

The Wadia 16 CD Player:

Extending the Digital Trail

by
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Article reprinted by permission of *Fi* Magazine
Publication Date: May 1996, Volume 1, Issue 4



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The first time I was ever favorably impressed by CD sound was hearing a Wadia 2000 DAC. (By the way, it's pronounced Wa-DEE-a.) At that point I'd heard early Sonys (ouch!) and a highly praised Meridian (better, but still no thanks). But the sound coming through that Wadia 2000 was way better than I'd thought CD was capable of sounding. Then I found out that the 2000 cost seven big ones—about like \$13-14K these days—so I went contentedly back to spinning LPs for another few years. Recently, I've heard a lot of good digital components. But when offered some of the latest Wadia gear to review, I remembered that first digital epiphany and jumped at the chance.

Off With Your Preamp!

The \$7,250 Wadia 16 is an integrated CD player with a high-resolution digital volume control. Although it works fine in a conventional system, the 16's digital-domain volume control and buffered low impedance output stage are designed for driving power amplifiers directly, eliminating the need for a Preamp. And with four digital inputs and four digital outputs (one each of Toslink, ST optical, SP/DIF and AES/EBU), the 16 offers a lot of digital flexibility, including the ability to accommodate just-emerging technologies such as digital radio and TV broadcasting.

"But wait a minute!" you cry. "What about turntables and tuners and tape decks?" Wadia has an answer for that: the Wadia 17 analog-to-digital converter, a compact component that accepts input from up to four analog sources, converts them into digital, and feeds the digital bitstreams to the 16 (or to other Wadia decoding computers). Wadia contends that using only a single analog gain stage and then handling all signals in the digital domain yields superior results by avoiding the noise and distortion elements present in even very high quality analog preamps. They point out that volume control topologies are not perfectly linear, nor are buffer stages perfectly noiseless and distortionless.

These are bold assertions, and I suspect they're counter-intuitive for most audiophiles—at least those of us who grew up with the LP as our primary source and have learned to regard the Preamp as the heart of the system. To

explore Wadia's claims, this review was originally intended to cover both the 16 and the 17 and to compare them with high quality conventional components. But because of some timing problems related to the departure of my old reference system and some delays in getting appropriate new gear, I haven't as yet been able to give the 17 the thorough workout necessary for a full review. So consider this part one of two, focusing on the 16; I'll cover the 17 in the near future.

Look 'n Feel

I confess I love the Wadia look. The 16 makes me think of the monolith from 2001: A Space Odyssey, with just a few LEDs, a cool blue display and a couple of buttons disturbing its elegant, satin-black, anodized skin. This 45 lb. hunk, with its integrated cones at each corner, exudes a sense of competence and understated authority.

That sense of competence extends to the transport. The 16 uses a Wadia-modified version of the TEAC VRDS (Vibration-free Rigid Disc-clamping System) mechanism, one of the most rugged and refined transport designs on the market. When you load a CD, you

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hear a quiet "clink" as the stabilizer clamp lowers and engages the disc. During play, disc wobble and laser light scatter are eliminated; the servo need only deal with the variable speed rotation of the disc. I attribute a good portion of the 16's fine performance to the excellence of the transport.

The only controls on the player itself are for drawer loading and play. The well laid out remote control allows you to select a digital source, control volume, and invert electrical phase, in addition to the usual transport functions. Red LEDs on the 16 indicate status and volume level. The 16 gives you 100 discrete .5dB volume increments; an LED lights at every 20 increments. In practice, it was easy to find the volume level I wanted. My one complaint about the remote, one that I've had with some other brands as well, is the sensor's narrow angle of acceptance, both vertically and horizontally. Loosen it up, guys.

Especially handy for a reviewer is the A/B button, which allows you to define a starting and stopping point for any passage, which then repeats continuously. I found this very useful when I was trying to lock in my impression of how the 16 handled different musical content. I also liked being able to invert phase from my listening seat. It's true, CDs are inconsistent in phase, in some cases even from track to track.

The Sound of the 16

The 16 sounded good out of the box, and continued to improve by small but noticeable degrees over about a six-week period. I used it to drive, to excellent effect, both the solid-state Carver Lightstar amp reviewed in the April Fi and the tubed VTL MB-600s, which metamorphosed into MB-750s with the installation of VTL's new Signature power transformers. For a brief interval early in the review period I had on hand the Spectral SDR 2000 Professional DAC reviewed in the March FI.

One question I wanted to explore was whether the digital volume control, which operates by truncating bits of data to reduce output level, would cause audible problems at mid-to-low levels. Wadia argues that their digital volume control provides a full 24 bits of math resolution, so that even the lowest volume setting delivers 15-16 bits of resolution, which they point out is higher than typically found even on high-quality CDs because of losses in digital editing and mastering. At more typical levels, Wadia says the 16's volume control yields 18 to 20-bit resolution, which exceeds the current CD standard. I can't argue with them; I was never able to identify any artifacts or

sonic deterioration attributable to the volume control.

The overall sonic performance of the 16 was impressive. In terms of absolute resolution, it fell slightly short of the \$8,995 Spectral SDR-2000, especially at the frequency extremes. The Spectral's bass is deeply extended and superbly defined in pitch and color; in the treble, its ease and air, coupled with its fine resolution of spatial information, are unsurpassed in my experience. Interestingly, the performance of the SDR-2000 improved when I fed it from the transport of the 16, surpassing the results I had earlier obtained with the CAL Delta and Theta Data Basic II transports.

Of course, the 16 wasn't yet fully run in when I had the Spectral available for comparison. Still, the 16 made it a horse race. In the bass, the 16 was excellent, if slightly short of the Spectral, in ultimate extension. I also detected a slight warmth, a touch of fullness in the bass of the 16, compared to the extremely precise

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and perhaps slightly lean low end of the SDR-2000. The highs from the 16 were again slightly warmer than from the Spectral, but I detected no loss of musical information. Let me emphasize that these differences were subtle—akin to the differences one might hear between two fine amps or preamps—and that in terms of listening pleasure, I found myself liking the 16 as much as the Spectral on many discs.

Listening pleasure, in fact, is the real appeal of the 16. The pages of *Fi* have been filled recently—partially by me, in my Spectral review and at the beginning of this one—with ruminations about coming to grips with digital sound. You

know the drill. It was awful; it's getting better; I'm getting used to it. Etc., etc. And really, that's been the path for many of us. Our use of the word "digital" has long carried with it a subtextual vocabulary: cold, hard, grainy, glary, shallow, fragmented...add your own favorites. And we love to praise analog, and especially vinyl, with words like warm, continuous, dimensional, etc.

Now, I treasure my 6,000 LPs, and I can't foresee a time when I won't want to listen to them. But I'd be a fool if I couldn't learn to take pleasure from well recorded CDs. For instance, as played by the St. Petersburg Philharmonic under Yuri Temirkanov, the quietly throbbing strings early in the 17th variation of Rachmaninoff's Rhapsody on a Theme of Paganini, [with Dmitri Alexeev, piano, on RCA Red Seal; this Tony Faulkner-recorded CD also contains a fabulous Symphonic Dances] are rendered by the 16 more delicately than I have ever heard them on any media. And the spacious hall acoustic and gorgeous cello sound of Yo Yo Ma in the Stephen Albert Cello Concerto [see my classical Best of '95 in the March issue] leave little room for complaint as delivered by the 16. These are, simply, musical pleasures of the first order.

Wadia makes a point of preserving time-based relationships in their decoding algorithms, and I think that emphasis, together with excellent transport performance, contributes materially to the musicality of the 16. Anyone who listens critically over time to a broad range of components becomes aware that there are real differences in how they reproduce pace and rhythm. It's one of the hardest to describe of all audio phenomena, but one of the most critical indices of sonic truth. The 16's presentation of pace and rhythm is lively and compelling; some of my body parts were practically always in motion in listening sessions.

As weeks went by, I found the 16 a highly satisfying musical companion on all kinds of CDs. Perhaps the best word to characterize the listening experience with the 16 is relaxed. Yes, if I furrowed my brow and determined to listen analytically, the 16 delivered plenty of food for thought. But most of the time I found that the 16, rather than spurring

me toward analyzing its sound, relaxed me into the music. Bill Peugh, the designer of the excellent Metaphor speakers, talks about how when the music is right the listener's shoulders will relax and droop; I spent many slack-shouldered

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hours in front of the 16. If I had to choose a set of adjective to describe the 16, I'd be inclined to draw from my above analog list rather than the digital one.

All this is not to say that the 16 is state of the art. There is better performance to be had, although in most cases at a higher price. (I can't help wondering how good Wadia's \$26K combo is, for instance.) But the 16 is good enough that when you're listening to it you don't think about what's missing or what could be better—you just enjoy the music. In my book that's success.

Summing Up, Part One

The Wadia 16 is a superb CD player, and based on my experience so far, certainly warrants consideration as the center of a CD-only system. (In fact, if you really plan to use just CDs, you may want to look at the \$5,250 Wadia 21, which also offers a digital volume control but omits the four digital inputs of the 16.) The 16 gave me excellent results with both solid-state and tube amplification, and with the fundamentally "right" musical balances I heard from the 16, I never felt the need for a Preamp in the chain.

These results are impressive enough to make me eager to complete the equation by testing the Wadia 17 A-to-D in conjunction with the 16. I'll be running some excellent analog sources through the 17, and comparing the results with some impressive and well known conventional systems. So stay tuned!

Richard Marsh: The Low-down on Digital Volume Controls

In his article on the Wadia 16, Wayne Donnelly mentions the fact that a digital volume control could possibly cause losses of information at lower volume levels (although the digitally-controlled Wadia did not seem to be doing this). Our technical editor, Richard Marsh explains why you might lose information with a digital volume control:

Bits, as they say, is bits, whether we are discussing bits used in a digital volume control or in a DAC or in a computer. In audio, bits of information or data may be used to represent a musical waveform. These bits form a "word" of a fixed length. For most CDs, the word length is 16 bits, which gives 65,536 (or 2 to the 16th power) possible numerical values to represent a music-signal.

Just as the number of decimal places on a digital voltmeter display indicates the resolution of the meter (e.g., a meter that reads a signal to two places, say 1.3 volts, has lower resolution than a meter that reads the same signal to four places, say 1.297 volts), the number of bits in our binary digitalization equipment determines resolution. A 20-bit word length would give a resolution of 1,048,576 (or 2 to the 20th power) possible values to represent the true analog value of a musical signal; 24 bits gives 16,777,216 possible values. Therefore, resolution (i.e., the number of bits in each digital word) determines the amount of error. The higher the resolution, the lower the error and distortion. The fewer the bits used to make up the data word, the less information the word contains, and

consequently the lower the resolution and therefore the cruder the approximation to the desired result.

Most of us remember that computer screens of ten years ago lacked the resolution we count on today. Pictures had a rough edge and details were missing, giving only a rough approximation of the real thing. This "fuzziness" was the visual result of having too few bits. Those distorted pictures on the computer monitor were the direct result of the low number of bits used in the data words holding the information we wanted to see. Early computer systems had 8 bits of data per word, then 16. Now they have 32 and 64 bits, and we all enjoy the visual effects of the increased detail and resolution.

Computations using data words and their bits occur in audio as they do in computers. In a fully digital implementation of a volume control, for example, bits are manipulated (mathematically) to effect an overall level change of the original data word representing the music signal. The volume control on the front panel causes location shifting of bits within the word. Some such schemes have the effect of reducing the number of bits in a data word when the "volume" is turned down. If there is enough bit space to start with, then losing some of the data bits that may get shifted out of the word will still leave reasonably good resolution. With the Wadia, the resolution at low-level volume setting is purported to be 15-16 bits, and that is better than many others that start with a shorter word size or number of bits.

Manufacturer's Information

Manufacturer:

Wadia Digital
624 Troy Street
River Falls, WI 54022
(715) 426-5900; fax (714) 426-5665

Designers: Wadia development team

Serial Number: 1046

Price: \$7,250.00

Warranty: One year for the Transport
Five years for All Other Parts

Digital Inputs: 4 (ST Optical, SP/DIF, AES/EBU, Toslink)

Digital Outputs: 4 (ST Optical, SP/DIF, AES/EBU, Toslink)

Analog Outputs: 1 balanced XLR, 1 unbalanced RCA

Dimensions (inches): 5.5T x 17W x 16D

Weight: 45 pounds

Wadia Digital: True Believers from the Heartland

We reviewers lead a cushy life. Last December I scored an expense-paid (by Fi) junket from temperate San Francisco to River Falls, Wisconsin, arriving just in time for an all-day blizzard followed by resolutely sub-zero temperatures. This one-stoplight farm-country town, about 30 miles east of St. Paul, is notable for a campus of the University of Wisconsin, as the summer training camp of the Kansas City Chiefs (not much there to warrant breaking training), and, for us audio buffs, as the home of Wadia Digital. Wadia's modest facility, located in a small industrial park, houses the business, R&D, manufacturing, and shipping; so I got a good overview of the whole operation.

Lousy weather notwithstanding, my time at Wadia was rewarding. I met a lot of interesting and very friendly people, and spent considerable time with key players including sales director Jim Shannon, head technologist Jim Kinne, and Steve Huntley, who manages customer service and manufacturing. I was impressed by the relaxed, collegial, and cooperative interaction among the Wadia people, and by their fervent belief in the Wadia approach to product design. A case in point: when I asked who was responsible for their products' striking industrial design, the answer was, "We all got together and kicked around some ideas."

A little history: Wadia was founded in 1988 by a core group of engineers from 3M. These folks had

been working in digital technologies for over two decades, in specialized fiber optics and telecommunications switching. Appalled, like many of us, by the sound of early CD players, they determined to apply to digital audio advanced concepts from fields such as medical imaging, microwave, sonar, and radar technologies. They focused particularly on developing custom decoding algorithms to recreate the time-based relationships essential to quality digital audio.

In building products, Wadia places strong emphasis on key design and engineering factors such as sophisticated circuit board design (the top products incorporate 6-layer boards), advanced power supply regulation, ground plane optimization, RFI rejection shielding, advanced surface-mount technology, and control of resonances and microphonics in chassis and boards. It's no wonder they call their DACs "Decoding Computers." These are seriously engineered products.

They're not afraid to swim against the tide, either. Several reviewers have noted high frequency roll-offs and elevated THD figures in Wadia products. Wadia's answer is that the brick wall digital filters used by most manufacturers eliminate not only upper harmonic distortion but also any information above the half sampling rate frequency. Wadia's approach is to optimize the digital filter for proper time and impulse response, which does result in a 2.5 dB roll-off at 20 kHz,

"as well as certain harmonic images which will appear as harmonic distortion in normal THD testing." Wadia argues that their filtering technique is superior to brick wall filters in reproducing harmonic, timbral, and timing elements in music.

Another Wadia priority is long-term customer and product support. The big buzz during my visit was an upgrade they had just announced for the older Wadia 2000 and 64.4 Decoding Computers. The upgrades, although not cheap at \$3690 to \$4490, are said to bring those products up to the level of the current flagship, the \$13,500 Wadia 9 Decoding Computer. If that's true, the upgrades are fairly priced.

This small but ambitious company has an impressively broad product line, ranging from the Wadia 12 DAC (\$1,500) up to the Wadia 9 and the Wadia 7 transport (\$12,500). And new things are on the way. Branching out into the burgeoning home theater market, Wadia is working on a high-end video line quadrupler, expected to be released this year (no price or date yet). And back on the audio side, I was shown various prototype chassis and boards for what has long been a gleam in the company's collective eye. Known internally as the PowerDAC, this product would integrate D-to-A conversion, system control functions, and (high) power amplification into a single package. There's no formal commitment to it yet, but keep your eyes peeled and ears open. Wadia is worth watching...and listening to.



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