

NEXT-GEN Digital



Baetis Audio Revolution II Media Computer

Empiricism Wins the Day

Andrew Quint

The Baetis Audio Revolution II Media Computer is a remarkably versatile piece of gear that will play pretty much any digital file you throw at it, and play it well. It's designed and built to the highest audiophile standards and appears to be as future-proof as any digital AV component can be. That the Revolution II achieves this level of performance is impressive. That it does so for \$3000 is astounding.

Computer audio is the new frontier of the high end, and Baetis Audio is found in Livingston, Montana, a town of 7000 on the banks of the Yellowstone River and a prime destination for fly fishermen. Not too long ago, this *was* the actual American frontier. The founder and front man for Baetis is John Mingo. His fewer-than-ten coworkers, in addition to his wife, Suzanne, and his business partner, Darren Cunningham, include a talented local machinist and the “gunsmith by trade” who designed the company's proprietary BNC connection. Mingo will tell you frankly that he has little in the way of qualifications to be producing a leading-edge audio component. Though an audiophile for decades, the man has no background in either electrical engineering or computer science. John Mingo is a Ph.D. economist who labored for decades in the Washington, D.C., environs as an expert on the Federal Reserve and, above all, an empiricist. That is, he believes that knowledge comes from experience, from trying things out. “You start with a theory, then you look at the data,” Mingo told me in one of a series of phone conversations. “In the case of computer audio, there are instances where the ‘wisdom’ is widely perceived as being correct and yet, empirically, it doesn't work out that way.”

In the thoroughly dysfunctional computer-audio community, an uneasy admixture of DIY types, established companies trying to stay relevant, start-ups with a good idea or two and lots of ambition, and consumers (audiophile and otherwise), conventional wisdom reigns. In two design areas in particular there are truths that are not to be questioned. One is that the USB interface is the best interface for computer-audio applications. The other is that a fan in a music server is anathema because an unacceptable noise level is unavoidable. Not so fast, says empiricist John Mingo.

Mingo, of course, had to learn about building complex AV devices somewhere and acknowledges three mentors. The first is

Chris Connaker, the founder of the influential Computer Audiophile Web site; the other two are Adam and Ben Lye, the principals of Assassin HTPC, a company that builds computers for home-theater applications. Mingo ran Assassin's audiophile division and helped develop an audio computer that was “the best I had heard.” But the Lye's business model wasn't in line with Mingo's thinking about a heavy investment in time and money to achieve refinements of the design, so he broke off and started Baetis in late 2011. The first product was introduced the following year.

The Revolution II is a compact component (9.5" W x 4.25" H x 10" D) that manifests an obvious audiophile sensibility. The quality of key parts—the Intel Core i3 third-generation Ivy Bridge CPU, the H77 motherboard, the 128GB internal solid-state drive that holds the Windows operating system, the installed DDR3 RAM—is very high, often chosen after exhaustive comparative listening. Numerous smaller touches inside the case are notable as well—for example, the use of an “EMI-reduction material” to protect the unit's inputs and outputs. What's not in the box is also telling. The power supply is external, to minimize EMI (it ain't no wall-wart, believe me), and there's an option for a LiFePO4 battery-based PSU employing Neutrik PowerCON connectors. All data storage is also external. Baetis provides a compact 2TB Western Digital hard drive to get you started, but there are a total of eight USB inputs, half of them USB3.0, to allow considerable expansion of a music/video library plus, of course, the potential for NAS. You get no DAC for your investment. Baetis recognizes that the inside of a computer enclosure is no place for one to live, and understands that audiophiles will have their own ideas when it comes to what their ideal DAC or processor should be. In addition to those eight USB ports, the Revolution II's connectivity includes two Ethernet inputs, two HDMI outputs, antennae connections for Wi-Fi (the antennae are included), a DVI video port, a TosLink SPDIF output, and the Baetis proprietary SPDIF output, about which there is much to say.

The standard attitude regarding digital output from a computer is that USB is the best option sonically. But the reasoning for that conclusion, according to John Mingo, is pretty circuitous. “It's hard to find a laptop that actually has a SPDIF output. You literally have



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no choice other than a piece-of-crap TosLink or USB output. With Macs, there never was a choice—it's USB and FireWire. For most computers, USB is the best output. But not for the best-designed computers." What's wrong with USB? Even the latest USB outputs, those with galvanic isolation and anti-jitter circuitry, are far more complex and prone to EMI than the Baetis solution, which is to take a dedicated SPDIF signal directly off the motherboard. That signal follows an "ultra-short path" (USP)—under three inches—from the motherboard to a proprietary BNC output. (Some audiophiles, no doubt, will be put off by Mingo's choice of a BNC connector. Originally designed for military applications, it was picked for its physical and electrical stability. No worry: If your DAC or AV controller doesn't sport a BNC input—as do the Berkeley DACs Baetis favors as a reference—you can employ BNC-to-RCA adapters as necessary without losing sleep. Quite a bit of precision soldering with a Japanese silver solder is required to create the USP, but the result is less EMI which, potentially, translates into better sound. Mingo's inevitable mantra: "We believe in USP, not USB."

Mingo's other practice is to employ fans in his products. Video processing in particular—and that includes the playback of a rising category in music software, the music-only Blu-ray Disc—generates a lot of heat which can impact the performance of electronic devices, especially their longevity. But conventional wisdom again rears its ugly head. "All the do-it-yourself designs specify it must be fanless. If you've ever tried to use the fan that comes with any Intel

CPU, you will understand why it should be fanless. Those fans have a market value of six or seven dollars and are so noisy they make it impossible to listen to music if you are any closer than 20 feet away from the computer." Mingo acquired a professional-grade digital SPL meter and started measuring everything he could. "The first thing we discovered is that the fanless computers weren't completely quiet. If you're getting rid of heat inside the computer by moving it out to the fins or the surface, that is moving air. Without a fan, you could measure sound on the digital SPL meter that was above that of the audio system in the absence of the computer. And that was just playing ripped CDs. What if you play a Blu-ray?" So, in the Revolution II's chassis, Baetis has strategically placed a pair of 80 mm precision-milled Noctua fans. The base noise level in Mingo's Montana listening room—the nearest asphalt highway is three miles distant—is 33.1dB, with the lower limit of human hearing somewhere below 20dB. *[The threshold of hearing is designated 0dB SPL, a pressure of 0.0002 dynes/cm², humorously described as "the weight of a gnat's eyelash."*—RH] Mingo measures an additional 0.1 to 0.3dB one meter from the computer when the fans are operating. If I actually put my ear in contact with the Revolution II while it's running, I think I can hear the fans. Maybe.

In terms of music management software, every Revolution II comes loaded with JRiver Media Center 19. Other programs have their advantages—Wax (TAS 238) is much easier to use and MusiCHI (TAS 224) is a classical tagger's dream—but JRiver is surely the standard by which all others are judged. It handles over 50



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audio and video codecs, including the *au courant* DSD-sourced formats. JRiver's sophistication and robust versatility is also its problem. The learning curve can be steep, especially if you're a relative newcomer to computer audio. And no one picks up the phone at JRiver if you have a question; "help" comes from on-line forums where you may or may not get a timely answer and the level of discourse can be pretty geeky. John Mingo and others at his company are enthusiastically available for e-mail and telephone support as you encounter issues. Turn the Revolution II on for the first time and you'll see a Baetis Remote Support icon on the screen. John Mingo's preferred form of assistance is to take control of your mouse and teach you how to more effectively use his product. Baetis is also prepared to help with Windows-related issues. In the course of the review process, I suddenly found that the computer wasn't recognizing any of the several attached hard drives that were connected. Mingo knew what the problem was from my panicked description and had it fixed in ten minutes. Lest you think this is special treatment for a reviewer, a full year of telephone support is included in the purchase price with customers averaging about 20 hours of one-on-one assistance each, some much more. Mingo emphasizes that this kind of support will always come with a Baetis computer and plans to establish a "call center" when his customer base is large enough.

The Revolution II was auditioned with a range of musical genres and audio codecs, both stereo and multichannel sources, and a little video. D-to-A conversion was always accomplished

via my Anthem D2v processor; cabling was an obvious variable, as different digital interconnects—USB, coaxial (SPDIF), and HDMI—were required for different applications. An effort was made to employ wires of roughly equivalent quality and expense when making comparisons. The Revolution II was plugged into an Uninterruptible Power Supply (UPS, not to be confused with USB, USP, or the people who deliver your packages) as the user's manual sternly advises that the unit's warranty is void if an owner doesn't provide both surge protection and voltage variation control. I used a CyberPower CP850PFCLCD, \$135 at Best Buy.

I spent many pleasurable hours comparing the Revolution II operating via USB, HDMI, and the Baetis special SPDIF implementation to my usual options for playing digital files—a Hewlett-Packard Pavilion P6000 Series desktop computer, the 3beez Wax Box, and, mostly for multichannel, an Oppo 93 fed digital files from an external hard drive. The cables employed to get data from the Baetis, Wax Box, HP, and Oppo to the Anthem included my trusty Halide Bridge for USB; for HDMI, an AudioQuest Chocolate cable (\$100) or an I-forget-how-ridiculously-expensive Transparent Audio model; for SPDIF, a \$200 Straight Wire Info-Link or Teresonic Clarison BNC digital cable (\$400), each with a Radio Shack BNC-to-RCA adapter installed at the Anthem end. After a period of time, I found it useful to focus on the three options involving the Baetis, especially John Mingo's cosmic matchup of USB vs. his proprietary SPDIF interface.

Time marches on and I am forced to admit that I've been

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captivated by Joni Mitchell's *Blue* for 40 years. With the 192/24 HDtracks version of the album, the Baetis SPDIF option provided insights into Mitchell's artistry I'd never had before. I developed a new appreciation of how the syncopated lilt to Joni's singing on "All I Want," "My Old Man," and "Little Green" plays so perfectly off the guitar and piano accompaniments, the vocal inflections providing the rhythmic impulse for these songs as much as the instruments. Additionally, all these years I'd considered Mitchell's piano playing on "My Old Man" to be charmingly rudimentary when, in fact, there's enormous tonal subtlety and dynamic nuance that serve to amplify the emotional power of the song. With SPDIF, guitars in this close-miked recording are as present as ever but less bordering-on-astringent than usual; Joni's voice is more richly characterized.

René Pape, the "Black Diamond Bass," has a voice as distinctive as Mitchell's. Richard Wagner's operas are Pape's specialty and a 2011 Deutsche Grammophon CD entitled simply *Wagner* finds him in top form with selections from *Die Walküre*, *Die Meistersinger*, *Lobengrin*, *Parsifal*, and *Tannhäuser*. DG's recorded sound is nothing special but, progressing from USB through HDMI to SPDIF output from the Revolution II, the orchestra becomes less strident and two-dimensional and Pape's huge voice becomes nearly as commanding and texturally appealing as it is in person.

It's the same story with instrumental timbres. Gordon Goodwin's Big Phat Band's 2008 *Act Your Age* CD has a trumpet feature called "Backrow Politics." In the middle section of that chart, each of the big band's four trumpet players takes a solo, employing different styles—reggae, New Orleans second line, etc. With the Baetis SPDIF option, it's easiest to discern the differences in the tone the four musicians produced: You can tell them apart even when, at the end of the section, they all improvise simultaneously.

Pianos provide a special challenge for recording engineers to capture just the right balance of percussiveness and resonance, to deliver the grandeur of a performance on a concert grand without slighting its lyrical aspect. The short and brutal second movement of Sergei Prokofiev's Piano Sonata No. 2, as performed by Matti Raekallio on the Ondine label, has long been a reference track of mine. The USB to HDMI to SPDIF journey provided an increasing sense of the piano's body and mass without any loss of focus. Baetis' BNC, uniquely, gave a powerful sense of a human presence behind the sound emanating from the speakers. Differences in touch with individual notes in rapid *marcato* passages were more apparent.

The Revolution II's performance with high-resolution multichannel material was a pleasant surprise, as John Mingo makes no extraordinary claims for his HDMI outputs and, of course, SPDIF can't handle HD multichannel formats. With FLAC-encoded surround-sound recordings, the Revolution II was superior to my usual method of playing such files, which is off an external hard drive into my Oppo 93 and then on to the Anthem for D-to-A conversion. A good example was the 2L *Souvenir* program, music for string orchestra by Tchaikovsky and Nielsen performed by the Trondheim Soloists. The Norwegian label is known for its immersive surround-sound approach that puts a listener in the middle of the action. With the Oppo delivering the data to the processor, the experience, while thoroughly involving, could become a bit exhausting. When the Baetis took over that job, the listening experience was more reminiscent of that time in my

life when I actually played in orchestras. It felt more participatory. More typically engineered multichannel material, especially DSD-sourced programs downloaded from Channel Classics or ripped from my own SACDs, manifested a relaxed spaciousness and dimensionality.

Although I do watch plenty of opera, concerts, and the occasional feature film on the 58" Panasonic plasma monitor resident in my listening room, music-without-pictures is my priority. But I can report that video quality with ripped Blu-rays—ranging from Sade to Shostakovich—was unassailable. Still, videophiles of the highest order, especially those with very large screens, should investigate the \$5000 Baetis XR2, which sports Intel's fourth-generation HD graphics engine and Core i7 processor.

The Revolution II, playing stereo HD files off an external hard drive via its BNC SPDIF output, produces the best digital sound I have ever heard in my system. How does Baetis sell this unit for three grand? There are a number of explanations, I think. You're not paying for a DAC, and the Revolution II's enclosure is an attractive but modest sandblasted aluminum case—black or silver, same price—favored by the DIY crowd. Of obvious importance is that Baetis isn't taking on any new dealers. The plan is, as much as possible, to sell directly to consumers, which results in a substantially lower sticker price. (You will not, of course, pay any more if you do happen to live near one of the few dealers now carrying the Baetis line.) Mostly, John Mingo is not making customers foot the bill for his painstaking R&D, for the empiricism he finds essential to developing the finest audio computers he can make.

What's a "Baetis" anyway? I should have known: It's a fly-fishing reference. Baetis is a genus of mayfly, a bug popular with the trout that live in cold-water rivers in the United States. The Baetis is a "multi-brood" insect, meaning that there are several hatches per year, and each time the organism looks completely different. Says John Mingo on the company's Web site: "This is what a Baetis computer is all about. It is a machine that will perform very different functions for different owners at differing times of the day or in different places." After snapping a photo, a fly fisherman might return a 20-inch rainbow trout to the stream he or she caught it in. Baetis has a 90-day money-back trial period: If you purchase one of their media computers and don't like it, send it back to Livingston. But I very strongly doubt that John Mingo will be seeing much in the way of "catch and release." **tas**

SPECS & PRICING

Inputs/Outputs: One proprietary BNC SPDIF, one TosLink, two HDMI, eight USB (4 3.0 and 4 2.0)	Neutrik PowerCON DC connectors, add \$200; 256G SSD, \$250
Connectivity: Two Ethernet; DVI video; antennae	BAETIS AUDIO 428 Canyon Creek Road Livingston, Montana 59047 (406) 686-4282
Dimensions: 9.5" x 4.25" x 10"	baetisaudio.com
Price: \$2995 (black or silver);	

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