

Bel Canto EVO 2i digital amplifier



Can a digital amp rival the sweet sounds of a SET-powered design? Maybe it can with Class T Tripath

Evo 2i

PRICE	£2799
SUPPLIER	Aanvil Audio
CONTACT	01359 240687
WEBSITE	www.aanvilaudio.com

You would think the very word 'digital' would be anathema to your average valve-loving audiophile. So, what on earth is Bel Canto – well known for its Single Ended Triode (SET) valve designs – doing making digital amps? It's as though Obi Wan had gone over to the Dark Side.

The answer lies, surprisingly, in Bel Canto's love of the SET sound. In 1986 Bel Canto embraced the unique qualities of the Single-Ended Triode, the simplest possible valve configuration. This method throws away the technical advantages of push-pull operation (using pairs of valves), which cancels out even-order harmonics to reduce total harmonic distortion. Yet, despite the technical limitations – higher than usual distortion and lower than usual power – SET amplifiers are much loved.

Now Bel Canto claims that, using a completely different technology, its Evo2i has the qualities of its SET designs but with much lower distortion. This is put down to the extreme simplicity of the output stage, a harmonic spectrum that reduces with frequency (like a SET) and a 6kV per

microsecond slew rate. The output filter required to remove the high-frequency switching noise adds output impedance at high frequencies, but far from being a disadvantage, Bel Canto claims this is a benefit by providing a degree of high frequency isolation between the output stage and the speaker load (in much the same way as an output transformer in a valve amplifier).

The Evo 2i is rated at 120 watts per channel into 8 ohms (200 watts into 4 ohms) and uses the Tripath TA3020 Class T digital amplifier chip (see also the ESIab review, page 52 in this issue) on Bel Canto's proprietary circuit board. Two N-type MOSFET output transistors, capable of handling up to 60 amps each, are used for each channel and only ever stay in two states – either 'on' or 'off' – for any appreciable time. They alternate rapidly between the positive and negative voltage power supply rails at around 600kHz under the control of a 'digital power processor' (switching speed is less than 30 nanoseconds between 'on' and 'off').

With this type of amplifier, the linearity of output devices is not an issue as they are either on or off (and in these two states, power dissipation is extremely low). Linearity and hence distortion depends solely on the accuracy of modulation.

The processor in the Tripath chip modulates the timing of these pulses in step with the analogue input waveform and also adds dither to improve linearity (and resolve information right down into

the noise floor, as with an analogue amplifier, claims Bel Canto). The resulting supersonic bitstream passes through an 80kHz second-order LC low pass filter to remove the switching waveform, leaving just the audio.

Older Pulse Width Modulation 'Class D' amplifiers controlled the width of each pulse, by means of a simple analogue converter, whereas the digital Power Controller contains a sigma-delta architecture with noise shaping. It's a time-domain digital processor using a control algorithm which governs switching timing. Being a digital device, there's quantisation, but in this case (unlike linear PCM) it's in the time domain.

The difference between pulse width and pulse timing modulation is subtle, but Bel Canto claims that timing control modulates the pulse density, not the width. This spreads the switching waveform frequency, and noise artifacts, over a wider range (approximately 200kHz to 1.5MHz) making analogue filtering easier than with plain Pulse Width Modulation.

The two channels run at slightly different frequencies to avoid audio band 'beat' notes. The lowest switching frequency is well above the audio band, requiring only a gentle analogue filter (not multi-pole) to remove out-of band noise. Bel Canto's philosophy is that this gentle filtering preserves the phase and clarity of the original signal. In addition, the Sigma Delta modulator

allows the in-band noise to be shaped to reduce it where the ear is most sensitive.

There is no conventional overall analogue negative feedback in the Evo2i, though fast-acting negative feedback from before the output filters the processor, to correct for time delay variations in the switching devices. As with conventional negative feedback, this has the dual benefits of reducing distortion and lowering output impedance in the audio range (it cannot correct for the output filter, as this is outside the feedback loop).

All told, Bel Canto claims the amplifier produces a distortion spectrum similar to that of its cherished SET amplifiers, but at a level some ten to 100 times lower (below 0.01% THD and IMD is claimed). Though Bel Canto uses the same Tripath chip as employed by many others, the low-level analogue section is entirely its own. This circuitry is coupling-capacitor free, using stabilized voltage lines and instrumentation type amplifiers and passive components to handle both balanced and unbalanced signals – all analogue signals being handled at low levels where distortion and noise levels are at their best.

In addition to modulating the output switching, the processor also monitors the analogue output and introduces soft limiting. This mimics the soft overload of valve designs, which is subjectively more acceptable than the hard clipping which occurs in many solid state-designs (or in digital circuits). Output and fault protection is also controlled by the processor.

A further benefit of switching amplifiers is that there is no standing bias current, and so there's little power is lost in warming the output devices while amplifying. They are very efficient. The Evo 2i is claimed to be over 90% efficient, whereas real-world Class AB amplifiers, though theoretically capable of more, are lucky to exceed 50%. In the

strength and very fine definition. Perhaps the bass could do with a tiny touch more warmth, but the Evo 2i imposes so little of its own coloration on the music it is frighteningly close to having no character at all.

Playing the Allegro from a 1959 recording of Mozart's Clarinet Concerto [Decca 417-759-2] I was immediately struck by the lush, well-balanced sound. Gervaise de Peyer's clarinet had a lovely rich textured and open quality. Perspectives are neither distant nor forward, with the instruments seemingly in just the correct proportion.

Strings were reproduced with a rare purity and lack of audible distortion with oodles of detail and extension. Yet, while the highest frequencies seem to soar up without limit – there is no sense of high-frequency dullness or roll off (the output filter is

some very good ones, when their coloration can sometimes be plainly audible. For instance, whereas some amplifiers can add or emphasise vocal sibilance, there is not a trace of this trait in the Bel Canto.

Musically, it is highly adept, measured and in control, yet at the same time fresh and energetic. However, in contrast to some bolder and brasher high-end products, the Evo 2i plays with the assured confidence of a mature artist – a Yehudi rather than a Nigel Kennedy (or perhaps that should be a blend of Yehudi and Nigel).

In conclusion, this amplifier does not sound like a valve amplifier, but neither does it sound like a typical high-power transistor-based design. In this model, Bel Canto has forged a rare alliance between the power, bandwidth and grip of the best



well above the audio range) – treble is smooth and super clean. This is transparency on a grand scale so don't expect the Evo 2i to make poor material sound nicer – it won't – as musical information

transistor amplifiers and the smoothness, delicacy, transparency and musical acuity of the best of valves. The result is a pairing to please the heart, head and spirit. ■

David Berriman

Strings were reproduced with a rare purity and lack of audible distortion with oodles of detail. Yet, while the highest frequencies soared without limit treble is super clean

Evo 2i, therefore, all the power supply has to do is provide audio power to the speakers, and is thus as effective as one roughly twice the capacity, compared to that of a Class AB amplifier. Also, in addition to the absence of low-level distortion, there are no distortions introduced by thermal effects, as is typical with analogue amplifiers.

Before I heard this amplifier I must admit to being sceptical. I expected a digital amplifier to sound, well, digital. What I heard could not have been more different. Here was a stunningly neutral sound which, seemingly against all odds, combines transparency, smoothness, micro detail and realism. Unlike most transistor amplifiers there was virtually no audible grain, grain or haze and there is a hear-through transparency with clarity and musical dexterity. Bass is also pretty good, maybe not so thrusting as some, but possessing very good

seems to sail through it uncompromised. In the Courante from Bach's English Suite No 3 in G minor [Murray Perahia, Sony Classical SK60276], the full shades of dynamics were reproduced – at one instant light of touch and in the next powerful and energetic. Subtle musical ebb and flow were much in evidence. Here was a fine depth of scale with utter clarity and smoothness, the presentation highly transparent and detailed with natural acoustic warmth of the venue was very apparent.

So great is the musical capability of this amplifier – the ability to dig deep into the layers of low-level information and musical clues it holds – that it seems to make some CDs sound more like SACD – especially when it's a transfer to CD of one of these old analogue recordings. Its almost total lack of character comes as something of a shock when going back to conventional amplifiers, even

Technology

The amplifier is certainly nicely put together. Lift the lid and you'll see three circuit boards populated by tiny surface-mount devices. At the front sits the display and control PCB. There's a rear-mounted pre-amp board, with selector relays mounted close to the inputs, and a left-mounted power amp board housing the Tripath TA3020 chip. The pre-amp has four unbalanced phono inputs with both line and tape outputs, and two true balanced inputs via XLRs.

The power amp section has a further three stabilizer ICs and four surprisingly small heat-sinks for the output transistors (due to the efficiency), flanked by two chunky toroidal output filter inductors. Finally, at the front sits a fairly massive 538VA mains transformer – another toroid.

Features

- Tripath technology
- Excellent build quality
- Digital efficiency, musical sound