EQUIPMENT REVIEW



Audio Research Corporation

DAC7 Digital to Analogue Converter

Back in the early 70s, when the audio world was on an OCD-Bend regarding ever-increasing power outputs from the new 'wonder child' that was high-voltage solid-state technology, American engineer William Z. Johnson bucked the trend and embarked on a quest to build the very best amplification under the Audio Research brand. He may have been labelled a 'retrograde'-or a renegade-by exclusively using what was then considered passé valve technology. The rest is history. Over the ensuing decades the words Audio Research have become synonymous with American high-end audio and the company is probably the single company most responsible for the subsequent-and on-going-revival of valve amplification.

Several 'classic' designs followed and the products' distinctive styling and purposeful look also set them apart from the competition. Of course the world has moved on since the company's early days and Audio Research Corporation (ARC) as it's now known, now manufactures both valve and solid state products, including this DAC7 digital to analogue converter (D/A or DAC).

The Equipment

The DAC7 has the typical 'ARC' look—the prominent *albeit* redundant rack-mount handles—with a faceplate available in the original and traditional silver or in black. A central cutout houses various status LEDs that inform the user of what's going on inside; power on, lock (digital data from CD player/transport), mute,

and phase invert. There are also LEDs to indicate input signal status.

'Round back, the DAC7's comprehensive set of inputs can be a 'hub' for a number of digital devices via a variety of connecting options. From left to right we have a USB-B type data input followed by S/PDIF coaxial via RCA and next to that, via BNC. XLR-type AES/EBU is also provided for and, finally, there's an optical S/PDIF via Toslink. At the other end of the rear panel are the analogue signal outputs in both RCA and balanced XLR electrical formats.

Unlike the majority of ARC products, the DAC7 is completely solid-state, with the fullybalanced design comprising a new direct-coupled FET output stage and seven stage-regulated multiple power supplies. Digital duties are the domain of a 24-bit/192kHz Burr-Brown device.

The supplied remote replicates all the controls on the front panel, obviously very handy for input switching, phase inversion and muting from the comfort of your listening chair. In addition, there's a set of buttons for direct playback control when using the USB input. Of course this USB input is catering for the growing number of audio enthusiasts using media servers and their computer hard drives to store music. Whether uncompressed music files or otherwise (FLAC, WAV, etc), stored music files can be played back in glorious non-jittered quality via the DAC7. So Audio Research has kept in mind 'traditionalists' wanting to reap the best from their optical discs (CDs, SACDs) and those *avant-garde* listeners who are moving on to what will no doubt be the future of music playback.

Sonically DiDACtic

Being in the 'traditionalist' camp at this stage—I am open to change but not optimally set-up for computer audio yet—I used Audio Research's entry-level player (the CD5) as a transport to supply all the 1s and 0s. I tried both the S/PDIF 75Ω RCA and the XLR AES/ EBU 110 Ω connections and, at least in my set-up, found that there was no difference between them sonically. And no matter what input I used, the DAC7 was ultra-quick to recognise and lock onto the data signal.

The DAC7's considerable strengths came to the fore pretty much at the outset. This is a DAC that is totally smooth and balanced throughout the frequency range but with a superbly-powerful bass. Having just used the word 'balanced' and then stating, 'superblypowerful bass', may sound like an oxymoron. Describing a product as 'totally balanced' may suggest to some that no frequency range should stand out over any one other. But the DAC7's bass register, outstanding as it is in terms of its power and quality, still beautifully blends in with the rest of the spectrum. It just provides an added foundation and sense of fullness to the presentation: It's speedy, too. Electric bass in particular has a bop and rhythmic groove-beat that is kind of addictive.

This lower frequency flow truly blends in and becomes an organic part of the complete

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The DAC7 is very good at creating illusions—reality facsimiles... all you need do is close your eyes and listen.



LAB REPORT

Readers interested in a full technical appraisal of the performance of the Audio Research Corporation DAC7 Digital to Analogue Converter should continue on and read the LABORATORY REPORT published on the following pages. Readers should note that the results mentioned in the report, tabulated in performance charts and/or displayed using graphs and/or photographs should be construed as applying only to the specific sample tested.

musical presentation. So in no way does it overwhelm the magnificent midrange. These are mids with a sense of mellifluousness that drags you into the music. And yet this slightly sweetened presentation that separates instrumental lines with scalpel precision is also harmonically-rich and detail-abundant. Play a first-rate production, such as Tori Amos' 'Boys for Pele', and her inflections and guttural sounds on Horses are there for the hearing, but never get in the way of the overall flow. Ditto for Tori's Bösendorfer Grand, magnificently captured in this recording, with the DAC7 resolving the beauty of its tone, along with every subtle nuance and the percussive hammer-on-string strikes. But once again all this resolution and micro-dynamic detail is presented in aid of the music: It's never intrusive or tiresome.

Recently departed Blues artist Chris Jones had a genre-suiting raspy voice, probably a consequence of his many years of smoking and drinking. In the sadly ironic *Thank You* (*R.J. Reynolds*) from his 'Roadhouses and Automobiles' album, the DAC7 placed Jones' voice up-front and forward of the speaker plane within a sonic image with body and presence. What's more, this DAC has its way—in a very delicate and airy manner—with any cymbal, triangle or indeed any musical information that stretches into the very highest frequencies your tweeter can reproduce. The DAC7 is very good at creating illusions—reality facsimiles... all you need do is close your eyes and listen.

And of course this illusion is once again reinforced by the large and sweeping soundstage the DAC7 is able to re-create within a fine-tuned system. The soundscape—depending on the recording—can stretch laterally to the outside of each speaker and similarly the semblance of stage depth can trick the listener into hearing music from way behind the speaker plane. Bang & Olufsen's superb release—in conjunction with Deutche Grammophon—of Beethoven's 'Goethe's Tragedy'

Very powerful bass

options

Smooth and resolving midrange

Comprehensive connection

Opus 84 is a great example of an orchestral recording which the DAC7 excels at re-creating. This, combined with the beautifully-delicate tonal qualities the DAC7 re-creates, is almost capable of placing the listener in the concert hall.

Conclusion

Audio Research's DAC7 is a comprehensivelyfeatured DAC with a host of hook-up options, including USB connectivity for computer- and server-stored music files. That takes care of both the present and the future. Sonically the DAC7 will revitalise your source material with its extended treble, its smooth and resolute midrange and its powerful bass register. When a venerable company such as Audio Research Corporation releases a new product, the industry and the competition prick up their ears. With the DAC7 in your system, you'll do the same. – V Edgar Kramer

Audio Research Corporation DAC7

Brand: Audio Research Model: DAC7 Category: DAC RRP: \$6,945 Warranty: Two Years Distributor: Kedcorp Pty Ltd Address: Unit 8,509–529 Parramatta Road Leichhardt, NSW 2040 T: (02) 9560 4855 F: (02) 9569 1085 E: sales@kedcorp.com.au W: www.kedcorp.com.au



Large (for a DAC)





Audio Research DAC7 Digital to Analogue Converter - Test Results		
Analogue Output	Result	Units/Comment
Output Voltage	2.5830/2.5589	volts (Left/Right)
Frequency Response:	+0.0/-0.7	dB (20Hz–20kHz)
Channel Separation:	118/119/84dB	16Hz/1kHz/20kHz
THD:	0.016%	@ 1kHz @ 0dBFS
Channel Balance:	0.08dB	@ 1kHz @ 0dBFS
S/N Ratio	102dB	A-weighted
De-Emphasis Error	0.01/0.01/0.48dB	(1kHz/4kHz/16kHz)
Linearity Error @ -60.00dB/-70.00dB	0.04/0.02	dB (Not Dithered)
Linearity Error @ –80.59dB/–85.24dB	0.13/0.19	dB (Not Dithered)
Linearity Error @ –89.46dB/–91.24dB	0.25/0.24	dB (Not Dithered)
Linearity Error @ –80.70dB/–90.31dB	0.06/0.29	dB (Dithered)
Power Consumption	8.44 watts	Average
Mains Voltage During Test	241–247 volts	Min–Max

Test Results

The output of the DAC7 was quite high at around 2.5 volts, which means there's ample voltage to drive even an insensitive power amplifier to its full rated output, but it's also high enough to mean that if you're doing any A–B comparisons with another DAC, or with the output of a CD player, you'll likely have to pad down the DAC7's output a little to ensure you're getting a fair comparison. (In other words, in order to match the output voltages perfectly, so you will be hearing exactly the same level when you switch from one component to the other.) As you can see from *Table 1*, the left and right channels weren't perfectly matched, but they were accurate to within 0.08dB at 1kHz, which is more than good enough.

Channel separation was excellent at all frequencies, as well as being far greater than you'll ever need, though you can see from the tabulated results that separation at high frequencies lags well behind separation at low frequencies, with the result of 118dB at 20kHz being fully 34dB better than the measured result at 20kHz of 84dB. Signal-to-noise ratio was measured at 102dB with A-weighting, which is more than satisfactory, though as you can see from the graphs, the noise floor is mostly more than 120dB down at higher frequencies.

The level of distortion at a recorded level of 0dB (1kHz) was higher than I'd have expected from a state-of-the-art DAC, though 'higher' is relative in this case, because a second harmonic at -90dB (0.031%) and a third at -74dB (0.019%) would be completely inaudible, particularly against some mains noise at around -88dB, which is visible as the peak at the extreme left of the graph. It appears that this might have been caused by the 0dB signal over-stressing the output stage, because *Graph* 2, which shows distortion with a -6dB signal shows the second harmonic level has dropped down to -100dB (0.001%) and the third harmonic down to -93dB (0.002%). Look also at the difference in the level of the noise floor between 0Hz and 4kHz for the two graphs. It would seem Audio Research is trying to extract the most performance based on the fact that in the real world, no commercial CDs are recorded with signal levels higher than around –10dB. And, indeed at this recorded level (*Graph 3*), performance is exemplary.

From there on, performance improves further, likely based on the supposition in the previous paragraph, with *Graph 4* (–20dB) being typical of performance at all levels down to –60dB, such that the only distortion components are second and third, and these are at levels of –112dB (0.0002%) and –115dB (0.0001%) respectively. At –60dB, the DAC7 seemed to have a slight issue with the undithered test signal, but since adding dither cleaned up the signal instantly, as you can see from the dithered/undithered graph pairs of *Graph 6 vs Graph 7*, and *Graph 8 vs Graph 9*. You can see that with dither, the only distortion component in the DAC7's output is a second harmonic at –120dB (0.0001%). The small peaks to the left of the test signal in all these graphs seem to be related to the Audio Research DAC7's power supply. In a perfect world they wouldn't be there, but they're more than 110dB down so you won't hear them at all.

Newport Test Labs tested linearity at the same time as distortion. The results are tabulated and you can see that there are barely any errors in correctly reproducing the exact recorded level, with the highest dithered error being only 0.29dB at –90.31dB and the highest undithered error being just 0.25dB at –89.46dB. In other words, excellent performance. The same was also the case with de-emphasis error, which was also vanishingly low at 0.01dB at 1kHz and 4kHz. The 0.481dB result at 16kHz is partly an effect of the DAC7's own frequency response rolling off slowly above 3.5kHz to be 0.7dB down at 20kHz, as you can see in *Graph 10*.

Both the impulse test and the square wave oscillogram show the typical time-reversed ringing of an oversampling digital filter. From the even shaping and the mirror-like reversal, it appears to be one of Burr-Brown's standard implementations. $-\sqrt{-}$ Steve Holding



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