



DIRECT DRIVE: THE WADIA 850 CD PLAYER

by
Robert Harley

Article reprinted by permission of FiMagazine
Publication Date: December, 1997
Volume 2, Issue 10



Fi: The Magazine of Music and Sound
is a component that should be added to every sound system.
Featuring the world's best writing on audio and music, Fi
brings readers more of what really matters. For subscription
information call (800) 779-HIFI (4434) or write to:
Fi: The Magazine of Music and Sound
P.O. Box 16747
North Hollywood, CA 91615-97644

In WADIA's worldview, the preamplifier is a relic of the past. With many of today's playback systems using digital sources exclusively, Wadia believes it makes sense to eliminate the preamplifier from the system and drive the power amplifier directly from the CD player. Of course, the CD player must have a volume control built into it—as do all Wadia's CD players and digital processors.

In my previous experience with Wadia's 27 digital processor, I found that this thinking made sense. Removing even a superb preamplifier like the Sonic Frontiers SFL-2 Mk. II from the signal path increased the system's transparency, immediacy, and timbral realism. After all, the best preamplifier is no preamplifier.

But there's a price to pay for this shorter signal path. In addition to the drawbacks of digital-domain volume control (see sidebar), connecting your CD player to your power amplifier introduces logistical problems. Although the CD player can adjust the playback volume, there is one preamplifier function the CD player can't emulate—analogue source selection. Playing analogue sources (LP, FM, tape) forces one of two situations: either you connect a traditional preamplifier to your power amplifier every time you switch from CD to LP, or digitize analogue sources so they can be input to the CD player for conversion back to analogue (the CD player must also have a digital input). For many listeners, constantly switching cables is unacceptable, and digitizing an LP source is anathema.

If your system has only one source, however, there's no question about the musical advantages of Wadia's approach. In addition, this simple approach eliminates the cost of a preamplifier and a pair of interconnects.

This fact struck me when I connected Wadia's new \$4950 model 850 CD player to my system. The single-chassis 850 replaced five boxes in my rack: an Audio Research Reference One preamp, Mark Levinson No 31.5 CD transport, Spectral SDR-2000 Pro digital processor (plus its outboard power supply), and a Genesis Digital Lens.

The 850 is a large, squarish back box weighing in at a whopping forty-two pounds. Much of this weight is due to its battle-ship-like chassis; the machined-metal remote is equally substantial. Balanced and unbalanced outputs are provided. The 850 may also be ordered with digital inputs (\$995) for decoding other digital sources, and with digital outputs (\$495). Wadia's next model up, the 860 CD player (\$7450), includes digital inputs and outputs, a better transport mechanism, and a bigger power supply.

A front-panel display shows the track number, time, etc., and the 850's output volume is indicated by numbers from 0 to 99. Volume is adjustable from either the front panel or remote control. The volume numbers represent the amount of attenuation (lowering of volume) in half-dB steps from the 850's maximum output level. Because the attenuation is preformed in the digital domain, the less attenuation (the higher the number in the display), the better the sound (see sidebar).

If you drive a power amplifier directly from the 850, you must set the 850's analogue gain to match your system by selecting one or more tiny switches inside the unit. If you have sensitive loudspeakers and an amplifier with a high input sensitivity (in other words, a power amplifier that doesn't need much signal to produce a high playback volume), the 850's output level can be reduced with no sonic penalty. The internal gain switches are correctly set when the volume display shows a fairly high number (75 or above). If low numbers are displayed, you're not realizing the musical performance the 850 is capable of.

I enjoyed the 850's functionality, remote control, ergonomics, and overall feel. (The remote control operates over a wider area than previous Wadia products, and the remote's polarity inversion and display-off controls were particularly useful.)

With the 850, Wadia has distilled the essential parts and design techniques of the acclaimed 27 Digital Decoding Computer and 7 Transport (\$20,950/pair) into a single, less costly unit. The player begins with a Teac/Esoteric transport mechanism, a better built, more costly alternative to the ubiquitous Phillips CD mechanisms. The Teac/Esoteric drive's design is unique because of just holding the CD at a tiny part in the center (the spindle), it clamps the entire disc. Teac calls its mechanism Vibration-free Rigid Disc System (VRDS) because it prevents the CD from vibrating as it is read by the playback laser beam. The VRDS mechanism used in the 850 is a less

The Pros and Cons of Digital Volume Control

Removing a traditional preamplifier from your system has undeniable sonic advantages. Indeed, one of the high-ends's fundamental tenets holds that the shorter and simpler the signal path, the purer the sound. But is this sonic advantage offset by the drawbacks of adjusting volume in the digital domain?

All digital volume controls perform mathematical calculation on the digital data representing the analogue audio signal. Although complex in practice, it's easy to understand in principle. Reducing the volume in the digital domain is accomplished by multiplying each sample by a number less than one. Let's take the example of decreasing the playback volume by 6 dB. Because 6 dB represents a halving of voltage, every sample is multiplied by 0.5. The samples encode a number that represents the original analogue waveform's amplitude at the time the sample was taken. By multiplying each sample by 0.5, the amplitude of the reconstructed analogue signal is reduced by half—or 6 dB.

But there's a price to pay for this digital slight-of-hand. Every 6 dB of attenuation reduction in volume) reduced the playback system's resolution by one bit. In other words, a 16-bit signal attenuated in the digital domain by 6 dB now has the resolution of a 15-bit signal. Lower the volume by 12 dB and you have the equivalent of a 14-bit source. Dynamic range is reduced, and the music signal gets closer to the digital noise floor. With fewer bits, low-level signals can become more coarse, particularly at high attenuation levels.

Wadia claims it has mitigated the disadvantages of digital domain volume

expensive version of the state-of-the-art assembly found in Wadia's \$12,500 transport.

WADIA's core technology is its proprietary digital filtering. In fact, the company was founded to make digital decoding products using the unique DigiMaster filter algorithm. Rather than buy an off-the-shelf filter, Wadia makes its own using Digital Signal Processing chips, which execute the necessary instructions (the "software") to filter the signal.

Although the 850 claims to use a "32-x oversampling" digital filter, it's not as clear-cut as that. The 850's filter runs at 16-x oversampling, unlike off-the-shelf digital filter. Wadia also employs a trick to increase the effective oversampling rate. The 8-x sampled output from the DSP is put through a chip (a gate array) that performs an additional 2-x oversampling. Wadia then splits the single data-stream into two identical datastreams,

disadvantages of digital domain volume control by starting out with a 21-bit signal (created from the CD's 16 bits in the digital filter). Losing a little resolution from 21 bits is an acceptable situation, Wadia believes. Second, every Wadia product with digital domain volume control provides variable analog output level via switches inside the unit. Setting these switches gets the CD player's analog output level in the ballpark so that very little digital domain attenuation is required. Third, Wadia contends that the slight degradation imposed by the digital volume control is vastly less than the effect of an analog preamplifier and a pair of interconnects.

As you read in the above review of the 850 CD player, Wadia appears to have minimized the problems of digital domain volume control while maximizing its benefits.

delaying one of them. When each data-stream is converted to an analog signal (with its own DAC), the result is an effective increase in the oversampling rate by 2-x. It's as though the DACs are staggered in time. With 16-x oversampling performed in the digital filter, and 2-x "oversampling" accomplished in the transversal DAC arrangement, the 850 can claim 32-x oversampling.

This technique also provides a truly balanced architecture. That is, each phase of the balanced signal is covered to analog with separate DACs. This is better than simply putting an extra op-amp in the analog output stage to create a balanced signal. Consequently, the 850's balanced outputs should offer a sonic improvement over the unbalanced jacks.

The DACs are Burr-Brown PCM-1702s, a 20-bit device used in many of today's CD players and digital processors. The 850 uses four 1702s (two per channel). The current-to-voltage converters are Burr-Brown OPA 604s, and the output buffer is the Burr-Brown BUF 634. These are the same DACs and op-amps used in the \$8450 Wadia 27 processor.

Now let's see if the 850's impressive looks and design deliver in the listening room.

Driving the 850 directly into Audio Research's Reference 600 power amps produced a sonic presentation similar to that of the Wadia 27. The music had a startlingly vibrant immediacy and life. Oddly, the 850 shared some similarities with single-ended triode amplifiers, particularly the directness of communication and palpable timbres that come so easily to SE triode amps.

This impression was fostered in part by the 850's uncanny ability to infuse musical textures with a sense of realism. Reproduced music in general (and digitally-reproduced music in particular) suffers from a reduction in harmonic accuracy that makes us aware we're listening to a recreation rather than the original event. Subtle cues that tell us how the instrument produced the sound get lost in the recording/reproduction chain. When a playback system gets this essential aspect of music right, the listener is rewarded with a more involving experience. That's one reason I enjoyed the 850 so much.

The 850's "truth in timbre" was more apparent in the bass and lower mids than the upper mids and treble. In fact, the 850's reproduction of low-frequency-rich instruments was astounding. Edgar Myer's fabulous acoustic bass playing on Skip, Hop & Wobble [Sugar Hill SH-CD-3817] highlighted one of the 850's great strengths—wonderful weight and power through the bass, which gave a sense of the instrument's size and body.

This quality was also an advantage on orchestral music. The 850's bass warmth (without bloat) and resolution provided a sense of solidity and power. Orchestral climaxes were rendered with great "oomph," rather than sounding thin or anemic. The tremendous bass weight and dynamics of Holidays and Epiphanies, The Music of Ron Nelson [Reference Recording] was also well served by the 850.

Higher frequencies were still superb but lacked the purity and clarity of the Spectral SDR-2000 Pro processor driven by the Mark Levinson No 31.5 transport (a \$17,490 combination). The Spectral/Levinson combo was more transparent, had a cleaner and more extended treble, and better resolved midrange and treble detail. By contrast, the 850 had a slightly darker and more subdued character. But at three-and-a-half times the 850's price, you'd expect better performance from these state-of-the-art contenders.

The 850's overall spatial perspective was just right for my taste: present and immediate without sounding forward or forced. Instruments and vocals were placed slightly behind the loudspeaker plane, with breathing room between me and the music. This

perspective was more distant than the somewhat forward sounding Proceed CDP or even the Spectral/Levinson combination. If the Proceed put me in Row E, the 850 put me Row M.

Soundstage depth, and the ability to resolve its finer gradations, was excellent by any measure. A good example is Paul McCandless' oboe on the Oregon album Beyond Words [Chesky]. The Wadia accurately placed the oboe within the large acoustic and surrounded it with air and instrumental bloom. The oboe's decay not only hung in the air longer, but the instrument seemed to let go of notes less abruptly than it did through the Proceed player. Consequently, I could hear deeply into the recorded acoustic through the 850. This player is the antithesis of flat, synthetic-sounding machines.


Compared to either the Proceed CDP or Spectral/Levinson combination, the Wadia had less treble energy and detail, giving the musical presentation a gentler rendering. The CDP sounded more detailed and lively than the 850, but at the expense of sounding slightly etched, while the Spectral/Levinson combo has tons of detail without sounding at all etched. These differences were highlighted on JVC's stunning XRCD (Extended Resolution Compact Disc) of Doug McLeod's Come to Find. The sounds of fingers moving down the guitar neck was highlighted by the PCD and downplayed by the 850. My experience suggests that reality is somewhere in the middle.

Similarly, the 850's top octave sounded less airy and extended than many digital front-ends. The DigiMaster software running the filter produces perfect time-domain behavior at the expense of a nearly 3 dB roll-off at 22.05 kHz (-2dB at 20 kHz). I don't know if I was hearing this roll-off, or if the 850's character was such that the extreme treble sounded slightly closed in. This wasn't a significant liability, however, considering the 850's smooth overall tonal balance and wonderful sense of ease.

The 850's lack of HDCD decoding made HDCD-encoded recordings sound less big spatially, with reduced detail and narrower dynamic contrast compared with the HDCD-equipped Proceed PCD. With conventional CDs, the 850's dynamics, on both a micro and macro scale, were excellent.

Going beyond all this dissection of the sound, the Wadia 850 made music in my listening room with a top-to-bottom tonal rightness that was immensely rewarding. I spent many enjoyable hours with the 850.

Wadia's 850 exemplifies why today's CD players offer so much bang for the buck. By combining in one chassis a high-quality transport mechanism with many of the circuit refinements found in it's 27 processor, Wadia has created a fabulous sounding digital front-end that's hard to beat at the price. Although \$4950 is a lot of money for a CD player by any standard, this level of musical performance cost at least \$10,000 just two years ago. Moreover, the 850's beautiful construction is classic Wadia. While the 850 didn't have the transparency or resolution of Wadia's \$20,950 separates, this \$4950 CD player came a lot closer than one might imagine from the huge price difference.

I would have enthusiastically recommended the Wadia 850 even if I had to couple it to a preamplifier. But its ability to drive a power amplifier directly makes the 850 an outright steal. The 850 will not only sound it's best in this mode, it will save you the price of a line-stage preamplifier. Think of all the music you could buy with the savings. 

MANUFACTURER: WADIA

DESIGNER
Wadia Design Team

SPECIFICATIONS

Price: \$4950

Dimensions: 17" W x 7" H x 16" D

Weight: 42 lb. net, 49 lb. shipping

Output impedance: Less than 15 ohms

FI NUTS 'N' BOLTS

Type: Drawer-loading, single disc, solid-state CD player

Features: Variable-level analog output, switchable polarity inversion, mute switch (all available on remote control)

HDCD decoding?: No

Outputs: Balanced and single-ended analog (digital inputs and outputs optional)

Conversion: Four 20-bit ladder DACs per channel

Filter: Custom 8-x oversampling running DigiMaster algorithm, increased to 32-x oversampling in hardware

Build Quality: Outstanding

Overall Convenience of Use: Excellent
Compatibility: Smooth treble highly tolerant of bright amplifiers and loud speakers
Incompatibility: None

SYSTEM

Preamplifier: Audio Research Reference One line stage
(used for comparison auditioning only)
Power Amplifiers: Audio Research Reference 600
Loudspeakers: Genesis 200
Cable: MIT Reference 850
Interconnects: MIT MI-350, AudioQuest Diamond

ACCESSORIES

MIT Z-Stabilizer, MIT Z-Center, MIT Z-ISO HC, MIT Z-Cord II, Billy Bags 5500 equipment rack, ASC Tower Stouts and Tower Slims

[company](#) | [products](#) | [technology](#) | [news](#) | [dealers](#) | [support](#) | [library](#) | [links](#) |

[product registration](#)

| [contact us](#)