Guide to Wadia Technology

Use the chart below to compare the technology of the Wadia products. Descriptions of each technical element can be found by following the links in the chart.

Table of Contents	series 3	series 5 and 7	series 9	Transports
Digital Filter System	DigiMaster™ 3.1	DigiMaster™ 2.1	DigiMaster™ 1.3	N/A
Direct-Connect™ with Digital Volume Control	Yes	Yes	Yes	N/A
Adjustable Maximum Output Level	Yes	Yes	Yes	N/A
Swift Current	Yes	Yes	Yes	N/A
Modular Architechure	Yes	Yes	Yes	Yes
Modular Rear Panel	Yes	Yes	Yes	Yes
ClockLink™ Jitter Reduction	Yes	Yes	Yes	Yes
NoiseBlock™ Analog Circuit	Yes	Yes	Yes	N/A
Resolution-Matched™ Digital and Analog Stages	Yes	Yes	Yes	N/A
Digital Input	Optional	Yes	Yes	N/A
Digital Output	Yes	Yes	No	Yes
Configurable Digital Outputs	No	Yes	Yes	N/A
RockLock™ Inputs	No	Yes	Yes	N/A
Sleeping Inputs™	Yes	Yes	Yes	N/A
Ferrite RFI Noise Filtering	Yes	Yes	Yes	Yes
Schaffner AC Filter	Yes	Yes	Yes	Yes
Power Supply Transformer	Single Toroid	Dual Toroids	Dual Toroids	Single Toroid
Power Transformer Isolation Sub-Enclosure	No	Yes	Yes	Yes
Transport Mechanism	Phillips VAE 1250	Wadia Hybrid	N/A	Wadia Hybrid
Digital Servo Control	Yes	Yes	N/A	Yes
Separate Servo Power Supply	Yes	Yes	N/A	Yes
Volume Control Display	LED	Alpha-Numeric	Alpha-Numeric	Alpha-Numeric
Balance Control	No	Yes	Yes	N/A
Remote Control	Plastic	Plastic/ metal remote optional	Machined Aluminum	Machined Aluminum
Chassis Construction	Hybrid	Monolithic	Monolithic	Monolithic

NoiseBlock™ Output Stage

One of the difficult challenges faced by all CD player designers is that digital circuitry creates high-frequency noise. If this noise is allowed to contaminate the audio signal, it can degrade musical performance. NoiseBlock is a proprietary Wadia design technique that effectively prevents high-frequency digital noise from contaminating the audio outputs.

The Compact Disc format only produces musical information up to 22.05 KHz. Yet most CD players have output stages which reproduce high-frequency signals and noise up to hundreds of KHz or higher. Although it is critical that the analog circuit preserves all information up to the upper limit of the CD format, it is unnecessary to reproduce frequencies far beyond this range. In fact, circuits that do serve only to pass noise from the digital circuit on to the analog signal. This noise can cause amplifier input-stages and many loudspeakers to produce distortions that are clearly audible in the form of hazy, grainy coloration.

Some designers believe that ultra-wide bandwidth analog output stages are required to ensure that high-frequency detail is preserved. However, extensive listening and research, including a deep exploration into the relationship between wide bandwidth and the use of negative feedback, have shown that wide bandwidth is not necessary for excellent sound quality. In many cases, wide bandwidth circuits cause more harm than good by allowing high-frequency noise to pass through to the amplifier.

Wadia's NoiseBlock analog stage starts with a high-speed analog circuit with extremely wide bandwidth. During listening tests, Wadia engineers gradually limited the high-frequency limit of this circuit. Each increment brought a noticeable improvement in sound quality. As the upper frequency limit was reduced, there was no discernable loss of high-frequency information. Instead, there was an increased clarity and purity in the upper musical ranges, owing to a reduction of high-frequency noise being passed into the amplifier.

Over a period of many hours of listening on a wide variety of music, equipment, and listening environments, it became obvious that there was a threshold such that if the response was limited below this point there was a noticeable loss of high-frequency musical detail. The NoiseBlock circuit was set to limit noise at a sufficiently higher frequency than this threshold, ensuring complete transfer of all high-frequency detail.

It is not possible to discern the effect of NoiseBlock circuit using conventional measurement techniques, since NoiseBlock only affects signals far above the upper limit of the CD format. It is easy to notice the improvement in sound quality of the NoiseBlock circuitry, described by listeners as a more natural portrayal of high-frequency information. Massed violins, for example, have the appropriate degree of texture, clarity, and body. Triangles and cymbals have a clear, metallic character, without grit or haze. Percussive sounds and transients are reproduced with a balance of leading edge and decay. The overall character of the upper ranges is significantly more relaxed, while simultaneously being more detailed.

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Resolution-Matched™ Digital and Analog Stages
The Wadia 3 and 5 series disc players feature Resolution-Matched digital and analog stages to eliminate the sonic degradation from correlated digital noise.

All audio components produce residual low-level noise, called a "noise floor". Even though this noise is not audible under normal listening conditions, the character of the noise floor has a large affect on sound quality. For example, un-correlated noise, such as pure "white" noise, has a comparatively pleasing effect on sound quality, whereas correlated noise, as produced by digital circuitry, can create distracting distortions and unnatural sonic character.

Noise in a CD player has two sources: the digital circuitry and the analog circuitry. In the pursuit of ever-quieter analog circuitry, Wadia engineers discovered an interesting phenomenon. As soon as the resolution of the analog circuitry exceeds that of the digital circuitry (e.g. the analog noise floor is lower than the digital noise floor), the sound quality is compromised. Like looking through a clear window at a blurry image, the analog circuit can reveal the limitations of the digital circuitry.

To overcome this, Wadia engineers used a new approach in designing digital-to-analog circuitry. They began by designing the highest resolution digital stage possible, in this case true 21-bit digital resolution, ensuring that maximum information is extracted from the CD. Next, Wadia engineers designed an analog circuit that has adjustable resolution level. Through both listening and measurement, it was possible to match the resolution level of the analog circuit so that the noise floor is slightly higher than the digital resolution limit.

With this Resolution-Matched analog and digital circuitry, the high-resolution digital stage extracts maximum detail from the CD, while the noise floor is dominated by sonically pleasing un-correlated analog noise. The sonic result is a perfect balance between retrieval of subtle musical information and natural musical sweetness.

Digital Inputs and Outputs
The Wadia Disc Players include digital inputs and outputs as standard equipment. The Wadia 3 series CD Player includes a digital output and can be equipped with optional digital inputs and at the time of purchase, or as an upgrade later. These digital inputs and outputs include several innovative features:

1. Configurable Digital Outputs
   The digital outputs on the Wadia 5 series players can be configured as either tape monitor outputs (playing the input that is selected) or CD player outputs (playing the CD transport, no matter what input is selected). In addition, unused outputs can be disabled, reducing noise and resulting in a noticeable improvement in sound.

2. RockLok™ Digital Inputs
   The Wadia 5 series player uses Wadia's RockLok technology to reduce jitter on sources fed via the digital inputs. The RockLok circuitry is located close to the DAC chips on the main board for best performance.

3. Sleeping Inputs™
   When any input is not being used, the input circuitry and the associated power supply are disconnected. This reduces digital noise and improves sound quality.

Power Supply Noise Reduction

With digital and analog circuitry in such close proximity, CD players are ripe with opportunities for digital noise to contaminate analog music signals. Over the past ten years, Wadia has developed many techniques for reducing this contamination. In these new CD players, great strides were made in blocking one of the most insidious routes for noise contamination – through the power supply.

1. Ferrite Filtering

   Through careful listening tests and measurements, Wadia engineers were able to track the progression of noise through the unit. Carefully applying ferrite filters in key locations provided a dramatic reduction of noise. Ferrites are particularly useful at preventing high-frequency noise from escaping from noisy circuitry, such as fluorescent displays and microprocessors.

2. Schaffner AC Filter

   This costly, high-quality AC input filter serves two purposes. First, it helps prevent high-frequency noise from the AC line from entering the CD player chassis. In addition, this filter prevents noise from the digital circuitry inside the CD player from being transmitted, via the AC power cable, into other sensitive audio components, such as the power amplifier.

3. Dual Transformers

   One transformer powers the CD transport mechanism and servo controller; one drives the digital-to-analog circuitry. This separation reduces the chance for digital noise to pass to the analog circuits.

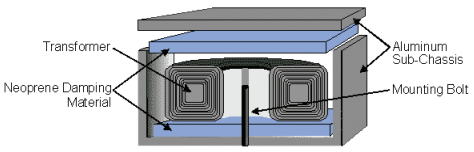
Power Transformer Sub-Enclosure

Transformer positioning is a difficult design choice filled with potential for compromise. Positioning the transformer within the main chassis allows for low-impedance, rapid delivery of instantaneous current to the circuits. Transformers, however, produce mechanical vibrations and stray fields that affect the performance of delicate circuitry nearby. In addition, transformer vibration can create objectionable noise in a quiet listening room.

Wadia engineers developed an elegant solution to this conundrum - the internal transformer sub-enclosure. This approach allows the transformer to be mounted close to the circuitry for instantaneous power delivery, but protects internal circuitry from interference.

The transformer sub-enclosure is constructed from machined aluminum plates. Affixed to the top and bottom surface are closed-cell neoprene damping sheets. This material combines excellent damping and thermal stability. A bolt, mounted to the bottom of the sub-enclosure, holds the transformer in position. However, the transformer is not connected to this bolt - it is effectively floating in place, clamped in position by the neoprene damping material.

This arrangement completely isolates the transformer. It absorbs vibration, prevents unwanted mechanical noise, and shields all other circuitry from stray electric fields caused by the transformer.



Power Transformer Isolation Sub-enclosure allows transformer to be mounted inside main chassis for instant power delivery, but shields transformer to prevent interference.

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Separate Servo Power Supply
Wadia's extensive listening tests reveal that the quality of the transport servo-control power supply directly affects sonic performance. Wadia products use a large, carefully pre-regulated power supply with substantial filter capacitance.

Alphanumeric Display
The Wadia products use an 80 or more character fluorescent alphanumeric display that allows for greater flexibility and more detailed display information:

1. Software Upgrades
   Because the microprocessor program controls display information, new features can be displayed with simple software upgrades.

2. Balance Control
   The right/left channel balance can be controlled and displayed in increments of one-tenth of a dB.

3. Status Information
   The display indicates which input is being used, whether the phase is normal or inverted, sampling rate, emphasis, and whether ClockLink is engaged.

Chassis Construction
All Wadia products are built using Wadia's trademark monolithic machined aluminum construction. This produces a chassis that offers remarkable mechanical stability, protecting sensitive electronics from vibrations that can adversely affect performance. In addition, this chassis functions as a highly effective shield against radio frequency interference. Last but not least, this design makes an aesthetic statement that has been lauded around the world for combining beauty, craftsmanship, and unparalleled finish quality.

Remote Control
The metal remote control is machined from a solid billet of aluminum, using a carefully designed shape that fits comfortably into one's hand.

The Wadia 3 and 5 series standard remote control is made of high-density plastic, and shaped in an ergonomically friendly full featured design. The machined aluminum remote is available as an option.