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## World Premiere! The Dodson DA-218

Ultimate DAC?

Review By Wayne Donnelly



It seems most appropriate that my first contribution to the online resurrection of Ultimate Audio (one of my previous reviewing gigs) concerns the Dodson DA-218 DAC. Ralph Dodson is a gifted, experienced and quality-obsessed digital engineer who for a decade or so has been relentlessly pursuing the creation of the finest possible DAC. The DA-218 is his most ambitious processor to date, and it is an extremely impressive example of no-compromise design and construction.

In creating the DA-218, Ralph Dodson is throwing down the gauntlet to challenge the industry's rush to sell SACD and/or DVD-A as necessary developments to realize the full potential of digitally based audio. He asserts that Red Book (standard 44.1kHz) CDs properly reproduced -- i.e., through the DA-218--are sonically at least equivalent to the newer formats. Dodson regards top-quality analog sound as the real standard at which he has aimed the DA-218, and he feels that he has at the least come very close to matching that standard.

To give the reader a feel for the complexity of Ralph Dodson's no-holds-barred conception and accomplishment, the following section describes key innovations, parts choices and quality assurance methods applied in the DA-218. In redacting these descriptions from Dodson's web site white paper, I have tried to maintain a reasonably high-level viewpoint. Nonetheless, the non-technically-oriented reader may find this section heavy going. But relax--there's no quiz.

# Technical Features Of The Dodson DA-218

## Cryogenic Treatment

When dissimilar metals are joined, crystal boundaries form. Soldering a resistor to a PC board results in stress and crystal formation. Even before that stage, in the course of manufacturing and assembly thousands of solder joints and copper crystal boundaries form in the conductive copper layers of each PC board.

In the DA-218 processor, cryogenic treatment significantly reduces crystals formed in the copper strata of the PC board during manufacturing and assembly-related soldering. Ralph Dodson confirms that the benefits of cryogenic treatment are measurable as well as audible.

## State-of-the-Art Upsampling and Oversampling

All input digital signals -- 32, 44.1, 48 or 88.2 kHz--are upsampled to 96kHz using a very high accuracy algorithm that yields a signal-to-noise ratio of -117dB.

After the input signal is converted to a 96kHz sampling rate, the data go to an oversampling digital filter which oversamples up to a 768kHz (8 x 96kHz ) sampling rate and 24-bit word length before going to the D/A converters.

Input signal jitter is eliminated by first clocking the input signal into a storage memory, then re-clocking the stored input signal out of the memory using a master clock with an unprecedented +/-2 picoseconds of phase jitter. After re-clocking, balanced differential drivers send the low-to-no-jitter re-clocked signal to the 24-bit/96kHz DAC chips.

## Advanced Power Supply Design

Separate power supplies for the digital and analog sections store over 100,000µf of filter capacitance, enough for a small power amplifier. Custom capacitors made to Dodson Audio's specifications connect to 13 low-noise DC regulators, including multi-stage regulation for the critical analog stages. The resulting very low driving resistance and output noise prevent contamination in the analog circuits.

## Super-Wideband Analog Filters

The analog filters that follow the DACs are Frequency-Dependent Negative Resistor types with very flat frequency response. Because no audio signals pass through the active part of the filter, there is minimum distortion and phase shift. Those low values are crucial to sonic purity. The audio signal path is DC coupled from the DACs to the output connectors. A DC servo keeps the output DC voltage offset level to a low 0.005V, preventing sound degradation from DC offset biasing of DC-coupled power amplifiers and loudspeakers.

The analog filters' bandwidth after D/A conversion can therefore be increased because of the high 768kHz-sampled 24-bit data going to the DAC chips. The analog filters have a super-wide 100kHz bandwidth that allows more pure music to reach the listener's ears. These new 100kHz-wide analog filters have only +/-0.1 degrees of intrinsic phase shift, essential to reproducing a properly sized soundscape, precise instrument location and overall musical purity.

## Balanced-Signal Four-Layer Printed Circuit Boards

The four-layer PCBs support balanced signals throughout the processor. The balanced architecture reduces signal jitter and radiated digital noise. The PCBs feature the finest dielectrics and materials, which enable extremely low clock jitter. There is no sound-debasing nickel-plating in the connectors. The PCB connectors are silver-plated directly over a copper base metal and then gold-plated over the silver for lasting protection.

The PCBs easily accommodate upgrades. Key ICs are inserted into sockets, not soldered. Extra socket locations on both the digital and analog sections ensure upgradeability to future formats and D-to-A conversion processes.

## Bybee Quantum Purifiers

Bybee Quantum Purifiers connected to the AC input lines remove quantum (shot) noise from the incoming AC voltage. Removing quantum-level noise before the AC line voltage energizes the digital and analog power supplies reduces power supply output noise and the processor's analog noise floor, yielding improved dynamics and resolution.

## Non-Magnetic Shielding

Non-magnetic silver-copper shielding integrated into the DA-218 chassis and cover protects the power supplies and analog circuits from both RFI and EMI. Magnetic (steel) shielding located near analog circuits would degrade the sound. A Faraday shield surrounds the digital circuits to protect the analog circuits from radiated high-frequency digital noise.

## Vibration Damping

Special nonmagnetic damping plates on the chassis and cover damp any vibrations that could corrupt the sensitive analog circuits. Five custom isolating feet strategically positioned on the chassis bottom provide excellent protection from external vibration.

## Exhaustive Testing And Fine Tuning

The upsampling and oversampling board, left and right DAC modules, Bybee Quantum Purifiers, Faraday shielding, and left and right analog filters are all either hand-soldered or hand-adjusted and matched. Exclusive test software written for an Audio Precision Cascade tester is used to measure, adjust and verify the stringent processor test requirements. The Audio Precision tester is also used to test the processor's assembled motherboard prior to cryogenic processing. After cryogenic processing, the board is again tested to measure the cryogenically improved performance before final mechanical assembly.

The assembled DA-218 is burned in for 48 hours. After that, the Audio Precision Cascade and Dodson test programs are used to adjust and hand match the left and right DAC chips. Left vs. right channel phase is hand-adjusted to  $\pm 0.1$  degrees. The test programs include multi-tone tests that simultaneously generate 1/3-octave signals to stimulate the processor's digital inputs. Simultaneous 1/3-octave multi-signal testing provides a more accurate depiction of music for matching the left and right DACs and hand-adjusting the phase of the analog filters. This custom multi-tone testing software is much more accurate than standard single-frequency test programs.

## Ins And Outs



The appearance of the silver-toned faceplate is simple and elegant. Vertical channels divide it into three sections, with all control pushbuttons and LED indicators located in the center section. There are four Input Select buttons and one to invert electrical polarity (phase, if you prefer), all with corresponding LEDs. Three additional LEDs indicate DVD (this one is inactive, intended for future upgrades), De-emphasis (indicates that a pre-emphasized CD is being decoded), and LOCK (confirms the transport/DAC interface). The STANDBY button at the far right is in effect the POWER switch, as there is no separate mains switch. In standby mode, the outputs and digital circuits are turned off, while analog circuits remain powered up to avoid "cold start" sonic harshness.



The rear panel is equally simple: the IEC jack; one set each of RCA and XLR analog output jacks; digital inputs labeled COAX 1 (RCA), COAX 2 (BNC) and OPTICAL (Toslink). The optional AES/EBU (XLR) input, when installed, is controlled by the front-panel AUX button. It is worth noting that rapping on the enclosure results in dull thuds but no ringing-confirming the superior chassis damping of the DA-218.

## Review Conditions

When I contacted Ralph Dodson to request a review sample, he interrogated me to satisfy himself first that my system is of sufficient quality to do justice to the DA-218, and more particularly that I could match the DAC with a transport of suitable quality. Ralph's transport is Sony's original flagship SCD-1 SACD player, and he agreed that my Sony SCD-777ES-whose transport and circuitry are identical to the SCD-1 except for the absence of balanced analog outputs-would be fine.

Unfortunately the 777's transport logic went "walkabout" soon after the DA-218 arrived, so I sent it off to Sony for repair, and for several weeks transport duty passed to the much-modified Pioneer DV-434 that normally resides in the smaller upstairs system.

Perhaps because the modifications to the Pioneer include Bybee Quantum Purifiers on the DIGITAL OUT, the sonic differences between the two setups were surprisingly minor. The Sony did eventually return, and was reinstated as both the transport for the DA-218 and a worthy test of Ralph Dodson's assertion that the DA-218 sounds better playing standard CDs than a high-quality SACD player on an SACD of the same recording.

## Listening To The DA-218

The DA-218 sounded wonderful from the start. No need this time to endure weeks of break-in time before hearing the DAC at its best, because Ralph Dodson sent me his well seasoned demo processor which already had 300+ hours of playing time.

Moments into the first listening session, it was clear that the DA-218 plays in an altogether different league than the various digital playback sources I am accustomed to-with perhaps one exception. (More on that below.)

It should surprise no one that the DA-218 is a stellar performer on every audiophile criterion. The wideband frequency extension and seamless octave-to-octave balance are to these ears beyond reproach. Loud transients demonstrate explosive dynamic attacks and realistically sustained decays. The same is true at the micro end of the dynamic scale. For instance, on the splendid-sounding Reference Recordings CD of Leonard Bernstein's *Candide* Overture and Suite, the delicate cymbal strikes emerge more clearly and concretely from the complex orchestral texture than I recall having previously heard on CD, and their decay is now audible for nearly a second longer. The reverberation decay of the final fortissimo chord of the Overture is now likewise audibly of longer duration as it subsides into the noise floor.

The DA-218 delivers definite, if subtle, benefits in spatial resolution. The soundscape improvements have less to do with size *per se* than with distinctly more precise, dimensional and stable imaging. [NOTE: These observations reflect my perceptions of soundscaping prior to placing the Shakti Hallograph Soundfield Optimizers (reviewed in this issue) into the system. The Hallographs produce dramatic increases in every dimension of the soundscape.]

The previously mentioned Bernstein CD also contains his "Four Meditations from *Mass*." The third Meditation offers an ideal test of soundscape depth. It begins with the soft, insistent tapping of a drum, and develops from there with a closely mic'ed solo cello, joined first by a heart stopping percussion smash and then by a body of strings, with each element clearly at a different depth in the soundscape. The DA-218 distinguishes those layers more distinctly than I have ever heard, and renders the complicated harmonics with exceptional precision.

At the heart of the DA-218's sonic personality is its almost spooky tonal purity. Whatever is spinning in the transport, be it Alison Krauss + Union Station or Andrew Manze and the Academy of Ancient Music, the music seems to emerge out of infinite "blackness" and spring to life effortlessly. There is none of the subtle digital "edge"-the slight bleaching of harmonics that heretofore has almost always seemed to signal my subconscious that I am listening to a CD. This absolute purity and silent background

allow the DA-218 to resolve a stunning degree of low-level detail-again beyond my previous experience-bringing freshness to even the most familiar recordings. Among those details, it seems, are subtle timing cues. For instance, listening to the Eroica Quartet playing Robert Schumann's first string quartet, or Patricia Barber jamming instrumentally with her combo, I am not consciously aware of the hair-trigger interplay among the musicians, but hearing these and other favorite discs, I find myself being drawn ever deeper into the music.

## Face-Off: CD, SACD, And Vinyl

With the long-awaited return of my repaired Sony SACD player it was finally time to test Ralph Dodson's claim that the sound of the DA-218 yields nothing to SACD and little or nothing to LP.

The reader should know that my SCD-777ES is so extensively modified that Mama Sony herself might not know her child. Dan Wright of Modwright in Portland, Oregon has "thrown the kitchen sink" at it-multiple DACs, clock upgrade, numerous parts replacements and more--topped off by the addition of his custom-designed, independently powered tube output stage, which completely replaces Sony's stock analog circuitry. Dan's work has raised the performance of this machine above any SACD player I know. I emphasize this point so the reader will not mistakenly assume that my comments on this player are applicable to a stock SCD-777ES. Far from it! [An article on this and other Dan Wright modifications is in progress.]

The analog setup comprises a Basis 2800 vacuum turntable, Graham 2.2 arm and Transfiguration Temper moving-coil cartridge, playing through the Thor TA-3000 Mk.II tubed phono preamplifier -- also more than worthy competition for the DA-218.

This shootout, of course, demanded that the music be available on all three formats. I focused the comparisons on two very familiar titles from Patricia Barber: *Café Blue* and *Nightclub*. The 180-gram LPs were compared to both the original Premonition CDs and the Mobile Fidelity SACD/CD hybrid reissues.

Starting with the standard CDs, I was initially taken aback by how close -- virtually identical -- were the sounds of the DA-218 using the Sony as transport and the Sony as a stand-alone player. A few of my listening buddies and I, listening under double-blind conditions, gave up trying to distinguish them. After about a week, the DA-218 began to show a very small -- but now fairly consistently discernible -- degree of superiority, primarily in low-frequency extension and impact. After pondering this phenomenon, my guess is that the silver Bybee purifiers used to modify the Sony's DIGITAL OUT needed a few days to break in.

That first set of comparisons was facilitated by the remote control and precise level-matching features of the VTL 7.5 pre-amplifier (review in progress). Comparing SACD on the Sony with CD through the DA-218 was not as easy. When the Sony is playing an SACD the DIGITAL OUT is disabled. I could compare the digital formats only by playing first one and then the other.



The results of those comparisons varied. On "Autumn Leaves," SACD seemed to give Barber's smoky voice slightly more body and her piano an extra touch of richness compared to CD. But on her soaring vocalism at the end of "Too Rich for my Blood," the CD through the DA-218 sounded just a little more free and open compared to a slightly denser, almost darkish rendition from SACD. These somewhat inconclusive results continued throughout the two recordings. Let me emphasize that every comparison was extremely close, and the quality and degree of difference are hard to describe.

One observation deserves commentary, however. The difficult-to-distinguish comparisons described here were between the original single-layer CDs and the SACD layers of the hybrids. The CD layers of the hybrids were inferior to both the SACD layers and the single-layer CDs. I have heard two theories about this. One is that the necessity of reading through the SACD layer disrupts the laser just enough to cause some degradation of the CD layer's sound. The other -- what we may call the conspiracy theory -- holds that in order to promote SACD, the CD layers of hybrid discs are deliberately being made to sound worse. I'm damned if I know; does anyone out there have an explanation?

There remained the question of the DA-218 -- and SACD -- versus vinyl. To make a long story a little bit shorter, on these recordings at least, the analog playback almost invariably won out, but by surprisingly slight margins. These sessions were the first in my experience to demonstrate near parity between digital and analog. I think these were eminently fair comparisons, given that the aggregate prices of the two front ends were also very close.

## What Does It Mean?

I don't think there are many SACD players out there that equal the playback quality of my radically modified SCD-777ES. It is clear to me that Ralph Dodson's claim of parity with SACD cannot be dismissed-and I have no doubt that against most SACD players the DA-218 might well sound superior.

What about vinyl? For years now, from the time I was dragged reluctantly into the digital age, for any listening session likely to include both CDs and LPs my practice has been to play the CDs first and then go on to LP. That has avoided the letdowns frequently experienced in going from analog to digital. But these days I mix the two formats willy-nilly, just letting the music take me along. I can't give any digital component higher praise than that.

The DA-218 costs \$7,995 -- serious money, especially when one can get a pretty decent-sounding SACD player or DVD-A capable player for a few hundred bucks. But I am filled with admiration for the DA-218, for several reasons. First, it is phenomenal sound quality and the uncompromising execution of the design. In addition, the DA-218 already has enough processing power and parts upgradeability to accommodate high-bit-rate digital formats in the future. (Perhaps Ralph is waiting to see whether SACD or DVD-A emerges victorious from the current format war.) The DA-218 is so good that it really is like hearing your CDs as if the CDs themselves had magically been improved.

This writer has voted with his wallet. The damned thing is addictive, and I am really

getting a kick out of the sonic refurbishing of my CD collection. For the time being at least, I'm hanging on to the Sony for superb SACD playback and its excellence as a transport for the DA-218. If innovative design, flawless execution and virtually unprecedented performance turn you on as they do me, you should audition this wonderful machine.

## Specifications

Digital Inputs, Standard:

Coax 1: S/PDIF RCA input

Coax 2: S/PDIF BNC input

Optical: EIAJ Plastic Fiber Optic TosLink

Fourth Digital Input, Optional:

AUX: AES/EBU XLR input

Analog Outputs:

Single-ended RCA

Balanced XLR

Output Level: 2.3 Volts RMS single-ended

Frequency Response: 10Hz to 100kHz

Total Harmonic Distortion + Noise: .0008%

Output Impedance:

75 Ohms single-ended

150 Ohms balanced

Channel Separation: >120dB @ 1kHz

Signal Inverting: Digital Domain

Sampling Frequencies: 32, 44.1, 48, 88.2, 96 kHz (automatically selected)

Modularity/Upgradeability:

The upsampler module, microprocessor, digital filter and analog ICs are socketed to facilitate future format upgrades.

Power, International: 105/220 VAC, 50/60 Hz

Dimensions: 3 x 17 x 12 (HxWxD in inches)

Silver faceplate is standard.

Black faceplate is available by special order.

Weight: 18 lbs.



Warranty: 3 years, transferable

Price: \$7,995

## Company Information

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