Aqua Formula xHD Optologic

The most novel high-end DACs often employ proprietary converter solutions instead of off-the-shelf chipsets. From Italy comes this unique take on the NOS ‘ladder DAC’

Review: Andrew Everard Lab: Paul Miller

Steps to success:
More to the point is the digital-to-analogue conversion process, with its various sections on separate circuitboards (all the way down to each ‘ladder’ here being on its own board), not just for ease of servicing but also to allow it to be upgraded in the future.

Well connected:
In fact, all three of the company’s DACs have already been subject to upgrades and improvements. Not only did the original Formula gain the XHD improvements in format-handling, processing and performance, but the model we have here, to give it its full name, is actually the Formula xHD Rev2. All that aside, the Formula xHD is a pretty simple device, its controls running to nothing more than power, mute and phase inversion flip-switches, plus selectors for the bank of digital inputs to the DAC.

In addition to what Aqua calls its AQLink input, an I²S port to match the similar construction on the La Diva transport, using an R145 connector, the Formula xHD also offers more standard coaxial digital ins. There’s an AES/EBU socket, and an asynchronous USB-B for computer connection, using a proprietary USB receiver implemented on an FPGA. The latter is a fully floating, isolated design that, along with heavily revised firmware for the main FPGA in the conversion system, is central to the xHD’s improvements.

Windows users will need to download a driver for the USB option, but as it is usual the DAC is plug-and-play with Macs or Linux computers. In addition, the DAC has a modular option – an extra interchangeable input, able to offer an extra AES/EBU or RCA coax, AT&T fibre or an optical Toslink. Between the switches on the front panel is a bank of LED indicators, which light singular or in pairs to show the type of input signal the DAC is receiving. The single lamps cover sampling rates up to 384kHz, while paired lamps indicate up to 768kHz, and one-bit audio up to DSD512.

These higher rates, and input of DSD in native form, are only possible via the USB and AQLink connections as the ‘conventional’ digital inputs are limited to 192kHz and DSD via DoP (the custom DSP within the Formula xHD necessarily converts DSD to PCM to suit the R-2R ladder).

Hand assembled:
Aqua, as with other Aqua products, this flagship DAC is entirely handmade in Italy, and the standard of finish is exceptionally high, with solid anti-resonance aluminium casework finished in Nextel, sitting on four Modestas Pitrenas, wonderful weight and case’ design, and there’s an awful lot of components hand-assembled together in there (see picture, p56). An infrared remote handset is optional, but the DAC also offers an RS232 port to the rear for control in custom installations.

If, or if you’re using it with a computer, you can just select the USB input and forget all about the DAC – yes, all £12k worth of it! What you’re unlikely to forget is the performance of the Formula xHD. I’m not sure of the provenance of the review sample, aside from its grilling on PM’s test bench [see Lab Report, p59], but after a week or so of gentle use in my system to let all those components warm up, when serious listening began I was both amazed and charmed by the music singing forth.

Above: The Formula xHD uses solid aluminium casework with a Nextel finish; switches cover power, input and LEDs for the digital inputs, with sampling rate indicator LEDs pointing isolated feet and available in a choice of silver or black. So the Formula xHD may be unashamedly expensive, but it’s a long way from your average ‘chip package, analogue output, power supply and case’ design, and there’s an awful lot of components hand-assembled together in there (see picture, p56).

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Whipcrack fast:
Opening the listening with pianist Anna Fedorova’s latest Bachmanov (Chamber Classics CCS42620; DSD128/DD); I was struck by the clarity with which the lared Sacks recording was conveyed via the Aqua DAC, especially in the Rhapsody on a Theme of Paganini. Not only is the presentation whipcrack fast where required, with a lovely sense of the attack and decay of each note, but the music is supremely easy to enjoy – there’s nothing mechanical or artificial going on here – with a fluid, organic quality, and a real glow of the concert-hall ambience.

Even more, this DAC delivers the fluency and emotion of Fedorova’s playing in a magnificent manner, while giving the playing of the Symphony Orchestra St Gallen, here ‘on their home ground’ under Modestas Pitrenas, wonderful weight and drama. Nor do you need to stick to...
brings us very close to ‘surround
of the 2019 wash ‘n’ brush-up and
Miserere
Scholars’ recording of the Allegri
on within the production.

It’s striking how the quality of the voice shines through, even against the lavish
arrangements here. It’s hardly
classic Etta, but it’s still something of
a spine-tingler in the way the
DAC brings out all the scale of the
accompanying forces while still
retaining focus where it should be.

MAGICAL EXPERIENCE
Streaming the David Bowie Is it Any
Wonder EP via Qobuz Studio [n/a
cat no], the Formula xHD again
does that intimacy thing with ‘I Can’t
Read’ before slamming and snarling
into ‘Stay’ and then delivering Eno’s
now-remastered funk-up remix of
‘The Man Who Sold The World’ with
gloriously deep bass and
skittering beats behind a close-up
yet reverberant view of Bowie’s
voice. The ability of the Aqua DAC
to get deep into a recording and
deliver it with crystalline clarity
makes it a magical experience.

Whether fed in from a PC via USB,
or using the ‘conventional’ digital
inputs, the Formula xHD does a
superb job with CD-quality music,
even opening up the muddy mix
of Billie Eilish’s dense
presentation, even against the lavish
instruments with the voice.
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It’s simply a performance,
captured, and the Formula xHD
brings out all of that sense of
listening in, rather than hearing
something manufactured in a mix.

The voices soar into the lushly-
captured Merton College Chapel
acoustic, and Alison Stamp’s top
notes sound easier than ever. Just
close your eyes and wonder at it all.

Similarly, the simplicity of Rais,
a new album on the ‘one take’ Just
Listen label [JLO10; DDS 128], shows
the ability of the Formula xHD to
thrive with the sheer realism of voices
and instruments, whether with the
tender numbers or the more dance-
influenced tracks, the trio set up and
close-miked in a large space – as is
all too apparent.

Due to the ‘no edits’ recording
technique, the music has an
immediacy that’s infectious, and
this is matched with a sound to die
for, both recorded and reproduced.
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Sound Quality: 89%

R-2R DAC concept shares certain
technical parallels with MSB’s DACs [HFN Aug ’19 & Feb ’20]. It’s lack of any digital filtering brings it closer to CAD’s NOS DAC [HFN Mar ‘16] in ‘real world’ performance. Aqua’s FET-based analog stage supports a 3.5V transformer-coupled balanced output, the latter isolating the system from circulating RF interference while blocking DC, but it does cause the output
impedance to rise from 290ohm at bass/mid frequencies to 690ohm/20kHz. The 11.3db A-wtd SN ratio is up with MSB’s DACs
but jitters [see Graph 1, below] is slightly worse than both the
MSB and CAD implementations at 210psec [48kHz] and 265psec
(96kHz). Low-level linearity is excellent, however, with errors of
just ±0.4db over a full 100dB dynamic range.

The drawback of a filterless DAC [see boxout, p57] is the
presence of digital ‘images’ directly outside the audioband – just
1.4db down with 44.1/48kHz media. This causes moderate IM
distortion within the audioband when treble levels are high
(±65db re. 20kHz) [10db9], but is less of an issue with 96kHz
files and entirely absent at 192kHz+ sample rates. However, the
most intriguing feature of the Formula xHD, and the one most
likely to (positively) impact its subjective performance, is the
remarkable consistency of its distortion vs. level over the top
50dB of its dynamic range [see Graph 1, below]. Distortion is
certainly higher at very low and high frequencies at peak output
(8% at 20Hz and 1.1% at 20kHz) but from 200Hz-6kHz it hovers
almost unawervingly at 0.04-0.05% over what amounts to the
practical dynamic range of most recordings. The distortion is
very extended (10th harmonic and beyond) so is more likely
a function of the R-2R DAC modules than the analogue stage. PM

HI-FI NEWS SPECIFICATIONS

Maximum output level
Voltage
3.52Vrms / 2W

Power consumption
9W (2W standby)

Dimensions
450x100x370mm / 9kg

AQUA FORMULA XHD OPTOLOGIC

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