier

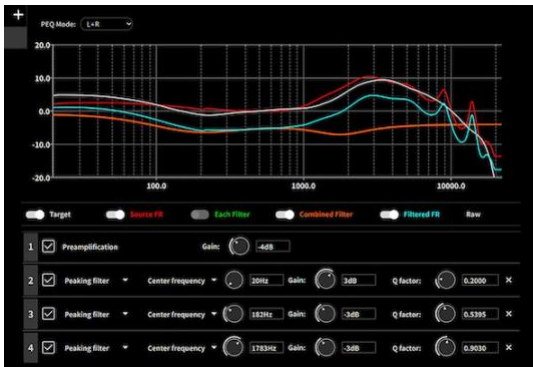
The DX9 Discrete treats headphone lovers to an elevated version of Topping's clever NFCA (Nested Feedback Composite Amplifier) architecture. This discrete, hybrid design, here in six-channel form, delivers sufficient power to drive even the toughest planar headphones, combined with a silent 'inky black' background with super-sensitive IEMs – a balance few headphone amps strike with such aplomb.

The amp circuits that feed the balanced and single-ended outputs are fully independent, helping to maintain the ultra-low distortion performance for which Topping's NFCA architecture is famed. Its power from the balanced headphone outputs is rated at 7,080mW per channel into 32 ohms and 10,000mW per channel into 16 ohms, whilst maintaining an ultra-low noise floor below 0.5 μ Vrms. Across a wide range of headphone and IEM types, embracing all manner of drive requirements, the sonic results are consistent: dynamic and expressive, with a remarkable level of fine detail.

Sophisticated sonic tuning

The DX9 Discrete supports Topping's firmware-level PEQ (Parametric Equaliser) system, allowing precise control of frequency, gain and Q (bandwidth) across ten customisable bands. By using the free 'Topping Tune' software for Windows and Mac OS, users can create sound profiles and upload them to the DX9 Discrete; these can then be selected via the DAC's menu without the software running in the background.

Far more sophisticated than simple tone controls, Topping Tune allows the user to create multiple profiles and even import target curves. This enables the sound to be precisely tuned to suit the connected headphones and speakers, and the differing characteristics of digital sources and acoustic environments, in line with one's personal sonic taste.



Left Users can create parametric EQ profiles and upload them to the D900 to precisely tailor the sound to suit different headphones and speakers

Headphone crossfeed

Another sophisticated form of sonic tuning, headphone crossfeed is a user-selectable feature designed to deliver a more 'speaker-like' experience when listening through headphones.

Developed by Topping's in-house engineers, this convolution-based crossfeed precisely simulates HRTF (Head-Related Transfer Function) and room acoustics, improving imaging accuracy and spatial depth while greatly reducing the in-head localisation and close-ear listening effect common to headphones. Through meticulous tonal calibration, the system balances tonal accuracy with realistic spatial presence, avoiding the distortion that can result from simply flattening frequency response.

A second, simplified crossfeed mode is also available, producing a natural, speaker-like presentation whilst maintaining more of the typical characteristics of headphone listening. This is based on the BS2B (Bauer Stereophonic-to-Binaural) algorithm, which aims to reduce the 'stereo fatigue' that can occur when using headphones to listen to music mixed for speakers.

Headphone crossfeed and parametric EQ are facilities that are highly prized by the 'head-fi' community; owners of the DX9 Discrete get both built in, engineered to the highest standard.

Price and availability

Built on a foundation of technical innovation, the DX9 Discrete is DAC/headphone amp unlike any other. Its unique design delivers class-leading performance – as a complete all-in-one package to use with headphones, amps and speakers, there's nothing to touch it anywhere near its price.

The DX9 Discrete is now shipping the UK via Electromod – Topping's UK distributor – available in a choice of black or silver at an RRP of £1,299. As with all Topping products, customers who purchase the DAC from an official UK stockist benefit from UK-based tech and servicing support.



Left Technically innovative and eminently versatile with exceptional sonic ability, the DX9 Discrete is a remarkable DAC/headphone amp

TOPPING

Formed in 2008, Topping has forged a formidable reputation for first-rate audio design and engineering that puts its competitors in the shade. The company's range includes class-leading DACs of various 'flavours', some using ESS Technology or AKM chips, others incorporating R2R or proprietary discrete 1-bit DAC technologies, to cater for a wide variety of tastes and preferences. Amplifiers are another speciality, from analogue headphone amps to match the various DACs, to stereo and mono amps for loudspeakers. All punch well above their price points.

toppingaudio.com



Founded by Mark Dolbear, Electromod is a leading UK distributor specialising in head-fi gear, from DACs to amps to headphones and associated accessories. The company focuses on product excellence and a personal style of customer support, operating as official distributor for class-leading brands such as Dan Clark Audio, Dekoni Audio, Écoute, Grell, Schiit Audio, Topping and Violectric. Mark has an engineering background and has worked in the audio industry since 1995, servicing products from the likes of Mark Levinson, Goldmund, Ayre Acoustic and Stax before forming Electromod.

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