

# Audio Research Reference DAC

With a network player built in, asynchronous USB interface and connectivity for iDevices and memory sticks, this is ARC's Reference preamp for computer audiophiles  
Review: **John Bamford** Lab: **Paul Miller**

**I**t's an indicator of the fast-moving audiophile world when even the Audio Research Corporation, doyen of American high-end tube electronics since the 1970s, feels that it is time now to fully embrace the world of computer audio.

The company's new Reference DAC – dubbed the 'Digital Media Bridge' – caused a considerable stir when revealed at 2012's International CES in Las Vegas. For not only is this Audio Research's first DAC in its range of top-line components to bear the 'Reference' name, but it is also designed to cover all bases for 21st century music lovers and audiophiles. It incorporates a network music player with access to internet radio stations, USB inputs for direct playback of files from memory sticks and HDDs, and a *digital* connection for iDevices as well.

## ALL-PURPOSE INPUTS

Of course, its type B USB input socket at the rear – into which one can simply push digital data from a connected computer – provides an asynchronous interface that's compatible with files up to 'full HD' 24-bit resolution and all sampling frequencies up to 192kHz. Requisite proprietary USB Audio Class 2.0 drivers are provided on a CD-ROM. There's an additional type A USB input socket on the fascia for convenient hook-up of flash drive memory sticks, while a second type A socket on the rear panel provides connection for an iDevice.

And yes, it *is* expensive given that such functionality is available from umpteen far less costly audio electronics components. This is because the new Reference DAC is also an audiophile-grade *Audio Research* vacuum tube preamplifier (albeit one for a system comprising only digital sources, as it has no analogue inputs) based on the tried-and-tested analogue stage and valve regulated power supply of the revered Reference 5SE preamplifier.

Audio Research says that the digital section of this new Reference DAC draws on its existing DAC8 model, including the company's quad DAC architecture and 'Dual Master Oscillators'. However, the details of the digital input receiver, the upsampling section and those 44.1/48kHz-centred master oscillators are apparently very specific to the Reference DAC.

Thanks to the dual clock, it offers the option of native rate upsampling (44.1 to 88.2 or 176.4kHz; 48 to 96 or 192kHz) together with soft or sharp digital filter selection, both features available from your listening seat using the supplied remote controller. The remote can also switch absolute phase, control the preamp's volume and balance, and switch to mono operation. A press of the button labelled 'Hours' reveals the unit's duty cycle on the fascia's display, a common feature on modern ARC tube gear.

If you want to have the Reference DAC pull your music files from a computer or NAS drive situated remotely from a listening room, or explore the planet's myriad internet radio stations, the on-board client can connect to your home network via Ethernet cable or Wi-Fi. Thankfully, it includes gapless playback to provide seamless transition between segued music tracks. It is however limited to 24-bit/96kHz. Further handset buttons allow navigation of folders and playback control of tracks from your digital library.

## FAMILIAR DISPLAY

As always with such devices that employ a small fascia-mounted screen, navigating your music collection is a bit clunky – and you'll have to sit next to the DAC in order to read the display – nevertheless with correctly tagged files it does display colour thumbnails of album artwork. If



**RIGHT:** Based on ARC's DAC8 with a Stream Unlimited network audio solution [see boxout], the REF DAC/tube preamp includes four 6H30 double triodes, a 6550C and 6H30 in the PSU





you're thinking, 'That 3.5in TFT display looks familiar,' you'd be correct: Audio Research has employed the same 'engine' used in both Musical Fidelity's £1300 CLiC network player/DAC/preamp and Pro-Ject's dinky £699 Stream Box DS, sourced from Austria's StreamUnlimited [see boxout].

Installing the supplied driver was a breeze, my Mac mini (2.26GHz; 8GB RAM) running Windows 7 and JRiver Media Center v.17 successfully pushing my digital music collection into the Reference DAC within a matter of minutes. The driver provides a control panel utility window in which you can set the sample rate to match that of the music file you are playing, should you need to, although audiophiles using music management software that ensures 'bit perfect' output should simply use the DAC in Native Mode.

Via the setup menu you can re-name the Reference DAC's digital inputs, for example changing the Toslink input to 'TV Box' and BNC input to 'CD', or whatever is appropriate. By default the display is permanently illuminated, but you can set it to time out – anywhere from 10s to one hour. While the handset doesn't provide

direct input switching, using it to navigate the Reference DAC's input selection screen and pressing 'Enter' where appropriate soon becomes second nature.

### 3D HYPNOSIS

I spent the first few days enjoying the sound of the Reference DAC with it plumbed directly into my system, the unit's XLR outputs mated to the balanced inputs of my Mark Levinson No.383 integrated amplifier and setting the ARC's volume control to 77 [see Lab Report]. It was immediately obvious that the sound was deliciously open and highly controlled, the DAC/preamp creating a seductively wide and deep soundstage. While the 'character' of the sound was neither recognisably valve nor solid-state, there was a delightfully euphonic nature in its presentation, the musicians depicted in a natural-feeling acoustic space – even when reproducing artificially created recordings where a real musical event had never occurred!

*'Musicians were depicted in a natural-feeling acoustic space'*

**ABOVE:** Available in both black and silver, the familiar ARC styling includes rotary volume and source selector knobs. Buttons enable navigation of setup menu and file selection

Taking a trip back to the pioneering days of Trevor Horn's ZTT label and an early digital recording, 'Dream Within A Dream' from Propaganda's *A Secret Wish* [ZTT CID 126] was rendered with a hypnotic, three-dimensional soundstage so airy and spacious that dissecting individual elements of the production, observing how electronic studio treatments had been applied to each sound, proved effortless.

Where many squeaky-clean-sounding audio components can be guilty of putting an obvious searchlight on detail, no such criticism can be laid on the Reference DAC. Combined with its spaciousness is a lyrical, free-flowing nature. The sound remains easy on the ear while permitting forensic inspection of details buried in recordings. Later in Propaganda's album the edgy harshness of 'Dr Mabuse' was handled with aplomb by this DAC, making the sibilant 'spit' palatable while allowing sound effects, such as the Lene Lovich-esque bird noises, to float high above the mix.

Using a USB-to-S/PDIF converter between computer and the Reference DAC (in order to confirm functionality of the DAC's coaxial digital input at all sampling frequencies) I played a selection of hi-res tracks – familiar test pieces from the likes of Channel Classics and Reference Recordings – with complete success. There wasn't much in it, but going directly into the ARC's asynchronous USB input was slightly better. Dick Hyman's solo piano performance of 'Tain't So' ➔

## STREAMUNLIMITED

Based in Austria, StreamUnlimited Engineering GmbH offers a growing range of bespoke design services and off-the-peg AV solutions, including CD/DVD/Blu-ray loaders, Wi-Fi modules and streaming audio packages. Positioned between the chip producers at one end and consumer-facing manufacturers at the other, StreamUnlimited's various solutions allow traditional audio companies to graft the latest digital technologies into their products, avoiding the prohibitive cost of developing such innovative software and DSP from scratch. Musical Fidelity was first in bringing a StreamUnlimited solution to market with its CLiC media player [HFN Jun '11] while others, from Pro-Ject through to dCS, have implemented the technology in products spanning the affordable to the deeply esoteric. The latest version of the Stream700 'High End Audio Streaming Client' featuring UPnP/DLNA and Internet Radio access and powered by the BridgeCo DM860 chip is used here in the ARC Reference DAC. PM



## DIGITAL MEDIA PLAYER



**ABOVE:** Balanced (XLR) and single-ended (RCA) analogue outputs are joined by USB, three S/PDIF and one AES/EBU digital input plus wired (and wireless) ethernet hubs

from one of Reference Recording's 24-bit/176.4kHz 'HRx' releases entitled *Thinking About Bix* [RR-116] was marginally better focused and explicit without the D-to-D converter in the replay chain. The attack and decay of the piano was more sharply defined, while the space in which it had been recorded appeared better resolved. Either way, the sound was deliciously vibrant.

### DIRECT TO THE AMPLIFIER

An impression I'd gained of the Reference DAC, its apparent airiness and 'fresh' tonal palette, was reinforced when I simplified the replay chain by running it directly into an Audio Research power amp: the 120W VS115 employing the hybrid circuit favoured by the company for its non-Reference amplifiers. This is how the Reference DAC should really be used to hear it at its best, the transparency and sublime musicality of the preamp stage taken full advantage of when connected directly to a power amp.

The all-ARC combo delivered grip and fluidity without any traces of artificial snap or hardness, so while it sounded stellar with audiophile-quality recordings it was also surprisingly kind to standard fare. I had a revelatory experience playing a CD-ripped-to-FLAC of The Temptations' 'Papa Was A Rollin' Stone' from 1972's *All Directions* [Motown 530 155-2]. Norman Whitfield's dark, psychedelic blend of funk and rock was rendered with what appeared to be acres of undeveloped real estate between the musicians, the percussion reproduced with lifelike zing. As for the strings... well, no doubt students of the recorded arts could quote us the brand and model numbers of the microphones used at the sessions.

Experiencing the sound of the Temptations' classic anthem pushed into the Reference DAC's USB input and subsequently playing it again – this time streamed via the network – brought me down to earth with a bump. The image lost some focus, the bass blurred and stodgy ... the magic, the suspension of disbelief, all eroded. I've experienced similar disappointments when streaming with other network players, but as the Ref DAC's bar is otherwise set so high, the effect was more marked.

I question whether owners of high-end systems will want to compromise by using the on-board network client when the sound quality of the DAC and preamplifier is capable of such delightful results with data 'pushed in' from a CD transport or correctly configured computer playback setup.

As with many great tube preamplifiers, the Reference DAC managed to sound beautifully sweet and refreshingly honest at the same time. That it isn't too merciless with less than pristine recordings only adds to its seductive charms. ☺

### HI-FI NEWS VERDICT

A fabulous digital preamp with an 'analogue sound', the Reference DAC is an important addition to Audio Research's portfolio. Vinyl replay is a minority hobby after all, so for many enthusiasts a preamp for today's many digital sources is all that's required. Recordings pushed into the DAC's USB and S/PDIF inputs sound enchanting, providing an open listening window for audiophiles with high-end systems.

Sound Quality: 82%

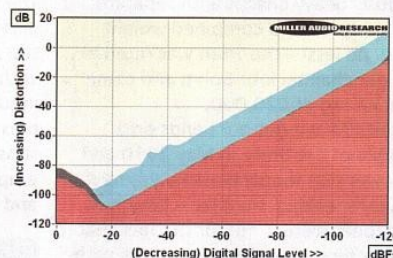


## LAB REPORT

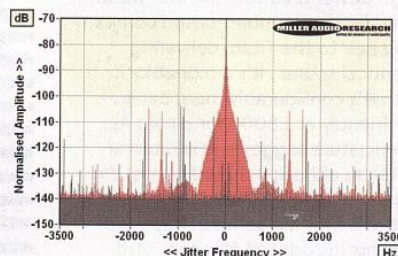
### AUDIO RESEARCH REF DAC

ARC's Reference DAC is not a story of two halves but a tale of three thirds – S/PDIF, USB and network streamed audio. All measurements were conducted at '77' on its 104-step volume, equivalent to 4.15V at 0dBfs via the balanced (XLR) output. Since our last ARC USB DAC [DSPre, *HFN* Aug '12] the company has upgraded its PC driver from v1.25 to v1.33 but the USB mode still follows the same linearity trend down to -90dBfs whereupon the signal is truncated, limiting resolution to about 15-bits. Otherwise the A-wtd S/N ratio is unaffected at 106dB and distortion, while slightly higher than via either S/PDIF or network, is more consistent with frequency at ~0.018% from 20Hz-20kHz at 0dBfs. Jitter is the lowest of all its inputs at a mere 40psec (all sample rates) although this is probably due to the J-test modulation pattern being truncated below -90dBfs.

Jitter via S/PDIF is more illustrative at 530psec [see Graph 2, below] while linearity is good to ±0.1dB over a 100dB range and distortion falls to as low as 0.0005% at -30dBfs through the midrange [black trace, Graph 1 below]. Incidentally, the sharp (standard) digital filter option yields responses of -0.3dB/20kHz (48kfs), -1.1dB/45kHz (96kfs) and -3.1dB/90kHz (192kfs), the slow filter -3.2dB/20kHz, -4.8dB/45kHz and -6.9dB/90kHz with minimal pre/post ringing in the time domain but poorer stopband rejection. The network connection is closer to S/PDIF than USB in calibre except for the 'cloud' of low-rate jitter which exceeds 4000psec at all sample rates and will impact its subjective performance. Readers may download full QC Suite test reports for the Reference DAC's S/PDIF, USB and network audio performance by navigating to [www.hifinews.co.uk](http://www.hifinews.co.uk) and clicking on the red 'download' button. PM



**ABOVE:** THD vs. 24-bit/48kHz digital signal level over a 120dB dynamic range. S/PDIF input (1kHz, red) and network audio (1kHz, black; 20kHz, blue)



**ABOVE:** 24-bit/48kHz jitter spectra. S/PDIF (black, 530psec) and via network (red, 4860psec)

### HI-FI NEWS SPECIFICATIONS

Maximum output level (Balanced)	4.15Vrms at 295-520ohm
A-wtd S/N ratio (S/PDIF / USB / network)	103.2dB / 105.9dB / 104.0dB
Distortion (1kHz, 0dBfs/-30dBfs)	0.0075% / 0.0005%
Dist. & Noise (20kHz, 0dBfs/-30dBfs)	0.0050% / 0.010%
Freq. resp. (20Hz-20kHz/45kHz/90kHz)	0dB to -0.27dB/-1.1dB/-3.1dB
Digital jitter (S/PDIF / USB / network)	530psec / 40psec / 4860psec
Res. @ -100dB (S/PDIF / USB / network)	±0.1dB / -25dB / ±0.5dB
Power consumption	120W (4W standby)
Dimensions (WHD)	480x178x394mm