USB DAC 128 Mk II from Henry Audio

Graham Morrison reviews a high-end audio output device without resorting to words like 'air', 'gravity' and 'pea soup'.

A good tune is still a good tune on AM radio, or through an MP3 player, or from the front seat of a car while the kids are screaming for One Direction in the back. Music is about enjoyment, and it can be enjoyed in virtually any environment. But we're also certain that if you spend a lot of time listening to music, improvements in playback quality will increase your levels of enjoyment. It may come from moving from AM to FM radio, or mono playback to stereo, or from taking time out of a busy day to listen to some music on your own. But it can also come from improving the way your digital music is converted into audio. This is the job of a DAC, the digital-to-analogue converter, and they're everywhere. From the headphone and speaker outputs on your smartphone, to your games console or DVD player to your car or amplifier. They perform an important job, and despite DACs having been consumer products since the dawn of the compact disc there's still enormous variation in their quality and capabilities.

> "**There was more stereo width and clarity, and a much stronger low-frequency bass response .**"

The PC requirements for high definition audio can be quite demanding, and the specs require a dual-core PC. However, we had good results from a relatively lowly quad-core ARM Cortex-A9 at 1.0GHz and even a Raspberry Pi.

DACs come in all shapes and sizes, with some costing thousands of pounds. It's a hardware category occupied by audiophiles and enthusiasts, and more recently, hackers. This is where the USB DAC 128 Mk II belongs. It's an affordable DAC, in audiophile terms, with reportedly exceptional quality output for the price, and with strong links to both Linux and open source. The controller inside its small aluminium case is an Atmel AVR32 general-purpose MCU, running C code that's open source, and the whole project is a descendent of the Audio Widget, a DIY DAC based on similar hardware, software and specification. The manual even includes the schematics.

Børge Strand-Bergesen, the brains behind Henry Audio, has been a long-time contributor to this community, and he's an audio geek who's been playing with converters for decades. You only need to look at his recent blog post (**http://www.henryaudio. com/blog.php**) on the difficulties of filming wagon wheels in motion to understand something of his dedication to taming streams of sound.

Living in a box

The box itself feels small but substantial (it's 114.4mm wide by 32.8mm high with a depth of 128mm). There are two halves to the metal surround, and the top half can easily be removed with a small hex/Allen key, giving access to the cleanly designed circuit board with its internal headers and potential for modification. There's a single dual-colour LED on the front, alongside a nicely rendered logo, and the rear panel houses two momentary switches, the audio connectors and a mini USB port.

Power comes in through the USB, so there's no external PSU to worry about, although the USB cable isn't included in the package. When connected to your PC, the USB DAC 128 Mk II appears as a standard class compliant USB audio output device, requiring no drivers nor any further configuration. There are no inputs, and outputs are available as both digital and analogue when listed from your software's audio mixer. Digital co-axial output is provided as a convenience rather than a feature, because it bypasses the DAC, but the same gold-plated RCA connectors are used for both functions.

We first connected ours to an Arch laptop and an amplifier, and yes, you need an amplifier. When we spoke to Børge and asked why the unit couldn't incorporate a headphone output, his response was that building a quality amplifier for a pair of headphones would make the unit dramatically more expensive. We know from shopping for similar products ourselves that he's got a point, but it diminishes the portability of the device when you've got to carry around two units.

As well as our Arch machine we also connected the unit to a Raspberry Pi and an ARM-based TBS 2910 Mini PC to see whether the DAC could be used as the output for a media centre.

The USB DAC 128 Mk II operates as both a class 1 and class 2 USB audio interface, and the colour of the LED indicates which mode the unit is currently using – bright green for class 1 and a more subdued orangey red for class 2. The difference in capabilities of the two modes is dramatic. Class 1 seems to be provided purely for compatibility with older Windows hardware that doesn't include class 2 drivers by default. Its maximum output resolution is 24-bit audio at 48kHz – or a little higher than CD quality. Class 2 output is capable of 32-bit audio delivered at 192kHz. The two modes are toggled manually using a slightly unintuitive button sequence on the back of the unit, but we had no problems using only class 2 from Linux when the correct mode was enabled.

This isn't an audio magazine. And we're all too aware of the mire of comments that accompany many Hi-Fi magazines/websites trying to describe something as subjective as audio quality – we still remember the gushing Hi-Fi review of an extortionately priced SATA cable for a music server. But reviewing an audio interface without giving an opinion on the sound quality would be remiss, and we do understand some of the technical challenges in creating great audio.

Quality in digital audio output is the result of absolute rock solid timing, and we'd even argue this is more important than resolution. Most USB audio interfaces, for example, rely on the PC for both the clock and the management of the data stream (known as a synchronous protocol). Any drift in timing affects how the DAC interpolates between one sample and the next, resulting in less audible clarity. (there's an analogous problem in video when a framerate becomes jittery.)

The clock and the crystal oscillators that drive the Henry Audio unit are of exceptional quality, and are fundamental to its sound. So too is the DAC chip itself, an Asahi Kasei AKM4430, and the asynchronous USB driver that Børge has spent a long time developing. This means the interface talks back to the PC rather than simply processing everything sent across the cable – an asynchronous protocol.

We are the music makers
We sat down to listen with some trepidation. Our first choice of music was something we're very familiar with, the album *Exai* by Autechre. To most, it will sound like an electronic cacophony of high-pitched squeals and noise, but it's one of the author's favourites and we'd imagine a good test for any converter. Best of all, we own the album as both vinyl and high-resolution 24 bit FLAC files, so we could test the DAC against an analogue input from the record player, the DAC on a (modest) Denon amplifier and the 128 Mk II. The difference between the amplifier's DAC and that in the USB 128 Mk II was so huge we had to check we'd not connected the source correctly. The amp was being driven by an HDMI output from the laptop, but there was no comparison with the output

produced by the USB DAC. Without resorting to the sycophantic lexicon of audiophile journalists, there was undoubtedly more stereo width and clarity, and a much stronger low-frequency bass response with the 128 Mk II – a huge improvement over the Denon's built-in DAC and marginally better than the vinyl.

Living in a box
Since then, we've spent a considerable amount of time listening to the DAC, and not just scary electronic music. We tested 24bit/192kHz playback with Mozart's Violin Concerto, where we found the differences more subtle, and we listened to heavily compressed pop, where the DAC added much more dynamic life to the recording. Everything we played sounded better, sometimes subtly and sometimes dramatically. And while we came into this review having absolutely no intention of spending £200 on something as prosaic as a converter, we're left convinced that it's worth the money.

If you're an audio hacker who wants a quality DAC to tinker with, we know of no better device. If you're a Linux user wanting great quality audio output, and you've got the music collection and the amplifier to match the investment, it's worth it. However, if you're still listening to music with your free smartphone headphones, you're better off investing in a better pair of headphones. IV

The schematics and the controller software are open source, and there's an active community of hackers building better power supplies and converters for the Audio Widget baselines designs.

LINUX VOICE VERDICT
It may seem like a luxury, but if you listen to anything other than MP3 and you've got a decent amplifier, it's definitely worth the investment.

★★★★★