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GUIDE TO

DISC PLAYERS, DACS, & MUSIC SERVERS

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FROM THE Editor

Welcome to this special Buyers' Guide to Disc Players, DACs, and Music Servers presented by *The Absolute Sound*, *Hi-Fi Plus*, and *Playback*. Inside you'll find everything you need to know about choosing, setting up, and enjoying the latest digital-audio technologies. We've packed this special guide with select equipment reviews of the best disc players, digital-to-analog converters (DACs), integrated amplifiers with DACs, and music servers. These reviews run the gamut from the amazing \$99 NuForce Icon USB DAC to the \$22,000 dCS Puccini/U-Clock—with lots of stops in between. Whatever your budget, this special Buyers' Guide will hook you up with the very best sounding gear.

Today, options for acquiring, storing, and accessing music have never been greater. Many disc players include a host of features unimaginable just a few years ago. The traditional system architecture of a CD player, amplifier, and speakers has been overthrown by new technologies that blur the lines between product categories, such as music servers—a term that describes everything from an iPod, to a turnkey system such as Sooloos, to a PC that's been converted into a digital jukebox. To help you sort out all these new options, we've included several comprehensive, in-depth feature articles that cover everything from servers to how to transfer your LPs to digital.

This revolution in digital audio technology not only expands our ability to easily access our music, it also offers an unprecedented opportunity for greatly improved sound quality. I'm talking about high-resolution digital audio, which is a significant step up from what you'll hear from CD. The combination of music servers (actually, file-based audio as opposed to physical-format-based audio) and the Internet allows us to

leapfrog the technical and economic hurdles of introducing a new high-res disc format. We can simply log onto our favorite high-res music site and download our music with far greater fidelity than that of even the best-quality CD. When done right, high-resolution digital audio (defined as 88.2kHz/20-bit or higher) is spectacularly good—something every music lover should hear for himself or herself. We'll show you how to go about experiencing high-res audio in our feature articles, and guide you toward the best-sounding gear in the equipment reviews.

There's never been a more exciting time for music lovers and audiophiles, and this special Buyers' Guide to Disc Players, DACs, and Music Servers will point you in the right direction to put together your own high-performance digital music system.

Robert Harley

*Click here to
turn the page.*

Vincent's CD-S8 CD player features a tubed-based analog section, dedicated headphone jack with its own volume control, an upsampling digital filter, and fully balanced circuit topology. The company's flagship C-60 CD player sports gorgeous cosmetics and design, Vincent's best circuitry, and a front-panel switch that lets you choose between tube and solid-state output stage.
Prices: \$2995 and \$4995.



ON THE HORIZON

A Sneak Peak at New Digital Gear Coming Your Way

Steven Stone



← The McIntosh MVP881 BR universal disc player supports virtually every disc format, including Blu-ray, CD, DVD-A, DVD-V, and SACD. With an SD-card reader and Ethernet and RS-232 ports, the MVP881 BR can receive firmware upgrades and BD-Live content automatically. With four 32-bit 192kHz internally balanced DACs, the MVP881 BR has enough horsepower to handle all the current multichannel formats with ease.
Price: \$8000.

ON THE HORIZON - A Sneak Peak at New Digital Gear Coming Your Way

More than just a disc player, the super stealthy Esoteric RZ-1 hides its complexity beneath a vault-like silver exterior. Part slot-load SACD/CD transport, part integrated amplifier with 100Wpc Class D amplification into 6 ohms, it also boasts a USB/32-bit DAC and 24-bit/192kHz conversion via coax and optical inputs. There are two analog inputs, as well—one of which is switchable to a moving-magnet phono stage.

Price: \$6000.



Krell's Evolution 555 Blu-ray Disc player features the 32-bit Sabre Reference DACs connected to Krell's own differential Evolution CAST analog circuitry. The Evolution 555 comes standard with Ethernet capabilities; a 02.11b/g/n wireless card can be added for wireless transmission. Dual HDMI outputs and a front-panel SD-card slot allow for added flexibility, as does the card-based interior topology. Currently configured for HDMI 1.3, the Evolution 555 will be easily upgradable to HDMI 1.4 with a simple card swap.

Price: \$15,000.



NAD's upscale Masters Series now includes the M56 Blu-ray Disc player. The machine sports a rear-panel USB input for attaching USB memory devices and players to the M56's digital-to-analog converters.

Price: \$1999.

ON THE HORIZON - A Sneak Peak at New Digital Gear Coming Your Way

MSB, long a technology leader in digital-to-analog conversion, has just introduced its Platinum family of DACs. The Signature DAC IV includes three hand-matched DAC modules that run at 384kHz/32-bits and deliver a S/N ratio of over 140dB. All MSB DACs are custom-built and include the ability to add features such as multiple USB inputs, analog inputs, and MSB's proprietary iLink II input protocol.

Price: \$13,995



Bel Canto's e.One DAC 1.5 offers a high-precision clock, 96kHz/24-bit decoding capability via its USB input, a 24-bit volume control for driving a power amplifier directly, five digital inputs with front-panel input selection, a headphone output, and balanced as well as single-ended analog outputs. **Price: \$1395.** The company's e.One DAC 2.5 adds an upgraded internal power supply, an analog input, and a larger front-panel alphanumeric display. **Price: \$1995.** Finally, the top-of-the-line e.One DAC 3.5VB includes a ST-Type glass-fiber optical input. **Price: \$3495.**



ON THE HORIZON - A Sneak Peak at New Digital Gear Coming Your Way



Half high-tech, half art, and all cool, Chord's QBD76 has got Buck Rogers retro-cool side-fins and plastic bug-eyes that reveal the DAC's jewelry-box circuit board interior. The technology in the QBD76 is just as well thought out, using Chord's proprietary combination of RAM buffers and a special digital phase-lock-loop word clock to reduce jitter. **Price: \$5995.**

Weiss Engineering has replaced its venerable Minerva DAC with the DAC202. This new FireWire DAC also has S/PDIF and AES/EBU digital inputs and outputs as well as both single-ended and balanced adjustable-level outputs. With a front-panel headphone output and provisions for an external word clock, the DAC202 offers a one-box solution for 192kHz/24-bit music files. **Price: \$6500.** Weiss also offers the INT202 FireWire interface which converts FireWire 400 to either S/PDIF or AES/EBU digital outputs. **Price: \$1300.**



ON THE HORIZON - A Sneak Peak at New Digital Gear Coming Your Way

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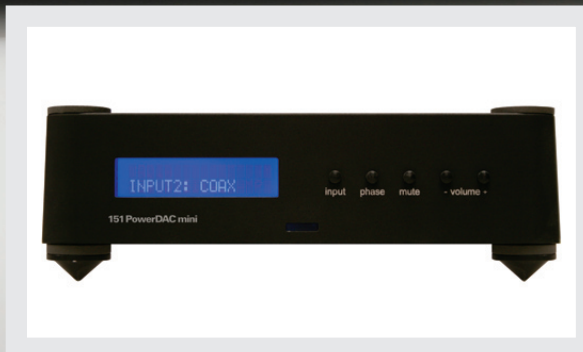
→ Simaudio's new Moon 300D DAC includes USB, coaxial S/PDIF and TosLink inputs, upsamples to 353.8kHz/24-bits, has both single-ended and balanced outputs, and supports up to 192/24 digital files via its coaxial inputs. **Price: \$1600.** The flagship Moon 750D is a 32-bit fully asynchronous device using eight ESS Sabre DAC chips. Besides four digital inputs—AES/EBU, S/PDIF, TosLink, and USB—the 750D also has a built-in CD transport. Its analog output circuits feature a fully balanced differential dual-mono layout.

Price: \$12,000.



↑ dCS' new Debussy DAC offers USB, AES/EBU, and S/PDIF inputs, and features dCS's latest Ring DAC technology, 5-bit oversampling, multi-mode phase-locked loop, higher-capacity field-programmable gate arrays, and asynchronous USB. With better than 110dB S/N and 96/24 via USB, the Debussy promises to be a contender in the USB DAC horserace.

Price: \$10,000.



← Wadia's 151i PowerDAC DAC/digital integrated amplifier sports the same small footprint as its trend-setting 171i digital transport/interface. The 151i supports S/PDIF, TosLink, or USB digital inputs and includes Wadia's DirectConnect digital volume control. It produces 25Wpc into eight ohms or 50Wpc into four ohms and includes a remote control that can also run your iPod when it's connected to the 171i.

Price: \$1195.

ON THE HORIZON - A Sneak Peak at New Digital Gear Coming Your Way



Meridian Sooloos announced the ID40 Sooloos card for the Meridian 861 controller. This card turns the 861 into a media system using the Sooloos as a front end. The cards support 96kHz/24-bit digital files and couple with Sooloos 2.1 software. Meridian owners now have the option of a seamless system for accessing Internet radio as well as anything in their Sooloos server.

Price: \$1995 (The card is integral to the 808.3 CD player and is an option on the 861 controller.)

Want to go back to the previous page? Click here.

9 Guide to Disc Players, DACs, and Music Servers



Naim Audio's UnitiQute is a small-footprint music server that supports UPnP sources, iPods, and even Internet radio through its WiFi or Ethernet ports. The USB input can handle 96/24 music files from a Naim HDX hard-disc music player, a PC, or a Mac source. It can also process 192kHz/24-bit music files through its S/PDIF inputs.

Price: \$2000.



Resolution Audio's Cantata music center includes a slot-loading disc drive and an Ethernet link for accessing iTunes and UPnP music libraries. The Cantata also accepts AES/EBU, S/PDIF, and TosLink digital inputs. Its USB input handles up to 96kHz/24-bit sources via a proprietary asynchronous protocol.

Price: \$6000.

ON THE HORIZON - A Sneak Peak at New Digital Gear Coming Your Way

High-Resolution Technologies offers four new DACs with USB inputs. The MusicStreamer II will decode signals up to 96kHz/24-bit. **Price: \$149.** The MusicStreamet II+ offers higher audio performance, including a signal-to-noise ratio of 101dB. **Price: \$349.** The MusicStreamer Pro offers miniature XLR jacks for balanced connection, along with a signal-to-noise ratio of 114dB. **Price: \$499.** The MusicStreamer HD will decode high-resolution signals up to 192kHz/24-bit via USB 2.0. All the new DACs feature asynchronous USB connection for lower jitter and better sound.



Blue Smoke's Black Box music server now comes with Bit-Perfect ripper software, a built-in disc transport, and the ability to rip and play 192kHz/24-bit files. The Black Box can also import, store, and play SACD files sent from an MSB-modified SACD player via the MSB network. Besides WAV files, the Black Box also plays and stores FLAC format files. The only things the Black Box doesn't include are DAC functions. You can use any high-end DAC you wish with it, but for ultimate performance Blue Smoke recommends connecting its Black Box to the latest MSB Signature DAC IV via MSB's iLink II input protocol. **Price: \$6995**



Venerable loudspeaker manufacturer Thiel Audio hooked up with music-server manufacturer Olive to produce a networked wireless two-channel HD music solution. The Olive+Thiel HD uses two active Thiel SCS4 speakers with built-in 200-watt Class D amplifiers, built-in wireless receivers, and a Burr-Brown 1792A 192kHz/24-bit DAC mated with an Olive 4HD server to deliver a complete wireless music system. **Price: \$7900.**

Music Servers for Audiophiles

The Time Has Finally Come

Steven Stone



What exactly does a music server do? Despite its high-tech name, a music server is basically a fancy digital jukebox. So why should an audiophile who puts fidelity first and foremost care about music servers? Because a music server can provide all the sonic quality of a stand-alone CD transport and deliver instant access to your entire music library. Some music servers also supplant your FM tuner by offering the entire spectrum of Internet and international radio. What's not to like about that? The only downside is the reduced exercise you'll get during marathon listening sessions. Having all your music available at the touch of a button is so addictive that you'll wonder why you wasted so much time looking for music instead of listening to it.

Until recently most servers fell into one of two categories, either toys for the ultra-wealthy or gizmos for the über-geek. Most complete "turnkey" music server systems start above \$5k and easily exceed \$30k. Some include complementary disc-burning services (from your own library, of course) or come already bundled with titles that can be purchased à la carte by buying "keys" from their creators. These systems are designed and assembled so that anyone can use them with minimum aggravation, but you must pay for the time and effort required to make a Windows-based PC server user-friendly.

Sophisticated users with advanced computer

skills have been assembling their own music servers for years. All that's required is a PC with a nice big hard drive, a CD/DVD reader/burner, some I/O boards, and the right software. The problem is making all these parts "play nice" while delivering maximum fidelity. Spend a few minutes surfing the Internet and you'll discover that for every stable working home-brew music server there are at least ten that are buggier than a roach motel. Building a do-it-yourself music server is a great hobby, but if your primary avocation is listening to music, a DIY server can prove to be a frustrating allocation of time and effort.

What's an audiophile with middling technical skills and a limited budget, plus a hankering to access a music library from the comfort of his listening chair, to do? Nothing when the options were all either ridiculously expensive or god-awful geeky. Some manufacturers, however, are making products that don't involve either barrel-loads of money or time to get them to work properly. This is the first installment in a series dedicated to music servers for audiophiles who want to spend their time listening to music, not mucking around with music servers. My goal is simple: to find devices that easily access music, while maintaining enough fidelity to ensure that music remains emotionally and intellectually stimulating.

IPODS—THE GREATEST THING TO EVER HAPPEN TO MUSIC OR NOT?

To send an Old School audiophile writer I've known for years into apoplectic fits, all I have to do is utter the word iPod. He blames Apple's iPod for single-handedly destroying high-end audio. He claims that its utilization of low-resolution lossy MP3 digital music files has made it impossible for high-definition music to remain commercially viable. I think he's nuts.

The iPod isn't merely a low-resolution portable MP3 player for the Clearasil set. You can upgrade any iPod to the level of an upper-mid-fi CD player by changing the preferences in the iTunes program mated to it! You just adjust the settings in the preferences file so all your music will be imported and stored in a non-lossy digital format. You're actually given three options in iTunes—Apple Lossless, WAV, or AIFF—which preserve

digital files losslessly. Any of these deliver CD-quality music. Whether CD quality (44.1kHz/16-bit) is good enough for your music is an argument best left for another time and place.

Why am I discussing iPods in an article about music servers? Because an iPod makes a pretty darn good music server. After all, what is an iPod? It's a portable hard-drive coupled with sorting/filing software designed specifically for music files. To use it as a music server you merely connect the iPod's headphone output to your audio system via a cable with a stereo mini-plug on one end and RCA cables on the other. Sure, you can't navigate through its menus from your listening seat, and the iPod's D/A only qualifies as a middling converter. But if you already have an iPod you can begin to enjoy many of the benefits of a music server for only the cost of a cable.

The next step up the ergonomic ladder is to use an iPod "dock" to tether an iPod to your audio system. A basic dock supplies an analog audio output in addition to powering the iPod so it won't run out of juice. Apple offers a basic dock with a remote control for \$49. Apple's dock preserves all the functionality of the iPod, but since the remote doesn't have any menus, you have to keep your iPod within reading range to decipher what's on its display. More sophisticated docking systems, such as the Keyspan Tuneview, supply a remote with a color display that mimics the iPod's menus. Since the Tuneview remote uses radio frequencies rather than infrared signals, you can navigate from your listening position even if the iPod is situated in another room.

For the audiophile seeking a simple but high-

fidelity music server, the iPod has one glaring problem: The internal D/A doesn't qualify as high end. Until recently this internal D/A was the sonic Achilles' heel preventing many audiophiles from using an iPod as a server. But recently Apple began allowing third-party developers to access the digital stream via the iPod's power/USB connector. Wadia is the first audiophile company to bring a high-end iPod dock to market. Wadia's \$379 170i Transport lets you send the raw unadulterated PCM digital stream from your iPod to the external DAC of your choice.

For audiophiles who have been leery of music servers, hooking up an iPod to their audio systems can be a revelation. Suddenly instead of spending time scrunched down in front of numerous CD storage cabinets looking for a particular CD track, they can find it quickly and easily on their iPod and have it playing in a matter of seconds. Listening instead of searching—what a concept! The advantages of consolidating an entire collection in one location can't be underestimated. Eliminating multiple CD equipment racks not only engenders greater domestic détente, but also improves the sound of a listening room, since CD racks are not the most sonically benign furniture.

LOOK MA, NO WIRES!

To assemble a music server you need a computer, either a PC or a Mac, with iTunes installed on it, where you can burn your CDs and store them as digital music files. Then you need a network to move these files around your home. This network can be either wired or wireless or a combination of both. Finally you need some kind of interface device that lets you choose what you want to

hear on your audio system.

The iTunes software, which is available for free for either PCs or Macs, makes the whole burning/sorting/accessing process simple enough that anyone with minimal computer skills can create an extensive music library. However, for music server applications iTunes does have several problems. First, it was designed for your computer desktop, not for an audio system in the next room. Secondly, iTunes was created by pop music fans, not classical music lovers. Its methods for organizing music work nicely for artist-driven titles, but are less than ideal when the composer, composition, title, or ensemble are the primary search criteria. None of these problems is insurmountable, but they can sometimes limit an iTunes-based music server's ergonomic ease.

You can move music data from room to room only two ways—via wires or wirelessly. The vast majority of wired systems rely on Ethernet cables to connect the various parts of the server system with each other. Ethernet has several advantages over wireless methods. It is impervious to interference from wireless phones and other devices, offers faster response times in complex multi-user systems, and is more robust over long distances. It has one obvious disadvantage—Ethernet requires wires to get from point A to point B.

Most wireless systems use WiFi to connect their parts together. Wireless has the advantage of infinite physical flexibility since no wires are needed, but it has issues with interference and retaining signal robustness over distances greater than 25 feet, depending on the number of walls, floors, furnishings, and other objects that impede reception. Wireless connections can have noticeable command execution lag-times and

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The "Made for iPod" logo indicates that this product has been designed specifically to work with iPod. The manufacturer certifies that this accessory has been made in accordance with the high standards of quality and performance that you expect from iPod and Apple.

occasional problems with dropouts. Some older WiFi networks lack a sufficiently fast or wide pipe to deliver adequate throughput for data-intensive high-definition audio and video sources. In addition, microwave ovens and 2.4MHz portable phones can occasionally interfere with WiFi signals.

Obviously, neither Ethernet nor WiFi are perfect methods for moving music around, but each has particular advantages. Used together you can assemble a glitch-free and robust music server system that will function properly 99.99% of the time.

MY SERVER SYSTEM—THE GRAND TOUR

I'm a Mac guy. I've owned five generations of Macintosh computers. My current model is a MacPro duo-core with 10GB memory, four internal hard drives, and two external hard drives. Why six drives? Redundancy, my friends, redundancy. My first 250GB drive has my operating system, applications, and word-processing data files. The second 250GB drive is dedicated to image files. The third 250GB drive is a mirror backup of the second. The fourth 500GB drive has all my music files, including my iTunes library. My first external 500GB drive mirrors my internal music files drive. Finally, my second 500GB external file mirrors my first drive and serves as an external boot drive in case of emergencies.

This is far more computer than you need for a basic music-server system. A Mac Mini with a monitor and a 500GB external drive would be completely adequate. The other piece of gear needed to make music skip merrily from room to room is a WiFi receiver/router. The simplest and most easily integrated WiFi device for a Mac System is an Apple Airport Extreme. It can work

as a WiFi hub, a cable or DSL Internet modem interface, and an Ethernet connector. I just replaced an earlier generation Airport Extreme snow model with the latest version that supports the new 802.11n high-speed protocols. Setup was easy and the results have been glitch-free. Currently I have my MacPro hard-wired via Ethernet cable to the Airport, which sends wireless music to any WiFi-enabled device in my home.

APPLE'S AIRPORT EXPRESS

Another WiFi device sold by Apple is the Airport Express. It delivers a simple and inexpensive way to move music around your home. Its ergonomic limitations prevent it from being a full-fledged music server, however. It can't send control commands back to the iTunes player on your computer; it only supports "music streaming." This means whatever is playing on your main computer's iTunes will come through the Airport Express. Fortunately, the Airport Express does have TosLink digital outputs, in addition to analog audio outputs, so you can connect it to any external D/A converter. For under \$100 it lets you easily and simply stream music from your computer to an audio system in another part of your home, but the Airport Express is not by any stretch a full-fledged music server.

Sonically the Airport Express's digital outputs connected to a decent D/A will surpass an iPod's analog outputs. If you want to get an idea of how a music server will sound in your system, for under \$100 the Airport Express will give you a taste of the future.

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www.nuforce.com

High Performance USB Audio & Headphone Amplifier



ICON
MOBILE

\$ 99

FEATURED SPECS

- * USB 48kHz/16-bit
- * 3.5mm mini stereo input
- * Two headphone/line outputs
- * Audiophile-grade DAC
- * Rechargeable Lithium Ion battery
- * Analog volume control
- * Headphone amplifier

ICON
HDP

\$ 449

FEATURED SPECS

- * USB 96kHz/24-bit
- * S/PDIF input: Coaxial or Optical 192kHz/24-bit
- * Analog input: 3.5mm or RCA
- * Audiophile-grade DAC
- * Headphone amplifier
- * Analog volume control
- * THD+N: 0.001% @ 1kHz
- * FR: 10Hz - 100kHz (-0.5dB)

ICON
UDAC

\$ 99

FEATURED SPECS

- * USB 48kHz/16-bit
- * S/PDIF output: Coaxial
- * Analog output: RCA
- * Audiophile-grade DAC
- * Headphone amplifier
- * Analog volume control

THE APPLE TV

The Apple TV makes a far better music server than a high-definition video source. The Apple TV has a hard drive (either 40GB or 160GB), a simple Mac operating system, iTunes software, built-in WiFi, and outputs for two-channel analog, TosLink digital, HDMI-video, component-video, and Ethernet. All this is contained in an enclosure only slightly larger than a portable hard drive.

When you first set up an Apple TV, a built-in system walks you through the basic installation process. You have the option of using either a WiFi or Ethernet connection. You must also choose one of several different video-display resolutions. This is a good place to mention that the Apple TV must have a display to work properly. If you wish to use it primarily as a music server, this may be an issue. No audiophile wants to be forced to put a video display in a music-only system. I installed my Apple TV in my home theater, which, of course, already has video capability, but I didn't want to turn on my projector every time I listened to music. Instead, I purchased a 17" NEC 1770 NX LCD monitor for the Apple TV's HDMI outputs.

When I want to use the Apple TV for videos I simply remove the NEC's video cable and attach another one that's routed to my video scaler.

After the initial setup the Apple TV loads your main iTunes library onto its own hard drive. The current model has no provisions for an external drive. This limits your storage space. Simply put, for any serious music server applications the 40GB version of the Apple TV is useless. The hard drive isn't large enough to hold a music library of any size. Even the 160GB version is on the small side if you intend to assemble a library of more than 2500 uncompressed CDs. However for most audiophiles this 2500 CD limit should be adequate.

Storing your music library internally in the Apple TV does have several advantages. Response time is quicker when the music doesn't have to travel through a networked system. Chances of dropouts and buffering failures affecting the sound are also minimized. Furthermore you don't need to have your main computer running to use the Apple TV. Once music files are downloaded, the Apple TV becomes a completely autonomous

system. Unfortunately, Apple TV's hard-drive storage methodology does have one glaring shortcoming: You might assume that the music files on the Apple TV's hard drive could serve as a backup in case your main computer's hard drive fails, but at present there is no way to export the Apple TV's data back into your main computer.

The initial transfer of music files from your main iTunes library to the Apple TV can take some time. To shorten the process you can, in theory, connect the Apple TV directly via Ethernet to your main computer. After over an hour of trying to make this method work I gave up and used the slower WiFi connection method. I was pleasantly surprised to discover that it only required 45 minutes to transfer my entire 65GB library! After the initial transfer the iTunes program on your main computer will locate your Apple TV as a remote device and synch with it every time you use the iTunes program. Having enjoyed the initial transfer's speed, I was bemused to discover that some of these subsequent updates, especially if I added more than ten CDs at a time, took as long, if not longer, than the initial transfer.

If you are familiar with iTunes, navigating through the Apple TV's menus will be very *déjà vu*. Apple TV has identical sort and search functions. One difference, however, is that instead of iTunes' popular "cover-flow" display option, Apple TV uses only alpha-numeric lists. You still see your cover art, but only while music is playing. Periodically the album covers flip and move to prevent any screen burn-in.

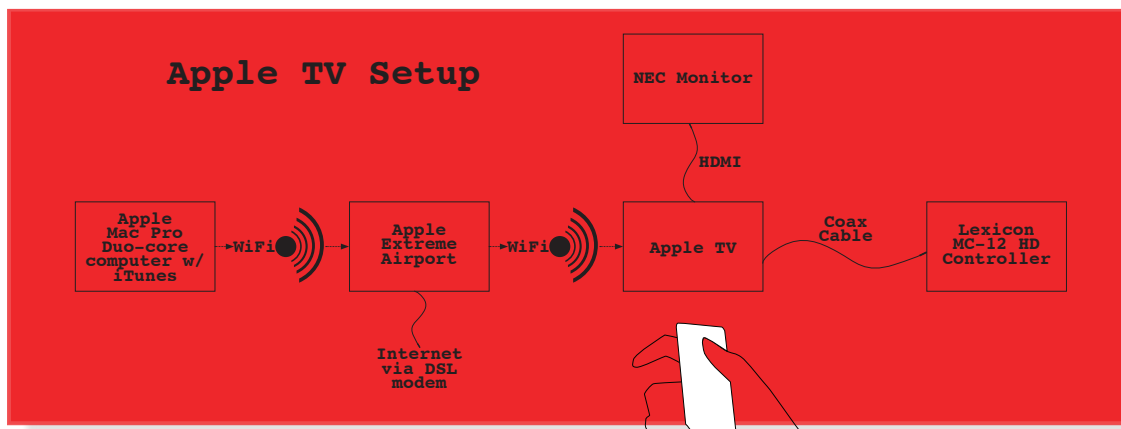
The Apple TV remote is identical to the one that comes with the \$49 Apple iPod dock. If you lose it, which is easy to do because it is tiny, you can easily synch another one to your unit. To put

the Apple TV to "sleep" you must hold down the pause button for several seconds (just like you would on an iPod), but pause is not the same as "off." Actually, it's impossible to turn off the Apple TV unless you disconnect it from AC power. But when you reconnect its AC power, you must wait through a several-minute-long boot-up before it becomes usable. This may present an ethical dilemma for those of us attempting to live "green," as the Apple TV generates substantial amounts of heat while it's on, whether asleep or awake. Its entire cabinet serves as one giant heat sink. I strongly recommend putting it onto tiptoes to allow more air to circulate around its chassis.

I mentioned earlier that the Apple TV is better as a music server than as a video device. This is due primarily to software and media-delivery issues. Although the Apple TV has the capability to store and display up to 1080i high-definition video material, most of the video available through the iTunes on-line store and You Tube (the Apple TV can directly access You Tube videos) is only 480i. The Apple TV, or your external video scaler, must upscale this material to match the resolution of a high-definition display. As more high-definition material becomes available the speed limitations of many users' DSL lines will affect the Apple TV's efficacy as a video device. Not many of us have the patience or desire to wait twelve hours for a high-resolution movie to download.

APPLE TV SONICS

Since the Apple TV has two-channel analog outputs, some users will be tempted to try them out. Don't bother. They only deliver slightly better sonics than the analog outputs on an iPod. Do yourself a favor and use the TosLink



digital audio connection. I realize that TosLink digital connections have long received a bad rap in comparison to coaxial connections. Many audiophiles feel that TosLink is less robust and likely to introduce higher levels of jitter. When given the option any audiophile worth his salt will choose RCA S/PDIF over TosLink. But on the Apple TV you don't have that choice, which may actually be a good thing. The Apple TV is a computer, and computers can generate copious amounts of power-supply noise. The best solution for reducing possible negative effects on an audio system is to isolate this noise-producing device. A TosLink digital connection makes this easier to accomplish since it does not create a common ground between the Apple TV and the rest of your system. Merely attach the Apple TV's AC power to its own dedicated AC filter, and you have effectively isolated it from other audio components.

Most of the time I did not connect the Apple TV directly to the digital inputs of my Lexicon MC-12 HD A/V processor. Instead, I used a Meridian 518 between the Lexicon and the Apple TV. I set the Meridian device to upsample the Apple TV's 16-bit digital stream to 24 bits. In addition to upsampling, the Meridian also served as a de-jittering and buffering device. Compared to a straight connection, the Meridian delivered a better sense of depth and overall musicality. This difference was far more pronounced on 320kbps MP3 files than on Apple lossless or AIFF files.

After a couple of weeks of burn-in I settled down to serious listening. I compared AIFF files on the Apple TV to the original CD tracks played back through both the Lexicon RT-20 and CEC TL-2 transports. The sonic differences between

the Apple TV and the two transports were not as great as I had expected. The Apple did not sound identical to either transport, but neither did these two transports sound the same. Actually, the Apple sat somewhere between the two in overall sonic personality. The CEC was the most musical and romantic sounding of the three. It excels at creating three-dimensional sense of depth, but it also delivers slightly softer transients and less dynamic impact. The Lexicon had the most matter-of-fact and detailed portrayal of the music. Its dynamic agility allows transients to retain the full measure of their "startle" effect.

But in overall sonic quality the Apple TV was these two transports' peer. It delivered a wide soundstage that matched either transport. It also produced an equally precise lateral image with excellent specificity and focus. The Apple matched both transports in harmonic balance, dynamic energy, dynamic contrast, low bass extension, and inner detail. Most importantly, the Apple retained the essential nature and feeling of the music. I never got the impression that the music was merely "there," as with many mid-fi components. Regardless of whether I listened to commercial pop, classical, or one of my own live recordings, the Apple always delivered enough musical information to keep me completely involved.

After using the Apple TV continuously for almost

two months, I've been very pleased not only with its sonic capabilities, but also its ergonomic elegance and reliability. It hasn't crashed, jammed, or failed to function properly since its initial installation. The ability to cruise through my entire music library without leaving my comfy couch is more addicting than a jumbo-sized box of Cracker Jack. When you consider its price and sonic capabilities, it's hard to understand why any audiophile with a computer and WiFi doesn't have an Apple TV in his system. A true 21st-century music-delivery device is finally here. The Apple TV offers every audiophile a gold-leaf-trimmed invitation to join the party.

THE LOGITECH SQUEEZEBOX DUET— ANOTHER VOICE FOR OTHER ROOMS

Fortunately, for those of us who like to have choices, the Apple TV is not the only sub-\$400 iTunes-friendly music server in town. Logitech's Squeezebox Duet network music player presents Apple with a worthy adversary in the battle for music-server supremacy. The Duet not only offers full iTunes interactivity and

a remote with a full-color LCD screen, but also delivers a range of other network music options. Does it leave the Apple TV in the dust? The short answer is "different horses for different courses." For many music lovers it makes perfect sense to own both.

WHAT IS A NETWORK MUSIC PLAYER?

The Logitech Duet offers a very different technological solution to the problem of how to move, stream, and store music. Instead of an internal hard drive the Duet depends on other networked sources such as your computer's music library and the Internet for its music. When

you initially unpack the Duet, you will be led through the installation process by a very well designed instruction set. The first step is to install its server software on your computer. This program not only controls the Duet's configuration, but also gives you access to a number of Internet music sources including Pandora, Rhapsody, Slacker, Shoutcast, Live 365, and Radio Time. Some of these are subscription services, such as Rhapsody, but others are free Internet radio portals. Although you don't need to have your computer up and running to access any of the Internet music sources, you do need to set up accounts through the "SqueezeCenter" program, even for the free ones. Your Squeezebox account not only grants you access to copious amounts of music, but also allows Logitech to automatically send firmware updates to your Duet. During setup you have the option of either WiFi or Ethernet connectivity



for the Duet. Since I suspect most owners will use WiFi, that's how I set up my review sample.

To play music from your own iTunes library you *must* have your home computer up and running. This is a fundamental difference between the Duet and Apple TV. The Squeezebox Duet is not an autonomous device. If you try to access your iTunes library when your computer is turned off, it won't be in your Duet's menu. Once you boot up your computer the library will magically reappear. Anyone who doesn't want to leave his or her computer on 24/7 could find this a significant drawback.

The Duet itself is a smallish box with only one light on the front. This light can glow either amber, green, orange, red, or white depending on the Duet's operating state. During initial setup and normal operation, this colored LED delivers continuous feedback as to whether the Duet is completely happy. The other part of the Duet's dynamic duo is its remote, which easily ranks among the best I've ever grasped. Its 2.4-square-inch color LCD screen is located at the top of its 6" by 2" by 3/4" case. Underneath the display is a

circular click-wheel with a central "enter" button flanked by buttons at the four corners. At the bottom the remote has volume up/down, pause, fast forward, and reverse buttons. The buttons all glow whenever you activate the remote, but the LCD screen and the circular click wheel are the stars of the show. Apply a bit of downward pressure to the click wheel as you move your fingers around in a clockwise or counter-clockwise motion and it will take you anywhere you want to go. When not resting it in the palm of your hand, the remote lives in a recharging cradle. Logitech has included several screensaver clock options for its display, so it can double as a very nice digital clock while at rest.

The menus on the Duet remote offer a multiplicity of ways to find music in your library. You can choose by artist, album, genre, year, personal playlist, random mix, or search via artist, album, song, or playlist. Even though the Duet system must gather its information from the iTunes music files on your home computer, which means it must send requests and get responses via the WiFi or Ethernet network, response time is



remarkably fast. Once you've made a selection, the Duet begins playing the music just as fast as the hard-drive-based Apple TV.

Unlike many remote controls, the Duet operates via radio frequencies rather than infrared light. That means you don't have to point, aim, or worry about whether the remote has line-of-sight to the Duet base station. In my home I can control the Duet from downstairs at my computer, which is at least 65 feet from the base station. When I walked outside I went over 100 feet down my driveway before the Duet remote lost its connection.

In theory the Duet has full access to all the artwork in your iTunes library. This was not the case for my review unit. Only about 25% of my iTunes artwork showed up on the remote. According to Logitech, Apple recently changed its artwork library specifications, which has resulted in a lot of "lost" artwork. Logitech hopes to find a solution soon and incorporate it into a future firmware update.

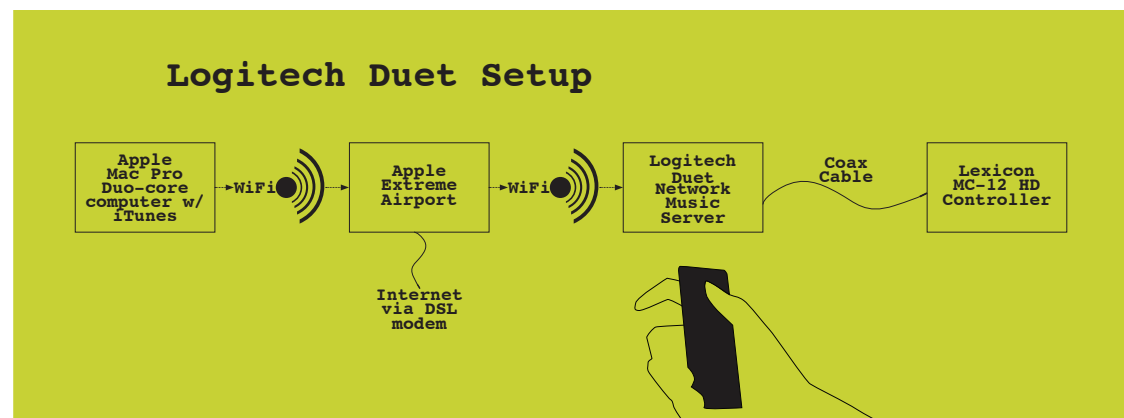
RADIO! RADIO!

If you routinely use FM radio to discover new music the Duet will be a revelation. Not only can you access any American radio station with a Web feed, you can also listen to radio stations located anywhere in the world, and I do mean anywhere.

THIS OR THAT?

Faced with the choice of buying either the Apple TV or the Logitech Squeezebox Duet, which one would I choose? The answer is easy—both! These two units, whose combined street-price is less than \$800, complement each other. The Duet is the radio king. Through it you can listen to almost any FM radio station in the world. Its full-color remote can leap through tall buildings with a single bound, and it even doubles as a nice digital clock. Apple TV's ability to store your entire iTunes music library on its own internal hard-drive gives it a unique level of autonomy. Accessing any music video in iTunes or YouTube's vast libraries makes it tempting to spend an entire evening surfing from one vintage performance to another. One viewing of Ry Cooder's band on BBC's "The Olde Whistle Stop," and you'll be hooked.

For audiophiles who haven't yet made the leap to a music server the time to jump is finally here. The sound-quality and ergonomics of either the Apple TV or the Logitech Squeezebox Duet make them worthy of installation in even the most exalted high-end system. It doesn't hurt that they are ridiculously inexpensive. Never before has so much high-quality music been so readily available at the touch of a button. One last warning: After you install a music server in your system you'll never be able to go back to hunt, find, load, and listen again. **SS**



Latin America, Asia, Europe, and Africa are all just a few push buttons away. Sonic quality varies wildly, however. Some stations, such as WNYC2, one of New York City's classical stations, broadcasts at 128kbps, which is good enough to rival all but the best analog FM. Many selections from WNYC had actual three-dimensionality and excellent low-level detail. Others stations, such as Denver Colorado's classical radio station KVOD, are only 32kbps, which isn't good enough for anything more than casual listening. Fortunately the Duet remote lets you know the bit rate of any radio station before you select it. The Duet also lets you develop your own radio "favorites" list. I can go from San Francisco's KDFC to Boston's WGBH in a few seconds. In the past month I've listened to more engaging radio than during the past several years!

Unlike the Apple TV you can actually turn off the Logitech Duet. But if you turn off the Duet base station you must also turn off the Duet remote. If you don't it will lose its link with the base station. Logitech is working on a solution to this bug, and by the time you read this review Logitech will likely have turned this ergonomic hiccup into a non-issue.

THE SONIC SHOOT-OUT

For audiophiles who make all their purchasing decisions based solely on sound quality I have some bad news—I couldn't hear a lick of difference between the Apple TV and the Logitech Squeezebox Duet using their digital outputs. I hooked up both units to the Meridian 518, so I could match output levels (since the Duet's native level is 1dB louder than the Apple TV). Also, the Lexicon MC-12 HD has a one second delay and fade-up to full volume whenever you

change inputs, which makes it less than ideal for critical A/B/X listening. Yet, regardless of whether I listened to MP3, Apple Lossless, AIFF, or WAVE files, the sound from these two servers was sonically identical. I conducted multiple blind listening tests, using a friend as a human switchbox, and still couldn't identify either unit with any level better than random chance.

The Duet also has analog outputs, but just like the Apple TV, their sound quality falls into the mid-fi category. Some audiophiles claim that earlier generations of Logitech/Slim Devices' Squeezeboxes can be vastly improved by substituting a better power supply for the original digital switching supply. Because the Duet uses a better-quality regulated supply this tweak should have less, if any, sonic effect. But even after performing mega-tweaks I can't imagine that the Duet's analog output sound-quality will begin to rival any high-end stand-alone D/A. Stick with the Duet's digital output, and you'll be happy.

Since I couldn't hear any sonic differences between the Apple TV and Logitech Squeezebox Duet, I didn't bother comparing the Duet to a stand-alone CD transport. I'm confident that even the most golden-eared subjectivist will discover lossless digital files played through the Duet will keep him as emotionally involved as the original CD played by a high-end transport. **tas**

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Computer Audio

Everything Makes A Difference

Steven Stone

As more audiophiles dip their toes into computer-based audio they discover, to their dismay, that it's far more complicated than conventional audio. In fact, the level of complexity involved in even a basic computer audio system dwarfs that of the most baroque multi-amp, multi-crossover, multi-driver traditional audio installation. Why? In computer audio the hardware, software, and cables interact with one another to affect the sound. Two very similar setups can sound different merely because particular details of their configurations are different. Unfortunately even small variables can have substantial sonic implications. Going from a 3' USB connection to a 6' one is audible in some systems. While this may be a tweaker's paradise, it's a reviewer's and manufacturer's nightmare.

In conventional audio it's relatively easy to substitute one component for another in a reference system and get an accurate impression of that component's intrinsic performance. In computeraudio the complicated interrelationships between different parts of a system make a clear assignment of sonic characteristics far more difficult. Generalizing that a particular interface is better or worse than another can't be ascertained by merely doing A/B tests in a handful of systems. There are simply too many variables at work to be able to make these kind of broad statements about universal performance.

In an effort to try to clarify what does and does not make a sonic difference in a computer-based audio system, let's look at some of the basic building blocks of computer audio. The goal here is to give

you a better idea of what's important and what to look out for when you assemble or make changes to your own computer-based audio system.

I'm not going to delve into the whole PC versus Mac issue here. Both systems have unique advantages and disadvantages. My goal here is to educate you about the parts and pieces, not to recommend universal solutions.

CPUS AND RAM

You might assume that getting the fastest, most powerful computer processor available is always the best way to go for a computer music system, but this is not the case. If you have a dedicated music computer whose sole function is reproducing music you can use a less powerful processor without experiencing any sonic degradation.

Many computer-music experts recommend or use the lowly Mac Mini as the center of their state-of-the-art computer music systems, while others use fairly basic no-name PCs.

What is far more important than processor speed or power is whether your processor can and will support the latest generation of software. For anyone putting together a Mac system, it's better to have an Intel-based Mac that can use the latest Snow Leopard operating system than a more powerful, earlier-generation computer with a Motorola processor. The newest \$599 Mac Mini trumps any G5 desktop for music-system use. On the PC side, having a unit that will run the new Windows 7 operating system should be a real advantage since this new version of Windows promises a more streamlined audio-processing chain than the ones currently available on Vista or XP systems.

A universal fact, regardless of operating system or processor, is that more RAM is always better. Although I'm not fond of generalizing, I'll go on record as recommending that you should always install as much RAM as you can afford and as your processor will allow. Maximizing RAM minimizes disc-caching (when a computer writes and then reads data from the disc in lieu of keeping it in RAM). And why is writing and then retrieving data from a disc so bad? Because each time data is copied by being written to a disc and then read off that disc it increases the likelihood of data errors and timing errors that degrade sound quality. Disc-caching also slows down a computer's operation and processing efficiency. So, disc-caching is bad and maximum RAM is good.

STORAGE

Data requires storage—you need a place to keep all your music files as well as the files used to run your computer. Most computers use hard drives for this purpose. Faster drives with larger on-board memory caches and higher rotation speeds are better for computer-music systems because they deliver data more rapidly and have more memory for error correction. Whenever possible 7200 RPM drives are a better choice than 5400 RPM drives.

Recently silicon memory discs have become more readily available and competitively priced. For some applications, such as storage of digital music files, they are superior to conventional hard drives since they have faster access times and lower numbers of read errors. But in situations where data must be written, retrieved, and rewritten over and over again, such as in your main computer drive, silicon discs aren't the best choice. (Silicon drives have a finite number of times that they can be successfully written and erased without write errors increasing.)

So far the largest commercially available silicon drives are only 320GB, which may be too small for the largest computer music libraries. But for many users 320GB silicon drives make an excellent choice for storing music files. On my Dell D620, for example, I have the option to use a standard internal drive for my operating system while storing my music files on a silicon drive mounted in a removable drive sled that goes into the slot that normally holds a CD-ROM drive. This rig makes a fine portable and completely self-contained music server.

CABLES

Even the most conservative and untweaked audiophile should realize that for better or worse, cables have an audible effect on sound. Just because a music system is computer-based doesn't mean that cabling will suddenly be any less important than in a conventional system. Unfortunately many owners of computer-based systems put little energy or resources into their cable options. Regardless of whether you employ USB or FireWire between your computer and other external sound devices, I would recommend never using the free cables that come with your external hard drives. The least expensive cables I use are the Belkin Gold Series USB and FireWire cables. In my computer audio system I've been using the Belkin Gold USB cables with excellent results. A serious step up from the Belkin Gold is the Locus Designs Polestar cable. In almost every setup where I've substituted the Polestar for the Belkin Gold I've found the Polestar delivers a noticeable sonic improvement.

Many computers use standard IEC AC cable connections. Experimenting with higher-grade AC cables can have beneficial sonic results.

AC POWER

Never plug a computer directly into your AC wall outlets. Computers are highly sensitive to all forms of AC power anomalies—surges, brownouts, sudden power losses can all wreak havoc on a computer's sensitive circuitry. Computers need to have at least a UPS (uninterruptable power supply) unit with spike protection so that if you have a power problem your computer won't shut down mid-operation, leading to corrupted files. If you do suddenly lose AC power, it's important

to have the opportunity to shut down a computer correctly to avoid future problems.

In a computer-based audio system you should also try to isolate your computer's AC from the rest of your system. That's because a computer's power supplies can have an audible negative effect on the rest of your audio system. I recommend keeping your computer on an entirely different circuit if possible. If that's not feasible, isolating your audio components from your computer with a brickwall power protection/conditioning system such as the PS Audio PowerPlant Premier will prevent the digital switching power supplies in the computer from dumping noise into the rest of your system.

USB, FIREWIRE, COAXIAL, TOSLINK

You can find a plethora of conflicting information on which method is best for connecting your computer to an outboard DAC. Advocates of FireWire argue that since it's been the professional standard for a number of years, it's also the best option for a high-end consumer-audio setups. USB proponents point to the ubiquity of USB and the ease of setup. Coaxial boosters write about coaxial connections having the lowest inherent jitter rates. Finally, TosLink fans point to the complete galvanic isolation between computer and the rest of your audio chain that only TosLink offers. So what's an audiophile to do?

All of the points made in the paragraph above are valid. And, frankly, there is no clear-cut universally sonically superior method for connecting your computer to a DAC. In every system other variables, such as your software and hardware choices, will make a profound difference in which method is sonically the most advantageous. Also the only way to know which will work best is by



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trying each connection and listening to the results. Alan Taffel found in the systems he tested that coaxial and FireWire were optimal. I've found that in some configurations TosLink or USB produced the best results. My advice is to try all your options and don't make any final decisions until you've finished listening critically.

CONNECTIVITY

When your computer is in one room and the rest of your audio system is in another you usually have more than one way you can connect the two—via wired Ethernet or wireless WiFi. Sometimes physical restrictions such as distance, layout, or the physical makeup of your home will be decisive in determining which method is most practical. In terms of fidelity each method has its appeal. Hard-wired connections offer more robust data throughput and are less likely to suffer from dropouts and data loss. Wireless connections allow your computer to be completely isolated from the rest of your system, which can eliminate any noise problems caused by AC, RF, and EMI.

Once again, since each connection method has its own particular advantages and disadvantages it's impossible to make a blanket recommendation about which is sonically superior. I've used both wireless and hardwired connections with my computer audio systems and found that wireless connections are definitely more prone to dropouts, but the complete isolation between the computer and the rest of my system is comforting. The best solution is to try both connection schemes and then choose the one that combines more ergonomic and sonic advantages.

SOFTWARE

Just like the arguments about whether nature or nurture is most important to human development, the discussion of whether software or hardware is more critical to sound quality in a computer-based audio system will probably continue well into the foreseeable future. Obviously not only does your choice of playback software have a major impact on the sound quality of your computer-based audio system, but how that software interfaces with your hardware will also affect your hardware choices. Just because one user finds a particular piece of software produces optimal sonics doesn't mean that you will have the same results in your system. Sometimes software decisions won't be clear-cut. When forced to weigh ergonomic ease against ultimate sound quality, different users will make different choices based on their own priorities. While iTunes is convenient, it doesn't offer (and doesn't claim to offer) the best playback quality; however, improving upon it does require additional effort in setup and day-to-day operation.

SIMPLE AIN'T NO FUN

Probably the most often asked question I've heard during 30-plus years in audio is the query, "Which is the best?" I despise this question because it means that someone wants a simple solution to a complicated situation. Computer-based audio is no simpler than high-end audio. Fortunately, the more you explore and the deeper you dig, the more sonically rewarding computer-based audio becomes. We are only at the very beginning of what will be known as the "computer-audio age." It will be a wild but entertaining ride. **tas**



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Reference Recordings' HRx Format

The Promise of High-Resolution Digital Audio Fulfilled

Robert Harley

The holy grail of consumer audio formats has always been to deliver to the listener an exact replica of the signal heard by the recording engineer. That's been a pipe dream—the LP is a big step down in quality from analog tape, CD is limited by its fundamental specifications, and even real-time copies of analog tapes suffer from generation loss.

New technologies, however, have narrowed the gap between what the recording engineer and consumer hears. Although DVD-Audio and SACD at their best can deliver high-resolution digital audio to consumers, it's really the advent of computer-based audio and Internet downloads that will usher in the new era of high-res digital.

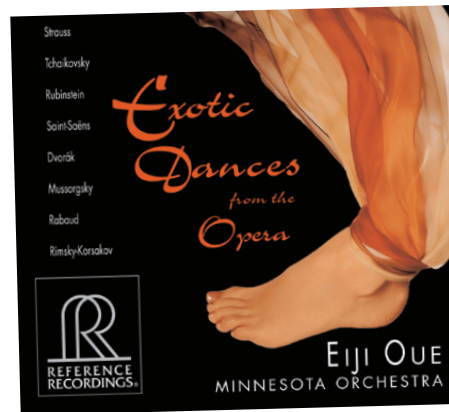
THE HRX FORMAT

Reference Recordings, a company at the forefront of technical advancements for the past 30 years, has broken through the technical barriers to deliver to listeners the exact high-resolution digital bitstreams created during the recording sessions. The company's HRx format encodes as WAV files on a DVD the master recording, which was sampled at 176.4kHz with 24-bit resolution. For the first time, you can

listen to the original high-resolution datastream of some spectacular titles from the Reference Recordings catalog.

The catch is that you'll need a computer, along with an outboard DAC capable of decoding 176.4kHz/24-bit datastreams. We'll get to the specifics of the computer later, but here's how HRx works. You buy the HRx disc (\$45 per title), load it onto your hard drive, and play it back using software such as MediaMonkey. You can't play HRx files directly from the disc; a computer drive's transfer rate isn't fast enough to get all the bits off the disc in real-time. (Boulder's new CD player reportedly will play WAV files directly, but the company has not yet tested it with HRx.)

So far, Reference Recordings has released five titles: *Crown Imperial*, *Shakespeare's Tempest*, *Exotic Dances*, *Yerba Buena Bounce*, and



Symphonic Dances. By the time you read this, the Malcolm Arnold Overtures and Dick Hyman's *Thinking About Bix* will be available. There's also a sampler containing excerpts from each of these titles along with short pieces of other titles yet to be released. This sampler isn't commercially available, but will be included in certain outboard DACs in the future (Berkeley Alpha DAC, Weiss, for examples). Incidentally, the Reference Recordings catalog numbers remain the same, but the high-res releases carry the "HR" prefix (HR-112 for *Crown Imperial*, for example). Titles originally recorded at 88.2kHz/24-bit will be released at that resolution. Some titles have been transferred from the original analog master at 176.4kHz/24-bit. In fact, this is the best way of distributing music that was originally recorded on analog tape.

The HRx discs are individually burned on a DVD-R and then their data are compared with the original file. The files are HDCD encoded, but the HDCD isn't functional (HDCD preserves on CD some of the information in the high-res source that is lost in the down-conversion).

The HDCD flag, however, allows you to verify on playback that the bitstream feeding your outboard DAC is an identical bit-for-bit copy of the master. If the DAC's HDCD light illuminates, the data are perfect.

Reference Recordings isn't married to the idea of distributing its high-res titles via WAV files on a DVD-R. Rather, it saw an opportunity to finally deliver to listeners high-res bitstreams. If downloading 176.4kHz/24-bit files becomes practical, Reference might discontinue the HRx idea. The HRx format, however, provides the original resolution as well as gives consumers the disc as a back-up. Note that many Reference Recordings titles are available at 96kHz/24-bit from Chesky Records' HDTracks.com site.

THE COMPUTER

The other half of the HRx equation is a computer-based music server. HRx will work with both PC and Macintosh, although Reference has more experience with PCs. My PC-based music server was built by the venerable Boston retailer Goodwin's High End. Alan Goodwin has been

at the cutting edge of recording and playback technology for decades, starting with a Mark Levinson ¼" 30-ips tape machine in the 1970s. He was disappointed by digital until he heard the Pacific Microsonics Model Two HDCD encoder/decoder in 2000. Goodwin recently recognized the potential of hard-drive-based music servers, but none of them delivered the level of sound quality he demanded. The commercially available music servers have great user interfaces, but are not yet capable of handling high-resolution files. Consequently, Goodwin built his own server to play back high-res files, and many customers who heard HRx in his showroom began asking him to build a server for them. These first servers used fairly conventional PCs with fans and hard drives. Goodwin's High End works with an outside company to build the PC, who ships it to the retailer for installation of the sound card, software, and drivers. Goodwin also listens to each server before it goes to the customer.

The full details of this server, along with instructions on how to build and configure a system yourself, are graciously provided on Goodwin's Web site (goodwinshighend.com). Click on "New" and then on the link in the Berkeley Alpha DAC description.

The computer Goodwin's High End built for me so that I could experience HRx is its next-generation server that uses heat-pipe cooling rather than a fan and a solid-state drive rather than a disk drive. These innovations together remove all moving parts from the computer for completely silent operation. As you'll see in my listening impressions, the exceedingly fine resolution of which HRx is capable can be masked by fan and hard-drive noise. The Korean-made

PC chassis carries the Zalman name, along with a sticker from a company called "Cool Tech PC" (cooltechpc.com). The model is TNN 300. Nearly every square inch of the chassis is covered by heat-dissipation structures. My system employed 64GB of solid-state memory, enough for about 17 full-length HRx titles. CD-resolution digital audio consumes about 10.5MB per stereo minute; 176.4kHz/24-bit digital audio consumes 63.5MB per stereo minute. The computer must also include a DVD drive through which the HRx files are loaded, but Internet access isn't required unless you would also like to download music.

The sound card that delivers the high-res digital to your outboard DAC via the AES/EBU interface is crucial to realizing HRx's potential. The card of choice is the Lynx AES16-XLR (PCI version), a professional device found in recording studios. The AES16-XLR can not only output 176.4kHz/24-bit digital audio, it reportedly has the lowest jitter of any sound card. The \$695 card can be ordered with a pair of optional breakout cables (\$120 per pair) with a "D" connector on one end and XLR cables carrying the AES/EBU digital interface format on the other.

The software for accessing music on the drive is the free MediaMonkey application. It's a text-based list, much like iTunes. My sample was already loaded with HRx files, along with some additional high-resolution material not commercially available.

Goodwin's High End charges about \$3600 for the computer I've described. A conventional PC with a hard drive and fan is considerably less, although if you choose this route, be sure to acoustically isolate the PC from the listening room. I should note that setup couldn't have been

easier; it took mere minutes to begin listening after unpacking the computer.

Incidentally, the computer works well for standard-resolution digital audio. I loaded music from CDs for playback from the solid-state drive and found that it sounded better than the same CD played from a disc transport and decoded by the same DAC.

THE SOUND

Before describing the experience of listening to what is unquestionably the state-of-the-art in music playback, I must comment on high-resolution digital audio in general. First, it's important to realize that a fast sampling rate such as 176.4kHz and a 24-bit word length don't guarantee good sound. Rather, those specifications simply provide the *opportunity* for higher quality audio. Implementation is everything. A well-designed 44.1kHz/16-bit system will outperform a poorly conceived and executed "high-resolution" system.

Second, high-resolution analog-to-digital and digital-to-analog conversion is vastly more exacting than standard-resolution conversion. In a 16-bit system, the least significant bit of the 16-bit word represents one part in 65,536; in a 24-bit system the least significant bit represents one part in more than 67 million. Many DACs don't even deliver real 16-bit resolution, never mind full 24-bit resolution. High-res digital places demands not only on the DAC chip's low-level performance, but also on the analog output stage, clocking accuracy (jitter), power supply purity, and every other subsystem. The temperature variations within components that might marginally affect the performance of a 16-bit system can introduce gross errors in a 24-bit converter.

Third, the big numbers associated with high-resolution digital audio (96kHz, 176.4kHz, 20-bit, 24-bit) are often marketing-driven. The product might not deliver "96/24," but consumers often think that higher numbers automatically translates to better sound. The additional 4 bits in a 24-bit DAC chip compared with a 20-bit chip are often cynically called "marketing bits"; they usually serve no technical function. Although the DAC might have 24 "rungs" on its resistor-ladder network, those last four (or more) rungs are incapable of delivering real information.

Finally, a "high-resolution" datastream doesn't do you any good if the signal has previously been subjected to a standard-resolution A/D or sampling-rate conversion. Once the music has been encoded at 44.1kHz (or 48kHz) and 16 bits anywhere in the chain, it has been irreparably compromised. This will become an increasingly important subject as more on-line music stores offer "high-resolution" downloads. Did they really go back and re-master the material from the original source elements, or simply upconvert the existing CD-quality datastream and call it "high-res"? And what about those albums tracked or mixed on 48kHz/16-bit machines in the late 1980s and early 1990s?

I raise these issues for two reasons: Listeners should be aware that high-resolution specs are not a silver bullet for digital's flaws; and the high-resolution experience I'm about to describe is a far cry from what's been done in the past. The system reported on here is high-resolution done right. The recordings were originally made at 176.4kHz/24-bit; the copies are bit-for-bit identical to the master; the playback system from the fan-less, drive-less PC through the Lynx card

is state-of-the-art; and the Berkeley Audio Design Alpha DAC is as good as it gets. Moreover, the rest of my playback system is ideally suited to revealing the full glory of the HRx files: The Alpha DAC fed Spectral DMA-360 amplifiers directly (no preamp) via balanced MIT Oracle MA interconnect, and then Wilson Alexandria X-2 Series 2 loudspeakers through MIT Oracle MA speaker cable. (See my review this issue of the Berkeley Alpha DAC, which has a complete listing of the system's components.)

I've long admired Keith Johnson's orchestral recordings on CD for their dynamics, truth in timbre, spatial detail, and low-level resolution. But hearing these familiar pieces for the first time in high resolution was an absolutely mind-blowing experience. There's so much more information in high-res that it fundamentally changes the musical experience. Yes, the HRx-sourced music has more low-level detail, wider dynamics, more realistic rendering of instrumental timbres, and a more fully developed soundstage. But that description doesn't begin to describe the profound effect these improvements have on the sense of musical involvement. The sound has such a sense of ease that I instantly entered that zone of complete immersion in the performance, and stayed there until the piece was over. Listening to these high-res files wasn't a *quantitative* improvement in the listening experience, but a *qualitative* transformation.

I'll try to describe specific aspects of the presentation that led to this experience. If I had to define the overall sound of HRx with a single word, that word would be "texture." First, instruments and voices have an almost tangible texture, so realistic is the rendering of timbre. The

timbral distinctions between brass, woodwinds, strings, and percussion were heightened to the point that other recordings sounded as though all the timbres were overlaid by a common synthetic texture that obscured the instrument's true nature. I heard a vivid realism in timbres that conjured an instant impression of the instrument itself. Even an instrument like the triangle (in the climax of the last movement of Rachmaninoff's *Symphonic Dances*, for example) jumped from the soundstage with a clarity and realism I've never heard from recorded music; the impression of a piece of metal being struck, and then ringing, was startling. Throughout the listening there was the distinct feeling of knowing the mechanism by which an instrument made sound.

This was true for every instrument or section. Bases sounded like big wooden cavities resonating, with the sound of the bows moving across the strings vivid and distinct. The rich darkness of the bass clarinet suggested the instrument's size, composition, and even the reed vibrating. Percussion instruments had such a steep attack that they seemed to jump instantly into existence. Cymbals didn't sound like trash-can lids or spray cans—and even at high levels didn't hurt my ears or make me want to turn down the volume. Moreover, the sound lacked the synthetic character overlaying instrumental timbres so prevalent in standard-resolution digital audio. There was no shiny glare on strings, no grain polluting woodwind textures, and no sense of hardness on brass.

Although the presentation was startlingly vivid in this way, another single word that describes the overall sound is "gentle." There was a complete sense of ease and grace. The resolution I heard

isn't what we've come to accept as "resolution" in standard-definition digital audio, but something very different. There is absolutely no hype, no etch, and no fireworks. Instead, you melt into the listening chair with an addictive combination of physical relaxation and mental exhilaration.

I'll use another single word to describe HRx: "atmosphere." I heard a nearly tangible sense of the venue's acoustic, of the exact location of each instrument in it, and of the precise spatial relationships between each instrument within the acoustic. The soundstage was exactly sculpted and defined, but not in the way that "edge enhancement" in video attempts to create a sharper picture. Rather, there was a spatial vividness that didn't call attention to itself as stylized or cartoonish. It was instead perfectly organic and natural in a way that one hears in live music.

Many of these qualities I've described are the result of the extraordinary resolution of very fine timbral and spatial details. The information about how an instrument makes sound, for example, is contained in the very finest micro-harmonic and micro-dynamic structures—the very components of the waveform that are simply not captured by standard-resolution digital audio. These waveform components are also the first to be destroyed by less-than-state-of-the-art circuits or signal-processing techniques. I've had the experience many times of listening to a live microphone feed, and then to the recording of that mike feed (analog and digital), and then to the LP or CD made from that recording. Each stage is a disappointing step down from the mike feed's resolution and clarity. Hearing HRx reminded me of listening to live microphone feeds.

Finally, HRx renders music's large-scale dynamics with a visceral realism that's physically thrilling. This ability to instantly and effortlessly swing from resolving the quietest ambient information at the back of the hall to the orchestra at full tilt is alone worth the price of admission. So much of music's expression is in dynamic shadings; to hear them reproduced with no constraints is such a liberating experience. Moreover, the system's complete lack of glare and hardness allowed me to set a higher playback level than usual, further enhancing the visceral thrill of full-scale orchestral climaxes.

CONCLUSION

Reference Recordings has made it possible for you to hear in your listening room the same high-resolution digital bitstream made during the recording—and the results are spectacular. Any arguments over which audio media best delivers the music should be moot—very high resolution PCM is as close as we've come to a microphone feed, in my view.

As great as HRx off the music server sounds, you should know that this PC-based system is a bit of a kludge, and a temporary solution. It's inevitable that we'll have turnkey music servers that can deliver high-resolution audio, and with a much better user interface than MediaMonkey. This system is also not inexpensive at \$3600 for the PC, \$4995 for the Berkeley Alpha DAC, and \$45 per HRx title.

Nonetheless, if you want the undisputed state-of-the-art in music reproduction right now, HRx is one thrilling ride. But consider yourself warned: Once you hear high-resolution digital done right, there's no going back. **tas**

Converting LPs to Digital Files

A Step-by-Step Process

Steven Stone

For many analog-loving audiophiles the ritual of selecting an LP from the storage rack, cleaning it, adjusting a tonearm and cartridge, putting a record on the turntable, and then finally settling down to listen is a major part of an LP's allure. But sometimes even the most pro-analog music lover wants the instant gratification of sitting down and immediately listening. Digitizing your LPs gives you two ways to enjoy your record collection.

Since I reviewed the Korg MR-1000 in Issue 180 I've received many letters from readers who want to digitally archive their LP collections. Some have already started. Many are still exploring their options—and a bewildering plethora of options are available.

Some audiophiles are analog experts with very elaborate and expensive systems, while others may not yet own a decent turntable. Still other readers have installed highly sophisticated computer-based multi-room wireless music systems all by themselves, while some may have very basic computer skills.

Transcribing an analog LP into a digital file can be as simple as hooking up your turntable to the back of your computer's built-in soundcard, opening up some recording software, dropping the needle into an LP's groove and pushing "record," or as complicated as you want to make it. But regardless of whether you opt for simple and decent-sounding or complicated and

sonically exceptional, the process of transcribing an LP requires time and effort. Fortunately, the more transcriptions you do, the faster and more efficient the process becomes.

This article breaks down the process of archiving LPs into individual steps. While you can skip what you already know, we will look at the many options at each stage of the archival process. No one method is intrinsically better than another, so your own choices will be based on personal preferences. But at the end, the goal is to successfully digitize your favorite albums.

WORKFLOW

Workflow is the process of efficiently going from the start of a project to its completion. Archiving an LP starts with a shiny black disk and ends with a digital file. The number of steps and complexity of this process can vary drastically, but the flow from step A to B to C always remains the same. The simplest way to explain and to

understand how to archive LPs into digital files is to use workflow as a template and guide. My own goal is to get the maximum sonic quality with the minimum amount of time, effort, and money spent. Obviously this is only one set of preferences. For ultra-fi audiophiles the goal will always be ultimate fidelity regardless of the time or cost involved, while many entry-level music lovers merely want to archive as quickly and cheaply as possible. I will try to cover all three paths.

THE BEGINNING—THE LP

The process begins with the LP itself. The better the physical condition of your LP the better it will sound when translated to a digital file and the less time you will need to spend "cleaning up" the sound. If I have my choice between an early pressing that shows the scars of many interactions with less than optimally set-up turntables and a later pressing that hasn't seen much turntable time, I'll usually opt for the later pressing. Less physically damaged records make for much cleaner digital files with fewer spiky transients.

The first step in the transcribing process is to clean an LP. Cleaning can be as simple as giving a record one pass with a record-cleaning brush or as complicated as multiple go-rounds

on a record-cleaning machine. I usually go the record-cleaning-machine route. First I use a specially formulated cleaning fluid followed by a rinse of distilled water. I've been using a VPI HW-16.5 for many years. It has proven to be both a mechanically reliable and thorough cleaning tool.

THE TURNTABLE

The better a turntable is set up, the better an LP played on it will sound. This rule applies to \$200 as well as \$20,000 turntables. I always check every parameter on my VPI TNT IV turntable and Graham 1.5 tonearm before I begin transcribing an LP. This includes making sure the turntable is perfectly level, the drive belts properly positioned, the speed re-calibrated, the tonearm's overhang adjusted, the cartridge properly aligned, and the vertical tracking angle optimized. This whole process usually requires at least 40 minutes. If your turntable is less complex, the set-up process should take less time and if your rig takes more fiddling or you are more obsessive than I am, this process could take substantially longer.

Optimizing your turntable is critical because of the old maxim, "Garbage in, garbage out." The goal is to get the cleanest, best-sounding digital files possible without having to mess with them

once they're in digital form. Sure, you can do a lot to improve digital files with modern digital-editing programs, but this takes time and even the most sophisticated program can't perform miracles. If your turntable's cartridge mistracks during transcription the results will remain fatally flawed even after extensive digital editing.

THE PHONO PREAMP

All vinyl records, be they early 78s, 45s, or stereo LPs, have an equalization curve built into them. Without an EQ curve low-frequency transients would toss cartridges out of the grooves due to their huge untrackable modulations. Therefore an EQ curve is engineered into every record. A phono preamp, which is the device that amplifies the signal from the cartridge, has a built-in inverse of this EQ curve, so its output will be correct. Part of a phono preamp's job is to accomplish this inverse EQ as accurately as possible. A good measure of a phono preamp's performance is how correct its inverse EQ curve is.

Phono preamps range in price from \$200 for "starter" units to well into five figures for top-of-the-line models. Some upper-tier phono preamps also have more than one EQ curve built in. For most records the standard RIAA curve will be fine. But some early Columbia, London, Westminster, and Deutsch Gramophone LPs have slightly different EQ curves that predate the RIAA curve. Rock and modern pop music fans needn't worry about this sort of minutiae, but classical music lovers, especially those with extensive collections of early LPs, may want to investigate using one of these other EQ curves for optimal transcription results.

A phono preamp both corrects for the EQ

curve and amplifies the phono cartridge's signal up to "line level." This is the output needed by most preamps and amps to produce adequate playback levels. Many high-end phono preamps are stand-alone devices where you attach the tonearm cables to the unit's input and then run the preamp's output to a line-level device such as a preamp, recorder, or the analog inputs of your computer's soundcard. A phono preamp can also be incorporated inside a line-level preamp, integrated amp, or receiver. Some of these internal phono preamps can sound quite good, but generally a stand-alone device will produce superior sonic results.

Some LP-to-digital-file software packages have RIAA EQ curves built in, so you can attach the RCA outputs from your turntable directly to the analog inputs on your PC's soundcard. Whether a software-based RIAA curve correction can do a better job than RIAA EQ circuit in a well-designed phono preamp depends on which preamp and program. Just as stand-alone phono preamps can vary in quality, all software-based solutions are not created equal. An on-line search will turn up many programs designed specifically for LP transcription. Depending on your gear and quality requirements, some of these may be perfect for you.

A major consideration when hooking a phono cartridge directly to a soundcard is whether the sound card can provide adequate signal gain for your cartridge. Some low-output moving-coil cartridges need as much as 60dB of gain to produce adequate volume levels. Very few sound cards can provide this amount of signal amplification without introducing noise. Usually their specifications will include a maximum gain

figure. If it is less than 45dB, only a high-output cartridge will mate with the card successfully.

THE ANALOG-TO-DIGITAL CONVERTER

LP records are an analog medium. At some point in the transcription process their analog signal must be transformed into a digital signal. The device that performs this presto-chango feat is an analog-to-digital converter, or A/D. Analog-to-digital converters come in many sizes and shapes. Some are self-contained boxes designed to interface with a computer or recording device, while others are incorporated into a mixer, recorder, or computer soundcard. Regardless of its physical size or location, an A/D depends on what sample rate and bit rate it uses for conversion from analog to digital.

The general rule of thumb for digital sample rate conversion is this—the higher the sample rate and the deeper the bit rate, the better the digital recording will sound *and* the larger the digital file will be. The CD or "Red Book" digital standard is 44.1kHz at 16 bits, but most professional recording studios use 96kHz at 24 bits. Some pro recording programs will support up to 256kHz at 24 bits. A few recorders have a built-in A/D that supports Sony's Direct Stream Digital codec (DSD) which offers some advantages if you want to "future-proof" your transcriptions, because DSD recordings can be down-sampled easily. Most computer-based A/Ds also offer MP3 and other lossy digital-encoding options. Lossy devices, as its name implies, toss out some information to create smaller files. During initial LP transcription I don't recommend using MP3 encoding unless you have extreme storage limitations and have

no intention of using the resulting files for critical listening.

What sample and bit rate you should choose for LP transcription? My advice is to always use the highest bit rate your hardware can reliably support. Although you can always down-sample your digital files, upsampling will never have the same sonic quality as a file that was originally recorded at a higher sampling rate. The ultimate "future-proof" sampling rate is DSD because it down-samples very cleanly into any PCM bit rate. The disadvantage of DSD is that it is only supported on a very limited number of recorders and must be converted into a PCM format to be played on a vast majority of systems. This requires several extra steps and additional storage space, since you will need to archive the DSD files as well as the PCM files made from the original DSD recordings.

STAND-ALONE RECORDERS VERSUS COMPUTERS

Either dedicated stand-alone digital recorders or computer-based recording systems can be used for transcribing LPs into digital files. Both have their advantages and disadvantages. I prefer stand-alone recorders because I've been using recording devices for many years (I started in the days of reel-to-reel tape) and I'm more comfortable with them.

Self-contained digital recorders can be more compact and portable than even laptop-computer-based systems. This portability can be especially useful when your turntable system is located some distance from your computer. Stand-alone recorders also tend to be more rugged and reliable, which makes them more

trustworthy for on-location or time-sensitive recording situations.

Computer-based recording systems can be less costly since many times you can reconfigure an older computer you already own into a dedicated recording unit. Also computer-based systems can save you several steps since the digital files are recorded directly onto a computer's hard disk. With stand-alone recorders you have to transfer the recorder's files into the computer you'll be using for editing.

As to which methodology will yield the best digital files—that depends on quite a few more parameters than merely whether your recording unit is stand-alone or computer-based. I've found that when I've made on-location recordings using both a stand-alone recorder and a portable computer the deciding factor for which one sounds best was always which recording was encoded at a higher bit rate.

For me, recorder reliability is the most important non-sonic consideration when transcribing LPs. I use the same gear for recording live concerts that I use for recording LPs. When I record an LP I can always re-record a side if a recording error occurs. This is a luxury I don't have when making live concert recordings. But since I value my time and hate wasting it on re-dos because a piece of gear failed to work properly, I use a two-strike rule with all my recording gear—if it fails twice, it's gone.

DIGITAL STORAGE

After you've digitized your analog recordings you need to store them somewhere. Fortunately hard drives have gotten very inexpensive so that everyone can afford to store *and* back up large

high-quality digital music files. Backing up your files is vitally important because there is no way to shorten the amount of time it takes to make the initial transcription from turntable to recording device. If a record has 25 minutes of music on each side, it's going to require at least 50 minutes of real time to transcribe. You only want to have to do this once. I've heard far too many horror stories about people who've lost their entire digital music collection because of a hard-drive failure or an editing program that corrupted their music files. I usually buy portable hard drives in pairs—one to store my files on and one to back up the stored files. The back-up hard drive is only tethered to my computer while I'm actually doing a file back-up. The rest of the time it remains disconnected from my computer and off-site in my bank's safe-deposit box.

SOFTWARE FOR RECORDING AND EDITING

With digital recording and editing software the usual rule-of-thumb is that you get what you pay for. The best recording and editing packages are not inexpensive since they are designed for professional recording engineers. Sonic Solutions, Cubase, and other pro programs are reliable, feature-rich, and require time to learn. I've used Sonic and Cubase and while they are certainly worth what they cost, many of their features are way past what is required to do two-channel LP transcriptions. Fortunately there are less expensive options that provide everything needed to make top-shelf transcriptions.

My favorite inexpensive program is so cheap it's free. It's called Audacity and is available for both PCs and Macs. I use the Mac versions 1.2 and 1.3. The reason I use two versions is

that 1.2 is less feature-rich but *far* more stable. When I record directly onto my computer I use 1.2 for the initial recording and then use 1.3 for editing. If Audacity crashes during editing it's a simple matter to reboot and continue, but during recording, a crash translates into time lost since I have to begin recording the LP side all over again. Audacity supports up to 96kHz/24-bit files, and has a myriad of built-in audio filters and effects. Most aren't germane to LP transcription, but some are an integral part of my standard LP transcription workflow. My go-to filters include "normalize" which raises the recording's overall level so the peaks are just below 0dB and the fade-in and fade out settings are set so that I don't have to listen to groove noise before and after a cut.

When I initially record an LP I record the entire side without stopping, which creates one large digital file. I then cut this big file into individual song files with Audacity. Since an LP usually has gaps of groove noise between musical selections, it's easy to place cut markers and then do quick fade-ups at the beginning and fade-downs at the end of an individual track. Once I've sliced a record side into individual tracks I save and archive them. Audacity can also downsample 96kHz tracks to the 44.1kHz CD standard, so I usually save both a 96kHz version and a 44.1kHz version of every LP transcription I do. This allows me to go back to the 96kHz files later if I want to do further editing.

Sometimes I record an LP with a DSD recorder and then downsample the DSD files to 96kHz/24-bit PCM files. Unfortunately Sony never completed a DSD editing program, so my editing has to be done in PCM format. I then archive the original

DSD recordings and work with the PCM files in Audacity. At the end of the transcription process I have four sets of files—the original DSD, the raw 96kHz PCM files, the edited 96kHz PCM files, and the edited 44.1kHz PCM files. The Audacity editing program will save a music file as a WAV, AIFF, FLAC, and MP3 file so I can tailor the output to my final use. Thank the lords of technology that storage is so inexpensive.

META DATA—SAY WHAT?

Digital music files have provisions for small headers or "sidecar" files that can contain information about the music file such as artist, song title, type of music, composer or songwriter, the year the recording was made, and other useful stuff. On commercial CDs this information is automatically downloaded from sites such as Gracenote (which is what iTunes uses) when you add the CD to your computer's music library, but on your own LP transcriptions you must enter this information manually by typing it in. This is often referred to as "tagging" a file. Audacity has provisions for adding this information to a music file before you save it. Tagging adds another step to the process of transcribing LPs, but if you want to be able to easily find and sort your transcribed LP music files it is vitally important to tag your files. Personally I find tagging to be one of the more boring parts of the transcription process, but that's why it's called *workflow*.

DIGITAL PLAYBACK

Now that you have converted the raw recordings into edited files the question becomes where, when, and how do you want to play back your transcribed LP files? You can make your own

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CDs, or you can play the files back through your computer, music server, or iPod. I do all of the above. But 44.1kHz digital music files may require some format adjustments depending on which playback scheme you use. For CDs, most CD-burning software will automatically convert your files into AIFF files. If you use iTunes or Windows Music Player for computer-based playback, uncompressed AIFF or WAV files will work fine. You could also use compressed lossless formats.

iTunes supports Apple Lossless files while most PC music playback programs support FLAC. These lossless formats will save some disc space with virtually no sonic degradation. I write “virtually” because depending on the software used and your own degree of perfectionism you may feel that any amount of data compression, even if lossless, is unacceptable. I usually use Apple Lossless files with iTunes on a Mac, Apple TV, and iPod and haven’t heard any ill effects when I’ve compared the Apple lossless files with uncompressed files. Many hardcore PC users opt for FLAC files, which are more widely supported than Apple Lossless files.

As digital playback via media and music servers becomes ubiquitous I expect that more devices will support higher-bit-rate files. Currently most computer hardware will easily support 96kHz files, but most commercial playback software is standardized for 44.1 and 48kHz files. This will change, and when it does I’ll be glad that I can go back to my edited higher bit-rate LP transcriptions and make new files to accommodate this newer software. If the past is any indication of future direction, its only a matter of time till higher-resolution digital files become the new standard.

FINAL CONSIDERATIONS

I have well over 3000 LPs in my vinyl collection, and no matter how digitized my music listening experience becomes, I have no intention of transcribing all of them into digital files. Instead, I’ve concentrated on transcribing only those records that have never been available as commercial CDs. I feel it’s every record collector’s duty to transcribe his rarest LPs into digital files to preserve this less commercially successful and available music for future generations of music lovers.

I hope this article will encourage you to make your own LP transcriptions. I assure you that few audio experiences are more rewarding or satisfying than listening to a digital music file of a long out of print recording and thinking, “I brought that recording back to life.” tas

EQUIPMENT REVIEWS CD Players



The Return of the Killer BEEs

NAD C515 BEE CD Player and C315 BEE Integrated Amplifier

Neil Gader

T rue story. A few years ago I received an unsolicited piece of gear for review. In the audio trade we call them “over the transom” items in that they arrive from a mystery company hoping that a favorable review in TAS might be parlayed into a U.S. market presence. At first blush, this modest 50-watt amplifier actually sounded pretty good and for \$199 seemed like quite the bargain. I thought to myself, “Watch out NAD.” But on closer examination there was the shoddy execution, the sheet-metal case with edges so sharp you could use it as a deli slicer, and...well, I could go on. The coup de grace occurred when I heard a little rattle and, upon removing the chassis cover, discovered that the amp’s teeny transformer had broken loose. I thought to myself, another NAD wannabe bites the dust. My point is this. There will always be land mines disguised as bargains in the high end so you need to step gingerly. But experience has shown that with a handful of companies like NAD you can step forward with confidence. Which brings me to its latest entry-level duo. The \$299 C515 BEE CD player and \$349 C315 BEE integrated amplifier are everything that the little no-name turkey slicer wasn’t—well built and finished, remote-controlled, and real performers.

The physical appearance of the C315 BEE amp and C515 BEE player is NAD-traditional, updated. As both are blood descendents of the legendary NAD 3020 integrated amp, the push-buttons and controls have that familiar, tactile feel, and there’s the reassuring, gunmetal-gray finish. Both units also have the look of efficient tools, focused to the task. For the 40Wpc C315 BEE integrated amplifier this means a large volume knob at the right edge of the front panel augmented by a clean line of input buttons. NAD’s traditional Tone Defeat button sit between the treble and bass controls and the balance knob. There are differences, of course. Outwardly, a much thicker front panel has been added to tame resonances. A front-panel headphone jack is now joined by a 3.5mm MP3-player mini-jack. On the rear panel are gold-plated RCA inputs and speaker terminals that will accept banana or straight wire cables. NAD family values have always been about sonic results rather than flash. Thus, finding shorter and cleaner and quieter signal paths was a prime directive for the design team.

Taken as a system, the C515/C315 tandem offer sonic qualities that are familiar to avid BEE

watchers. Warm in tonal balance, the BEEs have a full-bodied and slightly dark midrange. Dynamics are plentiful, musical details are well defined, and transient speed is lively, but none of these things stands out; rather, they blend into a naturalistic presentation. Like all NAD amps in recent memory the C315 BEE employs its own PowerDrive technology and seems conservatively rated as if, like fairy dust, some additional wattage had been sprinkled over the final design. PowerDrive might sound like pillow talk to an electrical engineer, but to my ears it allows NAD amplifiers to play big, with near-effortless dynamics, and to sing

like an amp roughly 50% larger in output. The result is an uncommon grip on music’s timbres and midbass weight. A good example is Mary Stallings’ *Sunday Kind of Love* [MaxJazz]. Recorded live at the Village Vanguard, the disc is pleasantly laid-back with good soundstage depth and a natural sense of clubby ambience. The NAD’s reproduction of the stand-up bass may not rattle bones, but it exhibited solid control. Thankfully, NAD’s honest approach to tonal balance makes for a non-fatiguing long-term relationship. The pairing may give up some transparency, and is lightly subtractive at the frequency extremes. Vocalists clock in



EQUIPMENT REVIEW - NAD C515 BEE CD Player and C315 BEE Integrated Amplifier

THE INSIDE STORY

Worthy of a *Jeopardy* answer, “BEE” are the initials of NAD’s Director of Advanced Development, Bjorn Erik Edvardsen, who along with Senior Engineer Steve Wilkins has been responsible for much of NAD’s success over the past 35 years. The C515 BEE might be the least expensive CD player in the NAD line, but it’s fully featured with a full remote control and all the common program functions like Random, Repeat, Repeat A-B, and direct entry of track. The C515 BEE will playback MP3 and WMA-encoded CD-R and CD-RW discs. It also supports CD Text and MP3 and WMA metadata via the front-panel display. The DAC is a 24-bit/192kHz device employing Delta/Sigma decoding. (Burr-Brown chips are reserved for the pricier C525 BEE.) Texas Instruments’ latest iteration of the classic 5532 audio op-amp is used for the analog amplification and was selected according to NAD for its warmth and musicality. NAD says that the large power

supplies were designed with independent regulation to isolate the various stages and provide ample current to prevent dynamic compression.

The C315BEE features a new, simplified and lower cost variant of NAD’s PowerDrive technology, a topography that yields high levels of dynamic power combined with low distortion when driving difficult low-impedance loudspeakers. The stated result is that for short peaks the C315 BEE’s undistorted peak power is roughly 110W in 8 ohms and 190W in 4 ohms. Not exactly chump change from a 40W amplifier. Since the C315 BEE is a hundred bucks less than NAD’s previous entry-level amplifier, features and connectivity are surprisingly reasonable. There are five line-level inputs plus a tape loop. Looking for pre-outs, IR, or 12V triggers? You won’t find them on this minimalist amp. But NAD has you covered with “queen” BEEs like the C325 and C355. **NG**

a little drier and instruments exhale a little less air into the mix. For example, you won’t quite hear the rush of air moving over the harmonica reeds during Bruce Springsteen’s intro to the live 1975 performance of “Thunder Road” [*Hammersmith Odeon*, Columbia]. The full sonic profile of a bowed acoustic bass or a run of tympani wallops isn’t fully captured, either.

Compared with my resident state-of-the-art setup, the Pass Labs INT-150 and Esoteric X-05 player (at nearly 20 times the price), the BEEs

lack the resolution to reproduce the full physical density of acoustic space and the complete palette of ambient textures and air. However, when Renée Fleming and Bryn Terfel sing the finale of *Stars* [Decca] and the Orchestra of the Welsh National Opera begins to well up within the hall and embrace the singers, you will probably be as surprised as I was at just how musically game these NAD components are. Sure, there is some attenuation of subtle acoustic values. But make no mistake; I’ve seen, er, have power cords that cost more than this combined pair.

While the C315 more than met my expectations for a NAD amp, the C515 CD player is the unqualified standout of the pair. It’s more transparent, specific, and controlled, and probably a bit quicker off the line. There’s also more bloom in the treble, although it’s still on the dry side. Extreme challenges like low-level retrieval of inner dynamic lines are not as easily surmounted—the pianissimo bass line during the bridge to “Linnet Bird” from *Sweeney Todd* [Nonesuch] is reduced in detail and impact. And during Norah Jones’ “Broken” the bowed bass viol lacks the growl and soundboard energy that this track has. However, I mightily enjoyed bouncing the “baby” BEE off of a parade of pricier players, from the vintage Sony DVP-9000ES to the Simaudio Equinox SE and the mighty Esoteric X-05. In each case it held its own, finding orchestral minutiae, dynamic thrills, and timbral details that would have gone unheard in a sub-\$300 player a short while ago. The sonic delights of the C515 BEE should make you look long and hard at your options in the under-\$1000 range.

I’ve been teasing the NAD BEE series for years for an abbreviation that’s just too tempting a target. But I’ve never lost sight of how serious these products

are. This latest pair performed in a way that makes me salute just how far entry-level products have advanced in the last few years. These are among the best BEEs yet and should create some major buzz. Like I mentioned at the outset of this article, there are many ways to get stung in the high end. My suggestion, become a BEEkeeper. **tas**

SPECS & PRICING

C515 BEE

Outputs: Analog RCA; Digital, one coaxial, one optical

Dimensions: 17.1" x 2.4" x 9.5"

Weight: 7.75 lbs.

C315 BEE

Power Output: 40Wpc into 8 Ohms

Inputs: Five RCA, one tape loop

Dimensions: 17.1" x 3.1" x 11.5"

Weight: 11.5 lbs.

U.S.

C515 BEE

Price: \$299

C315 BEE

Price: \$349

NAD ELECTRONICS INTL

633 Granite Court
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Canada, L1W 3K1
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nadelectronics.com

U.K.

C515 BEE

Price: £220

C315 BEE

Price: £230

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Arcam FMJ CD17 CD Player and FMJ A28 Integrated Amplifier

Affordable Excellence

Wayne Garcia

Affordable excellence. Funny how sensible, refreshing, and downright sane that phrase seems these days. Don't get me wrong: For those who can afford it, which more or less excludes most of us, owning the finest gear our hobby has to offer most assuredly rewards with intense musical satisfaction and aural pleasure. But most of us don't play in the Big Leagues, and there's many a tale to be told about those who jeopardized financial security for the latest object of desire. (Fess up, guys: Ever smuggled a new piece of gear into the house hoping the wife wouldn't notice?)

But thanks to companies like Arcam—and there are plenty of others—it is possible to enjoy mighty fine sound and real musical pleasure without threatening financial and marital stability.

Priced at a respective \$999 and \$1699, Arcam's new FMJ CD17 compact disc player and 75Wpc FMJ A28 integrated amp quite frankly astonished me by their performance. Not that I don't expect good sound from Arcam. This 30+-year-old company long ago earned a solid reputation for affordable excellence. And while I'll hit the specifics soon enough, what especially impressed me about this Arcam tandem is the way they grab your attention and pull you into the music. Ultimately, for me, this is what separates really good audio from the pack. And I'm not talking about razzle-dazzle, exaggerated, "hi-fi" sound, but a musical delivery that's natural and emotionally compelling. Curiously, this trait isn't necessarily reflective of price. I've heard more than a few expensive items that have excelled at the sonic stuff (loads of detail, accurate frequency and dynamic response, wide open soundstaging, etc.),



yet for whatever reason have failed to engage me on an emotional level.

These Arcam components do.

Before sitting down to "seriously" evaluate review samples, I generally like to start by casually playing a few tunes while pattering away at the computer in my office next to the listening room. The day I first fired up the Arcam

gear—and Mike Marko, Senior Product Manager for Arcam in America, was kind enough to supply already broken-in samples—I happened to receive a few Mobile Fidelity CDs and LPs for an upcoming feature on that company. Among them was The Band's *Music From Big Pink*. Having just written about the group's drummer and vocalist Levon Helm's *Electric Dirt* (reviewed in this issue), and being a

EQUIPMENT REVIEW - Arcam FMJ CD17 CD Player and FMJ A28 Integrated Amplifier

big fan of The Band's debut effort, I slid the disc into the CD17's drawer, hit play, set the volume, and walked back to the computer. Not for long, however.

Shortly after the opening strains of "Tears of Rage" I found my concentration was broken; I was completely distracted by the music. Now, kudos to MoFi for doing such a fine job remastering this terrific record—it has a clarity, air, detail, bass extension, and dynamic wallop that outshine my old Capitol rainbow-label LP, as a later direct comparison would reveal. And that excellence no doubt played a factor in the music's pull. But that doesn't detract from Arcam's achievement—within seconds my mind was wandering to the music, my shoulders swayed as I typed, and I was soon in the listening room completely pulled into a record I know as well as any other, yet riveted as if I'd never heard it before. No wonder deadlines get blown!

The more I listened, the more evident it was that both of these Arcam components possess unusual transparency, tonal accuracy, and dynamic resolve. For instance, listening to Telarc's recent release of *The Planets* (also reviewed in this issue) revealed impressive instrumental timbres and textures, a deep sense of hall ambience, air around instruments, and delightful dynamic nimbleness as well as dynamic range, which is ultimately restricted, if not hugely, by the integrated amp's honest 75Wpc rating.

By the way, the FMJ A28 falls in the middle of Arcam's integrated amplifier series, sandwiched between the FMJ A18 (50Wpc) and FMJ A38 (105Wpc). As

with most of the company's designs, the chassis, which comes in black or silver, is slim and functionally straightforward. The A28 offers six line-level inputs and a moving-magnet phono input, as well as the standard tape and preamp outputs. Unlike the more expensive Rega Elicit integrated reviewed in this issue, Arcam does not offer an optional mc card for the A28. Two sets of binding posts allow for single- or bi-wiring, as well as bi-amping when the A28 is mated with another Arcam power amp such as the A38. (My evaluations were conducted in the single-wire mode.)

Input and volume selection are achieved through all-electronic controls, which Arcam says allow for very short signal paths. You can also customize the volume settings for each input in order to match them when switching sources. The supplied CR90 remote wand is "universal" and also operates Arcam CD players.

Arcam boasts of "ultra low noise performance" due to the unit's high-quality internal components, and something the company calls, "Mask of Silence" technology, which is said to damp EMI (electromagnetic interference). While the term comes across as sales babble, there's something to this "Mask of Silence" thing, which is also used in Arcam CD players, along with the "Stealth Mat" a metal-fiber mat that is said to further reduce EMI.

The low-noise of these components was evident in the air and dynamics of *The Planets*, and also in another MoFi release, Sinatra's *Only The Lonely* (in a fine mono

transfer). One of Sinatra's best, *Only The Lonely* is something of a "downer" collection of tunes mostly about broken love. Playing the Mobile Fidelity version through the Arcam duo not only bathed Sinatra's voice in a gorgeous glow of studio air, and really laid out the Nelson Riddle orchestra, it brought forth the way Sinatra weaved his voice like another instrument with, say, the boozy percussiveness of the piano, the fluttering of a horn, or the flourish of strings. And throughout, the anguish that Old Blue Eyes brought to his phrasing! One example from "What's New" is when he sings, "I haven't changed/I still love you so." His voice dips and almost cracks as the line winds down. It's emotionally charged stuff and beautifully delivered here.

If I sound a bit over the top about these new Arcam pieces it's because, while a lot of gear comes and goes through my doors and most of it is very good, it's not everyday that I plug in something that is this musically compelling. Especially when you're talking \$2700 for a CD player and integrated amp that were designed to perform so well together. While that figure still strikes non-audiophiles as a lot for stereo gear, if you add in speakers you're looking at a \$3700–\$5000 system. When you consider the years of deep musical satisfaction that money will buy, it suddenly seems like dollars very wisely spent. Moreover, you won't need to hide the credit card statement from the wife... just be sure to have her pick the first disc you play. **tas**

SPECS & PRICING

FMJ CD17 compact disc player

Type of outputs: Two pairs RCA analog, one coax and one optical digital

Dimensions: 17.3" x 3.3" x 11.4"

Weight: 11.2 lbs.

FMJ A28 integrated amplifier

Power output: 75Wpc into 8 ohms

Number and types of inputs: Six line level, mm phono

Number and types of outputs: Preamp, tape, bi-wire speaker terminals

Dimensions: 17" x 3.3" x 10.8"

Weight: 18.7 lbs.

ASSOCIATED EQUIPMENT

TW-Acoustic Raven One turntable; Tri-Planar Ultimate VII arm; Transfiguration Orpheus moving-coil cartridge; Nagra BPS and Artemis PL-1 phonostages; Rega R3 and Kharma Mini Exquisite loudspeakers; Tara Labs Zero interconnects, Omega speaker cables, The One power cords, and AD-10B Power Screen; Finite Element Spider equipment racks

U.S.

FMJ CD17 compact disc player

Price: \$999

FMJ A28 integrated amplifier

Price: \$1699

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FMJ CD17 compact disc player

Price: £700

FMJ A28 integrated amplifier

Price: £900

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Exotica for the Masses

Simaudio Moon i-1 Integrated Amplifier and Moon CD-1 Compact Disc Player

Wayne Garcia

If you're a regular reader of this magazine, you know that flipping through these pages you'll soon find yourself in a section we call "The Cutting Edge." This is the place where my colleagues, and I, on occasion, review audio's priciest, sexiest, and, as the name says, most exotic cutting-edge components. Like the pages found in another type of magazine, "The Cutting Edge" has the power to induce lust from afar. But no matter how sexy its centerfolds, "The Cutting Edge" isn't merely a place to display gear porn. It's a forum for in-depth explorations of the finest technology and ideas this industry has to offer—no matter how out-of-reach the products may be to most of us.

But for anyone whose been exposed to such superbly musical and pricey items, "Exotica" can also prove to be hazardous. After all, give most people a taste of luxury—be it an audio component, automobile, wristwatch, or bottle of wine—and it's hard to go back. In other words, how do you drink Two-Buck Chuck once you've tasted Gevrey-Chambertin?

Thankfully, there's also a wide middle ground—that zone, for example, where highly satisfying and beautifully made wines are to be found for less than the price of a tank of gas. The same basic analogy, if not the price at the pump, holds true for audio gear. While there's a lot of good stuff out there that doesn't cost an arm and a foot, the real joy comes in discovering affordable components that provide outstanding sound and lasting musical satisfaction.

Which brings us to Canada's Simaudio.

Like many audio manufacturers, Simaudio builds a wide range of products. Naturally, many of the lessons Simaudio learned developing its upper-level Evolution Series are to be found in the company's more affordable gear.

Two shining examples are available in the form of Simaudio's latest entry-level components, the \$1500 (each) CD-1 Compact Disc player and i-1 integrated amp. What I like so much about these designs can be stated simply: While they lack the final degrees of air, detail, frequency extension, and transparency found in those "Cutting Edge"-bound products, there's an organic nature, a "whole greater than the sum of the parts" quality, that makes this combination surprisingly wonderful to listen to.

Lower noise floors—meaning a noticeable

lack of electronic haze, hash, and barely heard aural cobwebs—are one of the areas in which today's gear clearly whumps the best of the past. Curiously, because we're not talking about obvious noises such as a hum or a buzz, this is the type of virtue that you don't really notice until you realize that something you usually hear isn't there anymore. The sensation manifests itself not only in a greater sense of dynamic and rhythmic freedom, but also in transparency—the feeling that you're peeling back the curtain on an event that took place in another time and place, but that still feels like it's occurring right now, in your room.

This silence, or perhaps more accurately stated, this ability to let each recording's own energy and ambience announce itself from the get-go, is one of the triumphs of this moderately priced stack. To

hear what I mean, play the L.A. Philharmonic and Esa-Pekka Salonen's recording of Lutoslawski's Symphony No. 4 [Sony Classics]. The piece unfolds slowly, starting with a quietly scored passage of harps and skittering strings. The Simaudio duo makes you feel like you've placed your head through the looking glass into another world. A soundstage of impressive breadth and depth opens up, defying both speaker and room boundaries. Strings overlap laterally in beautiful impressionistic layers, yet a solo violin passage is in perfect focus. The symphony builds to a shimmering climax, but with no sense that the sound is emerging from two point sources.

Though rated at a solid but fleet 50Wpc (100Wpc into 4 ohms), the i-1 proved to have good dynamic headroom. No compression or audible stress occurred on this or subsequent



EQUIPMENT REVIEW - Simaudio Moon i-1 Integrated Amplifier and Moon CD-1

torture tests, one of which was Jeff Beck’s “Brush With the Blues” from the CD *Who Else!* [Epic]. The tune begins as a slow, snaky blues workout before Beck goes psycho on his Strat. To get the track’s full sonic and emotional impact and to truly appreciate Beck’s dazzling virtuosity—at one point he hits a sustained high note that will rattle your fillings—as well as the throbbing bass and hammer-blow drums that root it all, the cut begs to be played loudly.

The i-1 was again impressive, though keep in mind that my listening room is small,

and both sets of the speakers I used in the evaluation are rated at 4 ohms.

A singer, such as Nina Simone, benefits from this Simaudio pair’s musicality, too. Her hushed, haunting interpretation of Billie Holiday’s “Don’t Explain” from the *Four Women* box set [Verve] also emerged from a deep, beautifully described background. A flute flutters behind her at stage left, while her piano and an acoustic bass lay a rich foundation for her smoky vocal growls and intimate purrs.

As magical as these listening experiences

were, I also heard a slight darkness to the overall sound, most notably, perhaps, in the upper treble, as well as a thickness in the midbass region heard with cellos, basses, and percussion. I noticed this in the Beck disc as a slight fattening of the bass guitar, in the Nina Simone song as a reduction of air in the flute, in the Lutoslawski symphony as a slight diminution of the detail and tension it usually has. But these things are only noticeable in comparison with much pricier gear, and they are ultimately, for me, of little concern. Because in addition to that behind-the-curtain quality mentioned above, these Simaudio components present music with an organic wholeness I’m not quite sure I’ve experienced at this price point before.

By using the phrase “organic wholeness,” I’m not trying to co-opt buzzwords from the food industry. Rather, I’m trying to convey the sensation of musicians playing with and off each other the way we hear them in live performances and the feeling that the entire sonic spectrum, even if not as extended as way up and way down as the priciest stuff, is built from the same tonal, dynamic, and expressive materials.

In short, with its latest and most affordable CD player and integrated amplifier, Simaudio, like a neighboring wine from a less exalted vineyard in Gevrey-Chambertin, offers a mighty fine taste of the good stuff, at a price most of us can appreciate. **tas**

WHAT MAKES THEM TICK

Available in black and silver finishes, both the i-1 and CD-1 are cosmetically minimalist and quite solidly built. The i-1’s feeling of power-in-reserve comes from the 320VA toroidal transformer and 20,000mF worth of capacitance that occupies most of the interior left side. The preamp section utilizes JFET inputs, while the amplifier uses but a single pair of bipolar output transistors per channel. The back panel offers five line-level inputs, while the faceplate provides an eighth-inch mini-jack for personal media players and a quarter-inch headphone jack. The all-aluminum chassis was designed to be rigid and vibration free, and the i-1 was designed to be powered up at all times, to ensure consistently optimal sound, but also to operate at low temperatures for a lengthy operational life.

Built on what appears to be the identical all-aluminum chassis, the CD-1 boasts a proprietary CD transport mechanism, as well as Simaudio’s in-house software and hardware technologies. Burr-Brown PCM1793 DACs provide 24-bit/192kHz decoding and 8x oversampling, while an RS232 port provides communication links in custom-install situations and for any firmware updates. Like the i-1, the CD-1 was designed to be powered on at all times. And while the red LED front-panel display is nice and large, I wish Simaudio allowed for the thing to be dimmed or shut off. It’s very bright in a darkened room at night, so when I was not using it, I put the unit in the “standby” mode. **WG**

SPECS & PRICING

Moon CD-1

Outputs: RCA analog, S/PDIF digital, IR, RS232, SimLink
Dimensions: 16.9" x 3" x 12.75"
Weight: 14 lbs.

Moon i-1

Power output: 50Wpc into 8 ohms, 100Wpc into 4 ohms
Inputs: Five pair line-level, IR, RS232, SimLink
Outputs: One pair preamp
Dimensions: 16.9" x 3" x 12.75"
Weight: 22 lbs.

ASSOCIATED EQUIPMENT

TW Acoustic Raven One turntable, Tri-Planar Ultimate VII tonearm, Transfiguration Orpheus cartridge; Artemis Labs LA-1 linestage and PL-1 phonostage; Kharma MP-150 mono amplifiers; Simaudio Moon LP 5.3 phonostage; Totem Acoustic The One and Kharma Mini Exquisite loudspeakers; TARA Labs Zero interconnects, digital cable, Omega speaker cables, The One power cords, and AD-10B Power Screen; Finite Elemente Spider equipment racks

U.S.

Moon CD-1
Price: \$1500
Moon i-1
Price: \$1500

SIMAUDIO LTD.

95 Chemin du Tremblay,
Unit 3
Boucherville, Quebec Canada
J4B 7K4
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Moon CD-1
Price: £1450
Moon i-1
Price: £1450

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Cambridge Audio Azur 840C CD Player

The best CD playback under \$5k for...\$1799

Robert Harley

The new Cambridge Audio 840C CD player left me shaking my head in wonderment at how Cambridge can sell this much CD player for \$1799. The 840C is packed with advanced features, sophisticated technologies, and high-quality parts that one finds in digital products costing upward of \$10k. Here's a sample of the 840C's technology: custom transport mechanism; custom upsampling digital filter running on a 32-bit DSP chip; differential digital-to-analog converters; digital inputs; digital upsampled outputs; and balanced analog outputs. (See Features and Technology sidebar for details.)

Such an impressive feature and technology list, however, tells you nothing about how the player sounds. To know that, you must listen. Dropping the 840C into my reference system, I was stunned by its overall sound quality. I knew immediately that the 840C wasn't a player to be measured against similarly priced products, but was worthy of comparison with reference-grade digital front ends.

For starters, the 840C doesn't sound anything like an \$1800 CD player. It had a resolution, refinement, ease, grace, and musicality that were instantly recognizable as being different from every other product in the category. In fact, it's hard to know where to begin praising the 840C. We

could start with any part of the sonic fabric, but I'll choose the treble reproduction, an area where CD players often reveal their shortcomings. The 840C had a delicacy, refinement, and sophistication in the top octaves that must be heard to be believed. Most digital near this price—indeed, most digital at any price—tends to make cymbals sound like undifferentiated bursts of white noise, with no inner character or clue as to the mechanism by which the sound was created. By contrast, the 840C had a completely natural top end that was smooth and gentle, yet bursting with fine inner detail which gave high-frequency-rich instruments a remarkable timbral realism. Listen, for example, to Jack DeJohnette's delicate understated

cymbal work on Michael Brecker's fabulous new (and, unfortunately, last) CD *Pilgrimage*. I could hear every nuance of his exquisite playing, and the cymbals were infused with a wealth of finely filigreed detail in their shimmer and decay. Many \$5k players don't approach the 840C's beautiful rendering of the top octaves.

The midrange was equally well served by this combination of resolution and ease. Instrumental tone colors were vivid and alive, as though the 840C had access to a wider color gamut than other CD players. Most CD players anywhere near this price tend to homogenize timbres by overlaying them with a common synthetic character; the 840C portrayed timbres with a stunning naturalness. The natural rendering of tone color, coupled with the overall ease, made the 840C musically vivid without being sonically vivid.

The 840 also had a soundstage dimensionality that I haven't heard before in a sub-\$5k digital front end. The 840's spatial presentation reminded me of the first time I heard the Theta DSP Pro Generation III, with its spectacular sense of sculpted instrumental outlines "hanging" in the soundstage and separated by near-tangible air. The 840C presented tightly focused images,

with sharp outlines that were surrounded by a sense of palpable bloom. The result of the 840C's ability to present instruments as distinct objects in three-dimensional space was a heightened ability to hear what each musician was playing. The subjective consequences of this objective change in the presentation cannot be overstated; rather than hearing a congealed and synthetic mass of sound, the 840C brought the music to life by conveying a convincing impression of individual musicians. In addition, the 840C resolved reverberation tails down to a very low level, which further added to the illusion of hearing instruments in a large acoustic space.

Music through the 840C had an organic "rightness" and fundamental musicality that's hard to describe. I heard a sonic coherence that translated to an enhanced ability to hear into the music and understand it more deeply. This was partly the result of the 840C's remarkable ability to keep individual instrumental lines distinct, and partly because of the player's tremendous sense of ease, smoothness, and liquidity. This player is amazingly free from midrange glare (often manifested on the leading edges of piano notes) and metallic hardness in the treble. Despite the



EQUIPMENT REVIEW - Cambridge Audio Azur 840C CD Player

FEATURES & TECHNOLOGY

The 840C offers a host of inputs and outputs beyond those traditionally found on CD players. These connectivity options take advantage of the 840C's custom digital filter, and include two digital inputs for decoding external sources (each input offers coax or TosLink jacks) and digital outputs with selectable sampling frequency, word length, and dither on/off. These features allow you to use the 840C as a DAC, or to upsample digital signals (either from the internal CD drive or for processing external digital sources) for output to an outboard DAC. (See Specs & Pricing for a full list of supported sampling rates and word lengths.) You can even name the two digital inputs, with the name appearing on the 840C's front-panel display when that input is selected.

The custom filter is built on an Analog Devices "Blackfin" 32-bit DSP chip running upsampling software provided by a company called Anagram Technologies. Cambridge calls the filter algorithm Adaptive Time Filtering (ATF), presumably because the filter is optimized for time-domain response (conventional digital filters are optimized for frequency-domain response). The filter upsamples the 44.1kHz/16-bit audio from the CD (or external source) to 384kHz/24-bit.

Dual Analog Devices 24-bit DACs convert the digital data to analog signals differentially. That is, the left and right channels are each split in the digital domain to create balanced signals, and converted to analog with two DACs per

channel (one for each phase of the balanced signal). This technique reduces DAC-induced distortion (artifacts common to both halves of the balanced signal cancel due to common-mode rejection) and lowers the noise floor. It requires, however, double the number of DACs and analog output stages compared with conventional conversion. Another benefit of differential DACs is that a balanced signal is created without the penalty of a phase splitter in the analog domain. This is the right way to create a balanced output signal from a digital source, rarely used because of the expense.

The 840C gives you the option of adding dither, a small amount of noise that increases resolution at the expense of a slightly higher noise floor. A selection in the menu allows you to turn the dither on and off.

To top it off, the 840C employs a custom transport mechanism that's considerably beefier than standard-issue transports. A custom clock drives the DACs, and reportedly has less than 130 picoseconds of correlated jitter.

Finally, the power supply is massive, with a huge toroidal transformer, lots of filter caps, and rows of power-supply voltage regulators. I counted a whopping nineteen TO-3 regulators, about triple the number usually found in CD players of this price. Independent regulators for each subsystem increase the isolation between circuits, which often translates to better sound. **RH**

840C's utter grace and ease, the player is tremendously good at resolving fine detail. This rare combination of ease and resolution is an important factor in musical involvement and long-term listening satisfaction.

Dynamically, the 840C was good, but not out-of-the-ballpark great as it is in every other sonic criteria. Microdynamics were rendered with good resolution, but the 840C isn't the last word in slam, impact, and "jump factor." Through the balanced outputs, however, the sound is considerably punchier, with tauter and more muscular bass. If you have balanced inputs on your preamp, you should use them.

CONCLUSION

The Cambridge 840C CD player delivers the best CD playback I've heard from any player under \$5k—and it costs \$1799. Not only is the 840C easily the greatest value in digital sources in my experience, it must be considered one of the greatest bargains in all of high-end audio. Even if your budget for a CD player is considerably more than \$1799, I encourage you to audition the Cambridge 840C. I could live with the 840C at the front end of my \$100k reference system—it's that good. **tas**

SPECS & PRICING

Cambridge Audio Azur 840C CD Player

Analog outputs: Balanced on XLR jacks, unbalanced on RCA jacks

Digital outputs: Coaxial on RCA, optical on TosLink

Digital inputs: Coaxial on RCA, optical on TosLink (two each)

Digital input word lengths supported: 16-24 bits

Digital input sampling frequencies supported: 32kHz, 44.1kHz, 48kHz, 88.2kHz, 96kHz, 176.4kHz, 192kHz

Digital output sampling frequencies supported: 32kHz-192kHz (pass-through); 48kHz, 96kHz, 192kHz upsampled

Analog output upsampling: 384kHz/24-bit

Digital-to-analog converters: Dual Analog Devices AD1955 24-bit

Digital filter: Analog Devices Blackfin DASP-BF532 32-bit DSP, running ATF software, upsampling to 384kHz/24-bit

Dimensions: 16.9" x 4.5" x 14.7"

Weight: 18.7 lbs.

ASSOCIATED EQUIPMENT

Wilson MAXX 2 loudspeakers;

Mark Levinson No.326S preamp;

Mark Levinson No.433 power amplifier;

MIT Oracle MA

loudspeaker cables, MIT Magnum

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Bryston BCD-1 CD Player

One for the Ages

Alan Taffel



There has been a lot of talk lately about “buying your last CD player,” and understandably so. The format has come under assault from above and below. At the low end, we find Millennials downloading compressed MP3s rather than purchasing CDs. And the high-enders, largely unsatisfied with CDs from the get-go, can barely wait to do their own downloading of files whose resolution trounces that of the silver disc, and whose playback from magnetic drives is, by all empirical evidence, sonically superior to CD’s optical mechanism. CD’s plight only worsens when surveying the portable music scene. The Discman is long dead, replaced by iPods and their ilk, and automakers can’t incorporate MP3-compatibility fast enough. No doubt, then, the future for music reproduction—at any resolution, whether for the home or portable—will be computer-based (with maybe a little Blu-ray thrown in), leaving CD an orphan.

And yet, having had no real alternative for the majority of releases over the past few decades, we audiophiles have accumulated a substantial catalog of CDs. So the timing seems auspicious to buy that last CD player—one built for the ages, one that will do full musical justice to our libraries, even as new releases inevitably slow to a trickle.

But what makes a CD player an ideal “last”

player? Upon the arrival of the equivalent historical moment for LPs, the industry and consumers agreed that “last turntable” really meant “expensive turntable.” This widely accepted premise was not mere marketing hype; it was grounded in the reality of turntable production. Turntables (and tonearms, for that matter) are, first and foremost, exercises in

mechanical engineering. In this field, principles do not change over time; mass and materials are paramount considerations; and R&D is costly because the industry at large applies so little intellectual capital (relatively speaking) to the field. Meanwhile, manufacturing output is low, so production costs are inevitably high. For all these reasons, building a truly great turntable has always been a pricey proposition. And buying the most expensive one you could afford as your last made sense.

However, CD players are entirely different. True, these components, like turntables, must employ solid mechanical engineering. But once the bits are off the disc, the bulk of what CD players do is digital. Clocking, jitter reduction, D-to-A conversion, and filtering are the biggies on the block diagram. And those functions, like all silicon-based processors, are subject to Moore’s Law, which basically states that you can count on an exponential growth in power even as costs plummet. The internal components of CD players also benefit from a massive intellectual capital investment and from economies-of-scale. So the best, last CD player may not be the most expensive one at all—it’s more likely to be the most recent.

Enter the new Bryston BCD-1, the venerable Canadian firm’s first CD player. Why introduce such a unit now, when its competitors have had comparable models in their stables for years? Simply put, the company decided to wait out the SACD/DVD-A format war. The fact that there was essentially no winner allowed Bryston to do what

it really wanted to do all along: eschew DVD-based drive mechanisms—which are compulsory on universal players but which compromise CD sound because the clock speed is not an even multiple of CD’s 44.1kHz sampling rate—in favor of a purpose-built, CD-only drive.

To this it has added a DAC that employs an advanced, hybrid multibit/Delta-Sigma, 24-bit/192kHz, 128x over-sampling Crystal chip, and rigidly synchronized both the DAC and the transport to a master clock. This arrangement essentially abolishes the jitter inherent in S/PDIF connections. The final block in the diagram is the analog output stage. Here, rather than pulling a chip-based op-amp off the shelf, as most CD-player manufacturers do, Bryston pressed into service its own highly refined, fully discrete, true Class A circuit.

All these premium parts nestle within a handsome, rigid chassis that exemplifies Bryston’s legendary reputation for build-quality. Ditto the solid aluminum remote, which offers satisfying heft, positive tactile feedback, and backlighting. The chassis also houses both balanced and unbalanced outputs, S/PDIF, AES/EBU, and TosLink digital outputs (though I can’t imagine why you’d want to bypass the internal DAC), a 12-volt trigger, and an RS232 jack for software upgrades. And thanks to Moore’s Law and the other aforementioned fortuitous trends, a BCD-1 can be yours for the staggeringly reasonable price of \$2695.

Still, features, internal goodies, and brawny construction, while necessary, are insufficient to

EQUIPMENT REVIEW - Bryston BCD-1 CD Player

qualify a CD player for the ages. Performance, too, must be extraordinary. And here is where the full scope of Bryston's achievement becomes apparent. CD sound simply doesn't get much better than this. Is the BCD-1, even at its relatively modest price, of reference caliber? Unquestionably. It certainly matches the considerable virtues of my own reference, a superb Goldmund transport and DAC combo that has, overall, shamed everything else I've previously heard. But the Bryston gives no ground in musically critical areas such as dynamics, where it delivers the full measure of dramas large and small, and detail resolution.

The latter capability is closely related to—but not the same as—the ability to separate and allow the listener to follow multiple musical lines. This is where the BCD-1 really rises above competitively priced units. The Resolution Audio Opus One CD, for example, is only slightly more expensive than the Bryston, and boasts many of its own charms. But the BCD-1 is simply in a different league, with the greatest disparity being what Linnies would call the ability to “follow the music.” A fine example is the addictive Radiohead track, “Everything in its Right Place” from *Kid A* [Capitol]. The song sounds great through the Resolution, but the Bryston allows me to hear everything going

on within the deeply textured mix. Of course, this feat requires excellent resolution, but both players have that. Only the BCD-1 brings out these hidden musical layers, and effortlessly integrates them within the musical whole. This is something reference-level players do, while lesser units do not.

Admittedly, the Bryston and my own reference are not always equal—in some areas, the Bryston is better. Its timing, for example, is quicker; not only are attacks sharper, but rhythms in general are tighter. And while both the reference and the Bryston deliver wonderfully realistic timbres, the BCD-1 is ever-so-slightly better at capturing an instrument's unique essence. Listen, for instance, to the opening of Prokofiev's *Romeo and Juliet* as captured on the excellent Mercury CD. The composer allows each section of the orchestra its moment in the spotlight, and the Bryston shines a light on each with brighter illumination and, thereby, reproduces them with more recognizable sonic truth.

The reader might now have the impression that, aside from these minor distinctions, the Bryston and Goldmund setups sound remarkably similar. Well, they don't. With the Prokofiev the Goldmund has a richer, more voluptuous sound; the Bryston is lighter and cleaner. Note my deliberate use of

the word “light” rather than “lean.” I do not care for components that are tonally lean, that is, those that rob music of warmth and natural opulence. Never once did the BCD-1 strike me as lean or analytical (leanness' kissing cousin). So what is going on here? The answer is that the Bryston exposes the Goldmund as being darker than neutral, with a false richness caused by a mild boost in the midbass. The effect is not unpleasant (and is, in fact, rampant in high-end components), but can cause trouble with certain source material. One example is the ultra-pure Nils Lofgren *Acoustic Live* CD [Vision]. Through the Goldmund, Nils' guitar sounds mildly but inescapably bloated. The Bryston, with its greater neutrality, depicts the guitar far more naturally. Further, the BCD-1's superior timing renders the entire album much more lively and buoyant. Light, but not lean.

To fully experience what the Bryston is capable of requires a few set-up considerations. First, do not skimp on interconnects; this player deserves good ones. Second—and this almost goes without saying—replace the stock power cord with an audiophile-grade unit. Finally, although Bryston did put some effort into vibration isolation, the job is not complete until the BCD-1 is perched atop a good set of cones. I used those made by Goldmund, which are well worth their price if you can find them, and their effect was not subtle. Have you read elsewhere that the BCD-1 can sound “dry,” or that its soundstage is a mite squished? Those potential detriments are real, but they fall by the wayside if you use good cones and ancillary equipment. The biggest effect of the cones is in the bass, which becomes much clearer. But the cones also reduced glare and increased spatiality. Obviously, these are

benefits you wouldn't want to miss.

In sum, I am as surprised as anyone to discover that the best “last” CD player might well be an unprepossessing, modestly priced machine. But the Bryston BCD-1 has all the chops to qualify for the honor, from state-of-the-art digital components, to an audiophile-grade analog output section, to the feature flexibility and durability that will allow it to serve its role over the long run. Most importantly, it gets the music just right. This player is like a friend who takes a book from the shelf and opens it to a particularly enticing passage for your reading pleasure. That is what the BCD-1 will do for your CD library: Open it, and present it to you in all its glory. **tas**



SPECS & PRICING

Bryston BCD-1 CD Player

Analog outputs: RCA single-ended analog, XLR balanced

Digital outputs: S/PDIF, AES/EBU, TosLink

Dimensions: 19" x 3.1" x 11.2"

Weight: 18 lbs.

U.S.

Price: \$2695

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Meridian 808.2 Signature Reference CD Player

A Turning Point in CD Sound

Robert Harley

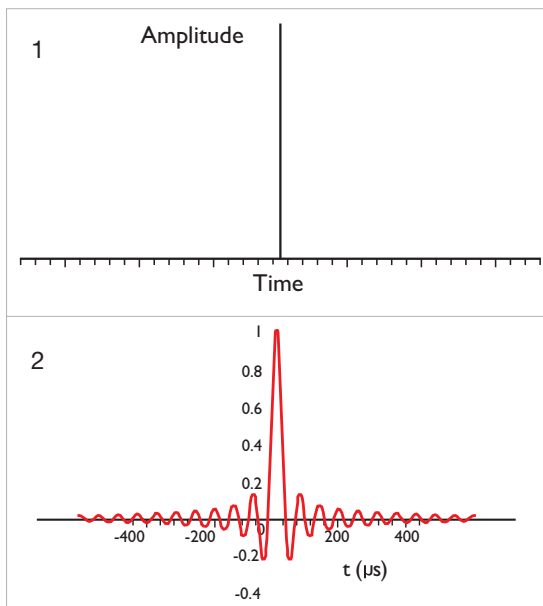
It's been a great privilege to have had a front-row seat listening to and reporting on the improvement in CD sound quality over the past 20 years. Every step forward in playback technology has rendered smoother textures and a more open soundstage, and fostered a greater sense of ease and enjoyment.

Despite these advances, CD has been fundamentally limited, we assumed, by its too-low sampling rate (44.1kHz) and too-short word length (16 bits)—parameters dictated by the state of late-1970s technology. Moreover, the vast majority of CDs in our music libraries were created with sub-optimum conversion and mastering technology, imprinting our favorite music with hardness, glare, and flatness. I've held a secret fantasy of hitting the lottery and using the money to re-master some of my favorite music (none of which has commercial potential), just so that I and other fans could replace our poor-sounding CDs with the best that today's mastering technology can deliver. As much as CD playback has improved, it's still fundamentally limited by the format's parameters, and our libraries are plagued by the distortions introduced by the brickwall filters in A/D converters.

But what if it were possible to design a CD player that didn't suffer from the characteristic distortions we thought were inherent in the format? What if the problems of CD were not primarily the result of the 44.1kHz sampling and 16-bit quantization but rather of another form of distortion that could be removed during playback? Could a CD player be designed that would make our CD libraries sound like high-quality re-masterings at worst, and approach the sound of high-resolution at best?

CD playback recently took a step in that direction, courtesy of the Spectral SDR-4000 Pro CD player (reviewed in Issue 190) and the Berkeley Audio Design Alpha DAC (reviewed in Issue 189). Both these devices ameliorated many of the sonic shortcomings that seemed endemic to the CD format. They both employ custom digital filters that avoid a characteristic distortion

EQUIPMENT REVIEW - Meridian 808.2 Signature Reference CD Player



that is largely responsible for “CD sound.”

That distortion is “pre-ringing,” illustrated in Figures 1 and 2. Figure 1 is an impulse, created by setting one sample at full scale and all other samples at zero. The horizontal axis is time; the vertical axis is amplitude. The “impulse response” of a perfect system would look like Fig. 1. But in the real world, digital filters spread out that impulse of energy over time (Fig. 2). Notice that some of the impulse’s energy appears before the impulse itself. This time smear, which can last up to 2ms on either side of the impulse, is called “ringing” (the impulse sets the filter ringing as does a hammer striking a bell), and the energy before the impulse is called “pre-ringing.” Pre-ringing is introduced by the brickwall anti-aliasing filter in the A/D converter, as well as by the linear-phase reconstruction filter in CD players. Although analog filters ring because of the resonant

elements in their filters, the ringing always occurs after the signal that set it ringing, never before it. Pre-ringing is unique to digital audio. Think of the impulse as a musical transient. Now think about how bizarre it is to hear part of a signal before the signal itself. Such a non-causal situation never occurs in nature and, consequently, is highly audible.

Ring in the audioband can be avoided with high-sample-rate digital audio. This is why, all other factors being equal, 96kHz-sampled audio sounds better than 44.1kHz—not because we can hear information above 20kHz. In fact, this pre-ringing is largely responsible for the characteristic “CD sound” of hard textures, flat soundstages, a top-end that is simultaneously closed-in yet bright, and a general lack of an impression of instruments existing in space. Some recent products with so-called “minimum phase” filters don’t exhibit this pre-ringing. These products have greatly improved the musicality of the CD format, and have even allowed us to hear poorly recorded discs with a newfound sense of ease and enjoyment.

Now comes the Meridian 808.2 Signature Reference CD player and its “apodising”¹ digital filter that not only doesn’t introduce pre-ringing, but also removes pre-ringing that was imposed in the analog-to-digital converter used to record/master the CD (or other subsequent signal processing). This is a startling development; the ability to remove this significant source of degradation that is imprinted on all the music in our CD libraries is nothing short of revolutionary—and a milestone in the history of digital audio. The filter, which has some other interesting properties, is described in detail in a pair of

Audio Engineering Society papers by Dr. Peter Craven (“Anti-Alias Filters and System Transient Response at High Sample Rates” and “Controlled Pre-Response Anti-Alias Filters for Use at 96kHz and 192kHz”—see also Bob Stuart’s “Coding for High-Resolution Audio Systems”). The papers include an explanation of how the apodising filter can remove ringing already in the signal that was added by digital filters further up the chain.

So how does the 808.2 and its apodising filter sound? In a word or two, very “un-CD-like.” Seconds into my first listen to the 808.2 I was immediately stunned by the player’s three-dimensionality and the sense of space between instruments. Although I’ve written in the past that certain digital products had a deep soundstage with instrumental images laid out along a continuum from front to back, none of them equaled the Meridian in this regard. In fact, listening to the 808.2 was like walking into a life-sized diorama, so realistic was the soundstaging. This wasn’t one of those differences that you have to listen closely to hear, or one that takes some time to appreciate. Rather, it was a wholesale transformation of the CD listening experience. In this regard, the 808.2 is a singular achievement.

The soundstage was fundamentally different from any other CD I’ve heard. Conventional digital playback tends to sharpen image outlines and flatten them in an almost cartoonish way. Yes, one can clearly localize an instrument, but the instrument’s image has no life and breath surrounding it. The Meridian transforms this aspect of CD playback, presenting images with a halo of air around them and a jaw-dropping sense of the instrument existing in three-dimensional space rather than being pasted

against a flat background. I could hear the expanding air around an instrument’s dynamic envelope, just as one hears it in life. The mighty Spectral SDR-4000 Pro and the Berkeley Alpha DAC also addressed this shortcoming of CD by opening up the soundstage to an unprecedented degree, but the 808.2 recreates acoustic spaces, the relationships of instruments to each other and to that space, and the impression of three-dimensionality like no other CD player I’ve heard. Moreover, this palpability of instrumental images was heightened by the blackness of the 808.2’s

SPECS & PRICING

808.2 CD player/ 808.2i CD player/preamp

Formats: CD audio, CD-R, CD-RW, MP3

Inputs: Six analog unbalanced phono, three coaxial S/PDIF digital, and two TosLink optical

Outputs: One analog unbalanced, one balanced XLR, one digital S/PDIF coaxial, one RJ45 (AES/EBU)

DACs: 192kHz-capable, 24-bit, Delta Sigma operating at 4x CD sample rate

Dimensions: 18.9" x 6.9" x 16.2"

Weight: 40 lbs.

U.S.

Price: \$15,995 (808.2)

\$16,995 (808.2i)

\$19,995 (808.3)

U.K.

Price: £7500 (808.2)

£8500 (808.2i)

£12,495 (808.3)

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EQUIPMENT REVIEW - Meridian 808.2 Signature Reference CD Player

backgrounds and increased contrast between the instrument and that background. The dead-silence between notes seemed to make images that much more believable as instruments existing in an acoustic. These qualities created an almost spooky sense of palpability and realism.

The way notes decayed was also different from any other CD player I've heard, with the notes seemingly decaying more gradually and hanging in space longer. The sound was the antithesis of dry and truncated. I'm not just talking about the ability to hear deep into the reverberant field of the hall (which the 808.2 is also superb at

reproducing), but into the duration and decay of the notes themselves.

The 808.2 playing CDs also sounded very much like a high-resolution source in its ability to resolve individual musical lines, even those of quiet instruments at the back of the stage during loud, dense passages. I experienced a sense of ease, as though my brain weren't working as hard to unravel the sound into musical meanings. Instead, I felt what could be described as "intense relaxation," as the music came to me in an utterly natural, unforced way.

The 808.2's bass and dynamics were good, but

not the state-of-the-art as were other aspects of the presentation. The bottom end tended to be polite and refined rather than visceral and driving. The Berkeley Alpha DAC, for example, has deeper extension, more weight, greater muscularity, and wider dynamic impact.

This minor point aside, listening to favorite and familiar music through the 808.2 was mind-blowing. It was as though my CD library had been re-mastered, so great was the improvement. To hear newfound spatiality, bloom, air, dimensionality, and ease in old favorites was immensely rewarding—and a totally unexpected

technical achievement. CDs I've listened to for decades opened up and delivered more musical expression than I've heard from them before—or ever expected to hear from them. Of course, poor recordings won't sound like audiophile discs. But the 808.2 will allow them to be heard without being overlaid with the problems we've long associated with CD.

CONCLUSION

The Meridian 808.2 is, in my estimation, the most significant product in the history of the Compact Disc. Through an incredible and unlikely stroke of fortune (the ability to remove pre-ringing after the fact), the genius of the apodising filter's creator (Peter Craven), and Meridian's 26-year expertise in CD player design, our CD collections can be played back with a degree of musical involvement no one in his wildest imagination thought possible from the CD format. **tas**

¹ The term "apodising" comes from optics and radio astronomy. Sharp edges at the boundaries of optical lenses or radio dishes create ripples in the diffraction pattern, analogous to the ringing in digital filters. In radio telescopes, the contribution from the outer edge of the disc is attenuated to reduce this effect, a process called "apodisation."

FEATURES & FUNCTIONS

The 808.2 comes in two flavors: a straight CD player with a fixed output level (808.2), and a CD player with a variable output and full preamplifier functions (808.2i). The units look identical from the front, and share their styling with other Meridian 800 Series products. And although the 808.2 looks like the 800 CD player, virtually every subsystem is new for Meridian's all-out assault on the state of the art in CD playback.

The front panel contains a large display that shows the disc track and time, function ("Loading," for example), and on the 808.2i version, the selected input and volume setting. The 808i also offers the options of using it in fixed output-level mode and accepting external sources. Transport controls are arranged in a row of very large rectangular buttons beneath the display. A fold-down door,

signed by Meridian founders Bob Stuart and Alan Boothroyd, accesses less-used transport controls such as scanning and repeat. The 808.2i version adds source selection and volume buttons behind the door. The remote is a large, two-handed affair that can operate a complete Meridian system. Thankfully, it includes an absolute-polarity switch.

The rear panel contains lots of jacks and connections unique to Meridian (the 808.2 will often be used to drive a pair of Meridian's active digital loudspeakers). In addition to the proprietary Meridian connections, an RS232 port is provided along with three trigger outputs. Analog output is on balanced XLR jacks and unbalanced RCAs, and a digital output is available on an RCA jack. Note, however, that the digital output is at 88.2kHz, not 44.1kHz. The 808.2i version offers six unbalanced

analog inputs, three coaxial digital inputs, and two TosLink digital inputs. These inputs can be named by the user, with the name appearing in large letters on the front-panel display.

The 808.2 is the culmination of Meridian's 26 years of experience in CD-player design. The unit is based on a CD-ROM drive with the ability to re-read, at high speed, sections of the disc that contain errors. The data are put through a FIFO (first-in, first-out) buffer, and clocked out with high precision. A DSP with 150 MIPS (millions of instructions per second) of horsepower then upsamples the data to 176.4kHz at 24 bits. As mentioned in the review, the digital filter is a custom design running on a separate DSP platform. The DACs are Delta-Sigma types capable of running at 192kHz. Much attention was paid to minimizing jitter. **RH**

EDITORS NOTE

The 808.2 has been replaced by the 808.3. The new model, priced at \$19,995, includes the preamplifier functions of the 808.2i, along with a port for direct connection to the Meridian Sooloos music server. The two players are sonically identical.

EQUIPMENT REVIEWS Multi-Format Disc Players

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REFERENCE SERIES 2010

Oppo BDP-83 Blu-ray/Universal Player

Better Than It Has Any Right To Be

Chris Martens



Audio and home-theater enthusiasts have long dreamed of owning disc players that could handle virtually every type of material they might want to play—movies in either Blu-ray or DVD format, CDs, and high-resolution audio discs in the SACD, DVD-Audio, and HDCD formats. What's needed, of course, is a combination Blu-ray/universal player, but building one is easier said than done—in part because the technical requirements of the various disc types vary considerably. But despite the technical challenges involved, a Blu-ray/universal player is precisely what Oppo Digital set out to create in its new BDP-83. And now that we've lived with Oppo's brainchild for the past few months, we're pleased to report that it is quite possibly the most universal "universal player" of them all.

To appreciate the magnitude of Oppo's achievement here, consider the fact that the only other player presently offering comparable functionality is Denon's flagship model, priced at a whopping \$4500. In contrast, the BDP-83 sells for what seems like the bargain basement price of \$499.

Of course there is a big difference between merely playing many different types of discs and actually playing them well—a fact the people at Oppo well understand. Happily, they are on the same page with most TAS readers and take great pride in building A/V "giant killers"—players whose video and audio performance far exceeds customers' expectations given their modest prices. As you'll learn in a moment, Oppo has pushed the performance/dollar ratio higher than ever before with the BDP-83, so that the player establishes a new benchmark in terms of value for money.

Recognizing that the interests of TAS readers center on music and sound quality, I will give only a brief summary of the Oppo's video performance capabilities. Let me start by saying that the BDP-83 is a very full-featured video-disc player. It incorporates,

for example, an Anchor Bay VRS (Video Reference Series) video processor—normally found only in far more expensive components. The player can scale video signals for 480i, 480p, 720p, 1080i, or 1080p output at 50Hz or 60Hz, and it supports 24p (movie frame rate) output from Blu-ray discs and from "well-mastered DVDs." After putting the BDP-83 through some DVD benchmark tests, I found it easily equaled or surpassed the DVD performance of any player I've yet tested, regardless of price. Then, on reference-grade Blu-ray demonstration materials from the Spears & Munsil High Definition Benchmark Blu-ray Edition disc (a free copy of which comes with every BDP-83), I found that the Oppo's picture quality was breathtaking—giving a noticeably smoother and more film-like presentation than I've observed from other Blu-ray players.

But how does the Oppo fare as a music-oriented, multi-format disc player? The short answer is that it does much better than it has any right to given its price. Early on, I discovered the fundamental character of the BDP-83's sound is

markedly different from that of earlier-generation Oppo players. Past Oppos were characterized by a slightly cooler-than-neutral tonal balance and an emphasis on definition and clarity. The BDP-83, however, introduces a noticeably warmer, fuller, and richer sound—serving up full-bodied bass, luminous and well-defined midrange frequencies, and sweet highs free of edginess and glare.

Diehard audiophiles are bound to ask how good the Oppo is in an absolute sense. Let me try to answer that question by saying the BDP-83 could probably hold its own in comparison with many of the \$1000 "audiophile-grade" CD players I've heard and could perhaps compete even further up the audio food chain. As an experiment I compared the BDP-83 to the NAD Masters Series M55 Universal Player (\$1800) I use as a reference, and found that, while the NAD clearly sounded better, it did not beat the Oppo by large margins. Specifically, the NAD offered somewhat more refined bass, a more revealing and open-sounding midrange, and a more transparent and focused rendering of treble details. But bear in mind that the NAD cannot play

EQUIPMENT REVIEW - Oppo BDP-83 Blu-ray/Universal Player

Blu-ray discs and costs roughly 3.6 times what the Oppo does. My point: The Oppo offers exemplary sound quality at its price and can only be surpassed by substantially more expensive components.

On CDs, I found that the Oppo's sounded both soulful and expressive. To explain what I mean, let me draw some examples from a well-recorded acoustic blues album I've enjoyed a lot lately. Blues artist Eric Bibb's *Get Onboard* [Telarc] features many songs with simple yet deeply moving arrangements that showcase Bibb's rich, mellow voice. One such track is "God's Kingdom," which has the feel of an old-timey spiritual, where Bibb's voice and tremolo guitar are supported only by drums, tambourine, an organ played by Glen Scott, and the sparse backing vocals of Scott and Nikki Leonti.

The Oppo did a great job of capturing the taut, deep "thump" of Scott's bass drum, the crisp "snap" of his snare drum rimshots, and the gentle sparkle of his high hats. Bibb's guitar sets the rhythm for the song, but his richly sculpted voice—presented front and center—carries its melody and draws most of our attention. I was impressed by the way the Oppo captured the richness and three-dimensionality of Bibb's voice and by its vivid pinpoint imaging, which heightens our emotional involvement in the song. One of the Oppo's strengths is its ability to present layers of soundstage depth with precision. Perhaps the only thing missing is that elusive sense of high-frequency "air" surrounding the

instruments and performers. To get that kind of sonic refinement, I suspect you'll need to invest in a far more costly player.

Unlike many universal players I've heard, the BDP-83 does an equally good job with high-resolution DVD-Audio and SACD materials, providing enough detail and definition to show you why high-res formats are worthwhile in the first place. Let me illustrate this point by describing the Oppo's performance on a strikingly well recorded SACD disc I've recently added to my rotation.

Jen Chapin's *reVisions* [Chesky, SACD] offers imaginative jazz treatments of Stevie Wonder songs performed by a trio made up of Chapin, who supplies vocals, Stephen Crump on acoustic bass, and Chris Cheek on saxophones. You might think it would be difficult for a minimalist ensemble to capture the feel of Wonder's often elaborate arrangements, but the trio does a fabulous job—making the flow of Wonder's individual musical lines stand out with unexpected power and lucidity.

From the moment you hit the "Play" button on the Oppo, this disc sounds terrific, and there is no better example than the opening track: Wonder's humorous yet biting "You Haven't Done Nothin'." On the right side of the stage, Crump jumps in with a fiery, syncopated bass line, while on the left, Cheek contributes incisive, sardonic comments carried by the deep, plunging voice of his baritone sax. At center stage, but standing a bit behind her sidemen,

is Chapin, whose feisty and occasionally sardonic voice flirts with edginess, while delivering swooping inflections that drive home the point of Wonder's lyrics with the force of a whip-crack.

The Oppo's presentation proved impressive in several ways. First, its soundstaging was precise and almost shockingly holographic. The performers appear at the exact locations I've described, which turn out to be faithful to the recorded event (Chesky supplies a stage "floorplan" diagram, so you can compare what you're hearing to the actual locations of the performers). Next, the timbres of the bass and sax were spot on and highly detailed. You can hear the mouthpiece action and reed of Cheek's sax and the sheer physical size and deep woody tonality of Crump's bass. But the Oppo focuses your attention on Chapin's voice, presenting each inflection, swoop, and emphasis with solidity and clarity, creating the illusion that Chapin is standing just a few feet away. This vividness and realism are a big part of the Oppo's appeal.

Oppo's BDP-83 Blu-ray/universal player is more versatile than most other players at any price, and it offers better picture and sound quality than anything I've seen or heard at its modest price. I would argue it represents the biggest bargain going in today's home-theater marketplace, and it also makes a wonderful starter player for audiophiles who want to sample the rich diversity of formats that contemporary digital audio has to offer. **tas**

SPECS & PRICING

Oppo BDP-83 Blu-ray/Universal Player

Disc/file formats supported:

BD-Video, DVD-Video, AVCHD, DVD-Audio, SACD, CD, HDCD, Kodak Picture CD, AVCHD and MKV files via USB drives

HDMI audio bitstream support: Dolby

TrueHD, Dolby Digital Plus, Dolby Digital/Digital EX; DTS-HD Master Audio, DTS-HD High Resolution Audio, DTS-Digital Surround; SACD via DSD bitstream or LPCM conversion, LPCM 7.1-channel, 5.1-channel and 2-channel

Outputs 1080p at: 24Hz, 50Hz, 60Hz

Video outputs: One HDMI, one component video, one composite video

Digital audio outputs: One HDMI, two digital (one coaxial, one optical)

Analog audio outputs: One 7.1-channel analog audio, one stereo analog

Other connections: Ethernet (for firmware updates and BD-Live content), two USB ports, IR in/out, RS-232 (optional)

Dimensions: 3" x 16.875" x 13.25"

Weight: 11.2 lbs.

Warranty: One year, parts and labor

ASSOCIATED EQUIPMENT

NAD Masters Series M55 universal player, Sony BDP-S350 Blu-ray player, Rotel RSX-1550 and Onkyo TX-SR607 A/V receivers, Acoustic Energy Radiance-Series 5.1-channel surround speaker system, Anthony Gallo Acoustics Reference Strada 5.1-channel speaker system, PS Audio Power Plant Premier power regenerator and other power distribution equipment, RGPC 1220 power conditioner, Ultralink/XLO cable system

U.S.

Price: \$499

OPPO DIGITAL, INC.
(650) 961-1118
oppodigital.com

U.K.

Price: £510

CRT PROJECTORS
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Surprising Refinement and Versatility

Cambridge Audio DVD99

Chris Martens

The \$399 DVD99 is presently the only universal player offered by Cambridge Audio, a value-minded British firm known for building products that offer terrific performance/dollar—a reputation we think the DVD99 is sure to enhance. As we spent time with the DVD99, we found it had three defining characteristics: video performance that is a cut above the norm for this class, refined and surprisingly sophisticated sound quality, and an unusual degree of versatility (thanks to a special features set that gives the player capabilities that few other in this—or any—price class can match).

KEY FEATURES

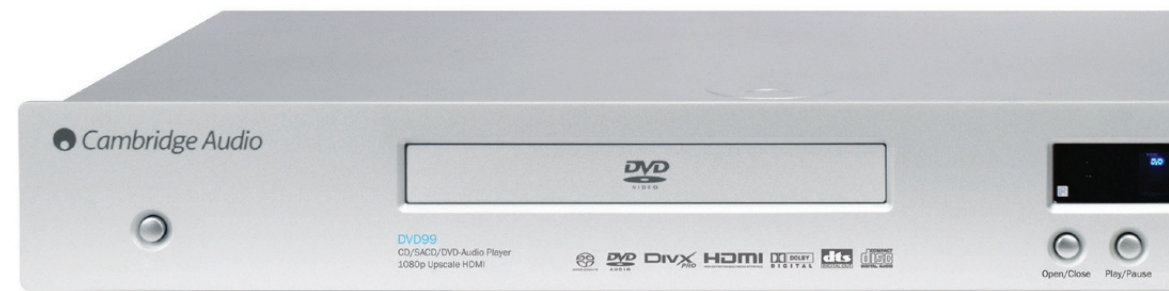
- HDMI upscaling options: 480i, 480p, 720p, 1080i and 1080p.
- 7.1-channel Analog Audio Outputs
- USB 2.0 Connection: Allows player to access and play material stored on USB flash/memory cards or other “mass storage devices”
- RGB/SCART A/V Connections: The DVD99 is the only player in this survey to support this distinctive combination audio/video interface, which is often used on European-spec televisions and monitors.
- PAL (European format) < - to- > NTSC conversion
- Variable Analog Outputs with Volume Control

USER INTERFACE

The DVD99 provides one of the best user (and most versatile) user interfaces we’ve seen on

any universal player, and the remote is quite nicely designed, too. Highlights include:

- Analog audio setup support for both 5.1 and 7.1-channel systems.
- Analog audio channel trimmers that provide a full +/- 10dB range of adjustment.
- Audio as well as (some) video settings that can be adjusted “on-the-fly;” that is, while disc are playing—a feature few players at any price provide.
- An OSD (onscreen display) button on the remote allows users to access a wide range of information on discs being played.
- A CD MODE button turns off any connected display device to minimize potential “screen burn” when playing audio-only discs.
- Direct PAL/NTSC switching from the remote control.
- Direct USB input switching from the remote control.



- A volume control on the remote regulates levels from the DVD99’s analog audio outputs. Note: This feature means the DVD99 can be connected directly to self-powered speakers to create cost-effective, minimalist systems. The DVD99’s user interface is so good that it leaves little to wish for, though two “gild-the-lily” touches we would like to see are an onscreen display that accesses SACD track titles and variable crossover frequencies for subwoofers (both are features some of the best players in this class provide).

VIDEO PERFORMANCE

Cambridge Audio doesn’t specify the video processor/de-interlacer used in the DVD99, but on the basis of our benchmark tests, conducted using the Silicon Optix HQV Benchmark DVD Ver. 4, we’re prepared to say it’s certainly a good one. In fact, on certain benchmark tests

the DVD99 outperformed the Faroudja DCDi-equipped players tested in this survey, with results as noted below:

- Color Bar (resolution) Tests: The DVD99 looked nearly perfect, with no “banding,” even on the most finely-spaced resolution test lines.
- Jaggies Tests: The DVD99 exhibits virtually no “ripple” on most jaggies test, and only barely perceptible “ripple” on worst-case tests.
- Noise Tests: While all players did a pretty good job of minimizing noise, the DVD99 did an exceptional job of suppressing noise.
- Motion Adaptive Noise Tests: The DVD99 performed flawless on these tests and—importantly—did so while doing an exceptional job of preserving fine image details. In one part of the test a tour boat is seen passing under a bridge, and the

EQUIPMENT REVIEW - Cambridge Audio DVD99

Cambridge player made the boat's name—"Portofino"—look sharp as a tack, which not all players we tested could do.

- **Film Detail Tests** (scene of a racecar passing in front of empty grandstands): Like most players we tested, the DVD 99 exhibited momentary moiré patterns visible in the grandstands before the processor intervened and the image locked in.
- **Cadence Tests:** The DVD99 not only performed well on the "big two" formats (2-2 30fps Video and 3-2 24fps Film) but also did well on most, though not all, of the less common IDVCAM, Vari-Speed, and Animation cadences.

Real world DVD tests confirmed what the benchmark tests already led us to expect; namely, that the DVD99 is a very fine DVD—probably one of the top three in our survey. With the player set for 1080i upscaling, the Cambridge offered a smooth, sharp, generally film-like presentation with much better than average resolution. In *House of Flying Daggers*, the player did a great job of teasing out the details of intricately carved and brightly colored interior of the Peony Pavilion—an interior many players tend to make look too soft (almost as if the camera were slightly out of focus).

What is more, the DVD99 acquitted itself well on acknowledged cinematic torture tests, such as the *Seabiscuit* scene where the camera pans over a black & white photo of a man wearing a finely patterned hound's-tooth jacket. Most players exhibit noticeable moiré problems when those jacket surfaces appear, yet the Cambridge player did not. My point is that the DVD99 gives you images with greater resolution, and greater freedom from potential playback problems, than most other players do.

AUDIO PERFORMANCE/ SONIC CHARACTER

Sound quality is also a significant part of the DVD99's appeal, though I would want to acknowledge from the outset that it does not sound equally good on CDs, SACDs, and DVD-Audio discs. I would say the DVD99 is a good CD player, a better DVD-Audio player, and an extremely good SACD player. That said, however, I should also point out that even the Cambridge player's baseline CD performance compares quite favorably with that of most other players in our survey. This player's general sonic character starts out shaded ever so slightly to the bright side of neutrality, while offering good measures of detail and resolution. The only drawback, really, is that the player can sound just a touch lean or slightly "etched" on some (though not all) CDs. As you step up to DVD-Audio material, and especially to SACDs, three good things happen: first, overall resolution improves; second, three-dimensionality improves; and third, a richer, warmer, and more vibrant sound emerges. What's not to like about that?

MUSICAL EXAMPLES

I put on "Mood Indigo" from the Joe Wilder/Marshall Royal Quintet's *Mostly Ellington* [Blueport/NuForce CD, reviewed elsewhere in this issue], and was simply floored at how lovely and lifelike the Cambridge player made the recording sound. The DVD99 succeeded largely because it revealed, but did not exaggerate, the recording's numerous small details, which together add up to terrific realism—realism few players in this class can match. You can hear, for example, subtle mouthpiece and reed noises from Royals' alto sax, as well as the almost subliminal sounds of him drawing breaths between phrases, all set

in contrast to stunningly beautiful timbre of the sax itself. While the record sounded perhaps a touch brighter and more lightly balanced through the Cambridge than through other more warmly balanced players, the DVD99's strengths more than offset its weaknesses.

But on well-recorded SACDs, such as the Reiner/Chicago performance of Bartok's *Music for Strings, Percussion, and Celeste* [RCA Living Stereo, multichannel SACD], things get even better. Through the DVD99, this difficult-to-reproduce piece sounds clean, angular, and exciting, revealing that inherent richness of orchestral tonal colors without any stridency, edginess or glare. And, thanks to the player's good levels of resolution, you can clearly hear the reverberant acoustic of the recording space, too. **tas**

LAST WORD

Sound offers good levels of detail and resolution adding up to compelling realism.

- Sounds good on CDs, even better on DVD-Audio and SACDs
- Much better than average picture quality thanks to superior resolution, low noise, and freedom from glitches.
- Excellent user interface.
- Can sometimes sound a touch bright or lean, at least on some recordings.
- Video benchmark tests reveal some minor weaknesses.

BOTTOM LINE:

Cambridge Audio DVD99 is sophisticated and highly versatile universal player that offers much better than average video quality, plus refined, high definition sound that is very effective for CD playback, and even better on DVD-Audio and SACDs. The player's user interface, let's not forget, is also a thing of beauty. **PB**

SPECS & PRICING

Cambridge Audio DVD99 universal player

Formats: DVD-Audio/Video, DVD-R/RW, DVD+R/RW, SACD multichannel/stereo, CD, MP4, and DivX

Audio outputs: Two digital audio (one optical, one coaxial), 5.1/7.1-channel analog audio, SCART, HDMI

Video outputs: One (each) composite video, S-video, component video, RGB/SCART, HDMI

Other input/outputs: One USB 2.0

Dimensions (HxWxD): 2.17" x 16.93" x 10.35"

Weight: 5.7 lbs.

U.S.

Price: \$399

AUDIO PLUS SERVICES

(800) 863-9352

audioplusservices.com

U.K.

Price: £150

CAMBRIDGE AUDIO

Gallery Court,

Hankey Place,

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Esoteric X-05 CD/SACD Player

[View from the Top](#)

Neil Gader

The Esoteric X-05 is a CD/SACD player that makes you want to gather every compact disc in your collection and give it another spin. And all the more so if you're still listening to vinyl. It's that good. It may also provoke you to wax philosophical about things that might have been—the “ifs” of high-end audio. If SACD had been universally embraced as the high-resolution format, it might have been heard at its best by more than just the choir of the converted. The point is that unless you've experienced SACD in a fine system played back on a player like the Esoteric X-05, you haven't heard the resolution and musicality of which the format is capable. The most important point, however, is that the Esoteric doesn't make you choose between quality CD or SACD reproduction. It's superb on both fronts.

From the moment I unpacked the X-05, the unyielding containment of the fortress-like chassis was beyond impressive. The front panel is heavy extruded aluminum, and the top, sides, and bottom steel plate are all 5mm thick. The toroidal transformer sits atop an additional 5mm base for improved vibration isolation. The chassis sits on the massive Esoteric-designed unique “pinpoint” isolation feet for an additional level of isolation. All in all, it's 39 pounds of seamless integrity.

At its core, the front-loading X-05 is basically (and I use this next phrase advisedly) an entry-level version of the X-03 player. Rather than BurrBrown DACs, the X-05 uses Cirrus Logic's 24-bit/192kHz DAC in a dual-mono configuration. The analog output circuits also maintain this dual-mono topology.



EQUIPMENT REVIEW - Esoteric X-05 CD/SACD Player

In fact, the basic internals of the X-05 are similar to those of many high-quality players with one notable exception—Esoteric’s precision VRDS-Neo disc-drive mechanism. The latest incarnation of this technology, which has evolved over the past 21 years, is the VMK-5—a massive, vibration-free, aluminum and polycarbonate turntable optimized for the high-speed rotation of SACD. The X-05 player brings this latest mechanism to a new lower price. Derived from the more massive VMK-3, the VMK-5 is a lower profile, lighter-weight design but it’s essentially the same in operation. It uses a polycarbonate anti-resonance disc clamp framed and cross-braced in aluminum that locks to the platter to reduce disc resonances. The shaft-mounted laser-pickup assembly was derived from the P-03 transport. The elegant clamping operation is visible through an illuminated window on top. (For further coverage of the fanatical build-quality of the VRDS drive mechanism, see Robert Harley’s comprehensive review of the Esoteric P-03 transport and D-03 DAC in Issue 171.)

What matters more than the X-05’s imposing and impressive architecture is that there’s a heckuva lot of music going on—more dimensionality, more air, more space. Silences and orchestral pauses are not reproduced as cold, antiseptic voids. There’s sophisticated low-level ambiance at play, and the softly shifting air pressure of a venue’s acoustic can be felt upon the skin. Whereas most compact-disc players possess a residual hardness and a flattening of three-dimensional space, the X-05 restores a level of warmth and depth that to these ears is consonant with music but rare with digital playback. You hear it when Tierney Sutton sings “Wouldn’t It Be Lovely”

from *Something Cool* [Telarc]—she is audibly holographic within the soundstage, instead of appearing as a disembodied voice emanating from the ether.

Tonally, the X-05 casts music in a slightly darker, warmer light but not in the ordinary sense of frequency response. Flat frequency response among CD players is pretty well an incontrovertible fact. But through the X-05, the silky upper-octave harmonics, the air, and the transient attacks are palpable, freed from the glassy haze that overlays most digital playback. Whenever I listened to Laurence Juber’s stunning solo guitar arrangements on *Plays The Beatles* [Solid Air], I heard the retrieval of resonances, decays, and gradations of overtones and micro-dynamics that led me to only one conclusion—music as expressed by the X-05 simply sounds more settled than showy. I think this is one of the reasons that when friends come by to listen and allow me to compare the vinyl and its CD counterpart on other CD players, the response is more often than not, “Wow, the vinyl sounds so much more relaxed.” My friends are hearing fewer artifacts—something consonant with what they hear in everyday life. It’s a sound they have to expend less effort to enjoy. It may not be scientific, but that analog-like effortlessness is also what I hear with the X-05.

Even more telling is the amount of additional harmonic saturation and dynamic jump that occurs during SACD playback. Mandolin and steel-string guitars become veritable springboards of microdynamic energy. The tonal distinctions between nylon and steel string guitars are more vividly accented. During Warren Bernhardt’s “I Mean You” from *So Real* [DMP Records], the

piano sound was a continuous line of energy which fused with the ambient environment of the studio. The acoustic bass was fat and resonant, but also defined in pitch and distinct in timbre. Images were precisely positioned—I noted how the drum kit appears directly behind and slightly to the right of the left channel. The images were so steady that they might have been glued to the floor.

Traditional Red Book CD playback is even more important in a market where the number of new SACD titles is limited. The X-05 didn’t falter. I recently reviewed the remastered deluxe editions of Cat Stevens’ hit albums *Tea for the Tillerman* and *Teaser and the Firecat* [Island]. I first reacquainted myself with the original vinyl LPs, which were very good recordings for their day. As played back via the X-05, the remasterings exemplified image focus and a surge of dynamic and transient energies. It also illustrated the vinyl’s limitations, namely a muted, softer vocal image and subdued transients. While the vinyl preserved its reputation with a winning sense of continuousness and ambience, the X-05 had nearly closed that gap, too. On balance neither format carved a clear path to sonic victory during this particular engagement. Perhaps the salient point that I keep returning to is that the X-05 manages to sound warmly analogous to analog minus vinyl’s most annoying artifacts—all the while offering the traditional virtues of digital in the lower noise floor and the heft and punch in the bass regions. I can’t say for sure, but I’m left with the impression that at least a few of Esoteric’s engineers might just be closet vinyl junkies.

CONCLUSION

There aren’t enough superlatives to describe this machine. Frankly it’s almost hard to imagine what further delights can be gleaned by ascending into Esoteric’s flagship P-03/D-03 territory. While I’m certain these rewards exist exactly as Robert Harley described them, keep in mind that the rest of the system chain needs to have every “i” dotted and “t” crossed first, just like RH’s. Meanwhile, for those of you who don’t have the wherewithal to reach for the summit just yet, I heartily commend the X-05. You will experience your music in a new light. The view up there is dazzling. **tas**

SPECS & PRICING

Analog outputs: Balanced stereo on XLR jacks, unbalanced stereo on RCA jacks

Digital outputs: One optical, one coaxial

External clock input: BNC

Dimensions: 17.5" x 6" x 13.25"

Weight: 38.9 lbs.

U.S.

Price: \$5995

TEAC AMERICA, INC.

Esoteric Division

7733 Telegraph Road

Montebello, CA 90640

(323) 726-0303

teac.com/esoteric

U.K.

Price: £3500

SYMMETRY SYSTEMS

Suite 5, 17 Holywell Hill,

St Albans,

Hertfordshire AL11DT

symmetry-systems.co.uk

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Wadia 781i CD/ SACD player

Back in a Big Way!

Roy Gregory



In the world of product marketing, brand value is hard won and should be jealously guarded. It's something that Wadia have done well and few products are as instantly or unmistakably identifiable as those emanating from their factory. The 860 CD player that first appeared in Issue 4 of *Hi-Fi+* was not a new product then, but it is virtually indistinguishable from this model under review. My own 860 evolved through 861 and 861SE guises without so much as turning a hair, surviving for many a year at the top of my own personal digital tree, seldom surpassed (and then only by players at a far higher price) and only once equalled by a machine that might be considered a serious competitor. But whilst that longevity and upgradeability are both commendable and reassuring, they also masked a worrying reality. As good as the 861 is, should it really take ten years to better its performance? And while that reflects a degree of design atrophy on the part of the competition, it also reflects something of a hiatus for Wadia itself, a decade of uncertainty and shifting fortunes that created the first cracks in what had been an industry edifice. Things were moving fast and the digital landscape was shifting rapidly—only Wadia wasn't. Suddenly, that four-square casework didn't seem quite such a virtue. Stuck with aging if still impressive products, the sharks began to circle – only to receive a bloody nose. Wadia is back and in a big way; and best of all it's still the Wadia that was.

First indication was the 581 CD/SACD player reviewed in Issue 60, which quickly re-established its benchmark status. Pure Wadia, it shared the casework, essential operating principles and functional versatility on which its predecessors built their considerable reputations. It added an entirely new clock design, a massively

reengineered and heavily regulated power supply section, SACD replay (with its own dedicated decoding algorithm) and a new discrete Class A analogue output stage. Add in the optional digital inputs and outputs along with the necessary switching and a cleverly executed digital volume control, and you had a thorough going update

EQUIPMENT REVIEW - Wadia 781i CD/SACD player

You are here

on everything that made Wadia what it was – including the sound. But the really sly move, the sucker punch if you like, was the i170 transport, a neat little iPod dock with a difference; it didn't just connect a portable player to your system, it was able to extract a digital signal from the little beast, transforming it in one fell swoop into a potential audiophile plaything. After all, WAV files encoded on a solid-state memory combined with the 581's decoding capabilities make for pretty serious sound quality.

And just when you thought it was safe to revisit your record collection, along comes the 781i, essentially a tuned and tweaked 581 that offers the latter's input, output and switching options as standard, adds a larger power transformer, more reservoir capacitance and regulation, and tops that off by extending the inductive filtering to embrace the analogue sections as well, whilst also adding additional mechanical damping to deal with the vibrational energy generated by all those extra PSU components. This is as good as it gets in a single box, at least as far as Wadia are concerned.

Digitally speaking, the heart of the DAC remains a dual processor driven gate-array, running Wadia's Digimaster 2.5 decoding software. With a sampling rate of 1.4112 GHz and 24bit resolution, this offers three alternative algorithms for CD replay (which could be summed up as A – standard, B – crisp and dry and C – warmer and a little rounded) and Wadia's own SACD algorithm, which they claim restores rise-time deficiencies in the original encoding. In current production the AT&T glass optical input has been replaced with the now essential USB connection, making the Wadia more computer audio compatible and, therefore, future-proofed.

Consider the 781i as a DAC, digital pre-amp and control centre, which happens to have a darned good transport section tacked on and you start to get the picture. It really has got pretty much everything you could require. Wadia even offer a separate A to D converter that could be used to route the signal from an occasionally used turntable through your digital pre-amp and, who knows, onto a hard-drive or server-based system – such is the way of the hi-fi of tomorrow.

But the real question remains, does it justify the price hike over a 581ise on sonic grounds? The answer to that is a resounding, "Yes!" All that work on the power supply has really paid off, with the 781 delivering a noticeably lower noise floor, expressed as greater transparency, focus and dimensionality. Backgrounds are blacker, stages deeper and more dimensional. But what really tells is the increased sense of stability, both in the way that images and the acoustic stay anchored in space and the added jump and faster rise time on dynamics, large and small. These differences are neither particularly subtle nor unimportant. Indeed. Anybody familiar with the 581 is going to immediately recognize the significant increase in musical authority and communication that flows from the 781's output sockets. Straight from cold its qualities are manifest (although they do blossom over the first 48 hours or so, and the review machine was already well run-in) hardly requiring side by side comparison. Having said that, I've been fortunate enough to have the 581 in-house for quite some time and it stayed throughout the 781's extended visit too. Do you get the sense of a certain reluctance to part with these players?

The Lim K2 CD re-master of the Solti/LSO

recording *Romantic Russia* is a perfect example of the 781's clear sonic and musical superiority. Even an orchestral pot-boiler like 'Night On The Bare Mountain' benefits from its advantages. As impressively present and dynamic as Solti's reading is on the 581, the 781 adds a greater sense of acoustic space, orchestral layering and dimensionality. Instruments have more body and shape, with the identity and tonality of the bass instruments in particular being far more natural and floating in a more convincing way, the floor clearly audible beneath them. Timing and phrasing improve too, meaning that even when you know what's coming the drama and impact of the orchestral tuttis still thrill, the dynamic contrasts are still extreme. Solti takes the piece at a fair old clip, contrasting that with pauses between passages, and the torrid, almost frenetic pace which sounds hurried, tumbling and two-dimensional on the 581 gains poise and a driven purpose on the more accomplished player.

While the spatial differences are perhaps the most immediately apparent effect of the 781's internal improvements, it is actually that precision when it comes to the timing, placement and weighting of notes that makes the musical and expressive difference. Take a listening to the Esoteric SACD re-master of Curzon playing Mozart's Piano Concertos 20 and 27 (Britten and the ECO). With the 781 doing the talking, the almost crystalline clarity and beautifully judged shaping of Mozart's melodic lines are perfectly poised against the orchestral backing of the ECO, Britten conjuring colour and texture from the modest forces available to coax every last ounce of drama from the intricate score of Mozart's final piano masterpiece. Curzon's playing is both

SPECS & PRICING

Wadia 781i CD/SACD player

Type: One-box CD/SACD player

Decoding: Wadia Digimaster 2.5 Algorithm running on a dual processor gate array with 24bit resolution and a sample rate of 1.4112 GHz

Digital Inputs: 1x S/PDIF (BNC)

1x USB (B type)

1x TosLink Optical

1x AES/EBU (XLR)

Input Data Rate: <96kHz

Digital Outputs: 1x S/PDIF (BNC)

1x Glass Optic (ST)

1x TosLink Optical

1x AES/EBU (XLR)

Output Impedance: 51 Ohms

Output Level: 0.3V - 4.25V internally adjustable

Digital volume control

Weight: 25kg

Dimensions (WxHxD): 432 x 184 x 420mm

Finishes: Black or silver

U.S.

Price: \$14,950

U.K.

Price: £14,999

WADIA DIGITAL

1556 Woodland Drive

Saline, MI 48176

(734) 786-9611

MUSICAL DESIGN

COMPANY

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EQUIPMENT REVIEW - Wadia 781i CD/SACD player

brilliant and sensitive, with a delicacy and intimacy that is almost magical. It is the Wadia's ability to reveal this extra depth in the reading and beauty in the playing that sets it apart. Never artificially warm or excessively polite, the brilliance here is clearly artistic, the advantage over the 581 (and other players) in the expressive range it allows the performers. It simply digs deeper into their technique, their playing and the performance as a whole, taking you closer to its sense and purpose.

This ability to unravel the structure and direction that underpin a musical performance is central to the 781's appeal, whatever genre you choose. And whilst there are plenty of machines that will pull a performance apart, the 781 simply reveals its layers and relationships, an exercise in clarity rather than dissection, one that increases musical communication and involvement, qualities that become even more obvious once you start to play SACD discs. As impressive as the 581 when it comes to SACD replay, the lower noise floor and dynamic advantages enjoyed by the 781 really show what the format is capable of; doubters should form an orderly queue...

But the 781i is nothing if not democratic or generous with its abilities. A perfect piece of *pop de jour* like Lady Gaga's "Poker Face" gains just as much as Puccini or Astor Piazzolla. The heavily layered and manipulated vocals that open the track are easily separated and understood, their manipulation and the almost Meccano like constructional symmetry of the hard-edged techno beats is laid bare, adding momentum to the rhythmic imperative and offering up the perfect lead into that telling hesitation that heralds the Summer's most sublimely catchy pop chorus.

That brief pause is what adds barbs to the hook. Now you know – not just that "Poker Face" is one of those perfect cultural collisions where style, fashion and ennui all combine at a single point in time to create a pop phenomenon (think Britney and "Baby One More Time"), but now you know the how too. And yes, if the 781i can unearth the drivers and emotional tags of bubblegum pop, then believe it can do the same for Beethoven or Brahms, Coltrane or Cannonball Adderley. This is all about access and intent, not the "definition *über alles*" control freakery that robs music of its life, energy and flow. The slashing guitar riffs that tumble across the Cure's *Head On The Door* carve rents across the soundfield, Basie's brass section rips out in perfect unison. The 781 is one of those all too rare products that deals not just in the what and the where, but also in the how and the why – a level of musical insight that escapes all but the best hi-fi equipment.

The 581 retains its benchmark status because of its price-point. It's not that it is necessarily better than players like the Audio Research CD8 or dCS Puccini, but it is the mark against which they should be measured or assessed. The 781 sits on a higher step altogether and yes, in this case it is better than these other machines: it needs to be better than the 581 and easily justifies the difference in price; the Puccini is perhaps closest in style and also offers the option of an external clock to bridge the price and quality gap; but perhaps ironically it's the Red Book only CD8 that offers the most enlightening comparison.

Take something that's played with real passion; the BBC live broadcast recording of du Pre and Barbirolli performing the Elgar Cello Concerto in Prague is a perfect example. At first it's easy

to conclude that the CD8 delivers more body, a richer woodier tone to du Pre's instrument, but as attractive as that rounded warmth and body is, you'd be wrong. The clue lies in the clarity and sense that the Wadia makes of the acoustic space, something you'll pick up in the air as the mics come up, in the incidental noises and shuffles of the orchestra and audience. With the 781 there's much, much more information – about the hall, about what made that noise and where exactly it was. du Pre's opening notes are focussed and held in space, not leaner or paler than the CD8 delivers, but more concentrated and with greater texture and attack, a fact that becomes abundantly clear in the pizzicato sections. So as impressive as the CD8 is – and when it comes to sheer orchestral sweep it's impressive indeed, with real weight, colour and body, the 781 matches it and builds on those qualities. Colour and harmonic tone may fall short of good analogue sources but are more than a match for any of the players mentioned here. Likewise, absolute immediacy isn't in the same league as a good record on a good record player. But having said that the stability, resolution, transparency and dynamic contrasts are up there with the best. So, despite initial impressions (and possible assumptions) while the Audio Research has romance running through its veins, the Wadia tempers it with a little less excess and more finesse, texture and dynamic discrimination, allowing the orchestra and soloist a wider emotional palette, a more sophisticated range of expression.

It is this ability to deliver both detail and the sort of instrumental identity and warmth that makes players like the CD8 so appealing that moves the 781 so close to the digital ideal. Switch to SACD

hybrid discs and the Wadia's superiority over standard Red Book replay becomes even more apparent. Yes, there will always be even more detail, more natural colours and more immediate, more lifelike micro-dynamics; we are, after all, a long way from the live event. But the 781's innate sense of balance and unexaggerated presentation belie its capabilities. It doesn't sound warm or rich until you compare it directly to a player like the CD8. It doesn't sound massively dynamic until you hear other machines struggling to match its sense of musical purpose. It doesn't sound like it's digging deep, deep into the recording until you realize just how much detail and insight other players are leaving behind. What it does sound is right – and that makes it engaging and satisfying in equal measure. The whys and wherefores might take some working out but the immediate musical appeal of the 781, the absolute authority with which it delivers a musical performance, cuts straight to the heart of both that performance and what hi-fi should be all about – the music rather than the means by which it arrives.

If you are in the market for a top one-box optical disc player then the Wadia 781i should be on your must hear list. It ticks all the musical boxes, offers significant added value in terms of its versatility and ability to handle more than one digital source... and it plays SACD too. Having been happy for so long with the 861se, the GNSC mods giving it a timely boost in performance to match the challenge of the 581, it is sobering to acknowledge just how soundly both machines are trounced by the musical dexterity and expressive range of the 781i. I guess negotiations start now... **tas**

Esoteric SA-50 CD/SACD Player and DAC

The Swiss Army Knife of the Digital Age

Robert Harley

Esoteric's new SA-50 CD player offers a host of features and capabilities unimaginable to the original designers of the CD format. Not just a CD player, the SA-50 will spin SACDs, decode other digital sources (including a music-server's output via USB), switch between digital sources, and drive a power amplifier directly. If you have no analog sources in your system, the SA-50 obviates the need for a preamplifier. This architecture not only saves money, but provides better sound quality. After all, the best preamplifier is no preamplifier.

Moreover, the SA-50 is packed with sophisticated technology. The unit offers a wide range of user-selectable upsampling options, a two-stage PLL reclocking circuit to reduce jitter from external sources, a dual-mono implementation of a new 32-bit DAC, a clock input, and a new minimum-phase digital filter (selectable) that doesn't introduce pre-ringing (a type of time-domain distortion).

Although well built and attractive, the SA-50

looks more business-like than Esoteric's more costly offerings. Priced at \$5800, the SA-50 is clearly intended to be an extremely high-value product that provides a multifaceted answer to the needs of today's complex digital sources. In fact, it struck me that the SA-50 is nearly functionally equivalent to the \$23,000 dCS Puccini/U-Clock combination I reviewed in Issue 200. The Esoteric lacks an asynchronous USB interface and external clock, but will do much of what the dCS does at a fraction of the price.

How can Esoteric offer so much for so little? The only concessions to cost that I could see were the flat front faceplate (more expensive Esoteric models have sculpted front panels), a plastic rather than a metal drawer, and...that's it. The unit is built like a tank, weighing in at nearly 40 pounds and featuring Esoteric's three-point vibration-isolation feet. The transport mechanism is a more cost-effective implementation of Esoteric's vaunted VRDS transport, known in the SA-50 as VOSP (Vertically aligned Optical Stability Platform). Although scaled down in implementation, the transport nonetheless maintains the key element



of clamping the entire disc surface rather than just a small area at the disc's center. The custom toroidal power transformer is huge, accounting for a good percentage of the unit's heft.

Let's take a closer look at the SA-50's rich feature-set. The Esoteric offers balanced and unbalanced outputs, along with either fixed or variable operation. In the fixed-output mode, the SA-50 functions as a conventional CD player, with the volume controlled by your preamplifier. In the variable mode, the SA-50 drives a preamplifier directly with volume controlled by the SA-50's remote control. The amount of attenuation is shown in the front-panel display. Note that you must go into the set-up menu to activate the variable-output mode (the default is fixed output). This could cause a problem the first time you connect the SA-50 directly to a power amplifier and play a disc, expecting to be able to adjust the volume via the remote control—you'll get a

surprise in the form of a full-level signal driving your power amplifier.

You can specify in the set-up menu whether pin 2 or pin 3 of the XLR analog-output jack is "hot." This allows you to determine if the SA-50 is polarity inverting or not. If used with a "pin-2 hot" power amplifier, choosing "pin-2 hot" in the set-up menu means the SA-50 is not polarity inverting.

Three digital inputs (USB, coaxial, TosLink) are provided along with front-panel source-switching between these inputs. The combination of a volume control and multiple inputs allows the SA-50 to serve as your system's control center, selecting sources and adjusting the volume. Note, however, that the USB input is limited to 48kHz/16-bit data. This is surprising given that most listeners' music servers will be loaded with high-resolution files, and that 96kHz USB is common. The coaxial and TosLink inputs are,

EQUIPMENT REVIEW - Esoteric SA-50 CD/SACD Player and DAC

however, specified at 192kHz/24bit.

The SA-50 offers four upsampling options. The most basic is called “ORG” (for “original”) which simply puts the signal through an 8x oversampling digital filter. In the “2FS” mode, the unit upsamples 44.1kHz (either from an external source or from the internal disc drive) to 88.2kHz (or 48kHz to 96kHz). The “4FS” mode converts 44.1kHz data to 176.4kHz (and external 48kHz data to 192kHz). Finally, selecting “DSD” converts the PCM data to the 2.8224MHz single-bit Direct Stream Digital format for conversion to analog. This latter feature, in my experience with this and other players with the same capability, offers better sound than when the PCM signal is converted to analog. In addition, when playing an SACD, the DSD bitstream is kept in its native format and converted to analog with a single-bit DAC. This is the only way to hear the full glory of DSD.

You also have the option of two digital-filter algorithms, “FIR” (finite impulse response) or “S_DLY” (short delay). The FIR filter is a conventional type that’s been used since the first days of the CD format (although, here, in a more powerful and sophisticated implementation). The S_DLY filter is a minimum-phase type that adds no pre-ringing to the signal. The recent trend has been away from FIR filters, which some believe are responsible for CD’s hardness and flat soundstaging, toward minimum-phase filters. Note that when playing SACDs, or converting PCM to DSD, neither of these filters is used. (The single-bit DSD format doesn’t require a reconstruction filter, which is perhaps one reason DSD sounds superior to standard-resolution PCM.) The filter is the new AK4399 from the Japanese semiconductor manufacturer AKM.

A rear-panel BNC jack accepts a word-clock signal from an external clock. If you don’t use an external clock, the SA-50 uses a dual-PLL for receiving external digital signals. A dual-PLL reduces jitter, although it slightly increases the time the SA-50 takes to lock to a digital input. (The PLL isn’t used when playing a disc in the SA-50’s transport.) Finally, a digital-output jack is provided for driving another digital device.

All these adjustments and configurations are accessed through the set-up menu and front-panel display. The menu system is straightforward and simple to use. I must also comment on the SA-50’s outstanding remote control. It feels great in the hand, the volume buttons are large and fall naturally beneath the thumb, and the buttons are laid-out well.

Inside, the SA-50 uses dual-differential DACs along with a fully balanced analog-output stage. That is, a balanced signal is created in the digital domain, converted to analog differentially by two DACs per channel (one for each phase of the balanced signal), and then amplified/buffered by two analog stages per channel. This is the right way to create balanced outputs. The DACs are a new chip from AKM, the AK4392, a dual 32-bit device with an internal filter and volume adjustment, although the internal filter isn’t used in this application.

LISTENING

I first evaluated the myriad filter and upsampling options to determine which was best in my system. In comparing the FIR filter to the S_DLY filter, I thought that the FIR filter was more immediate and vivid sounding, with slightly better grip in the bass. The S_DLY filter was smoother in the treble,

a little softer overall, less incisive, and more relaxed. The S_DLY filter setting also produced a more spacious soundstage. I preferred the S_DLY setting, although you should listen to both. I can imagine some listeners preferring the FIR filter’s more up-front presentation. This filter choice was, however, rendered moot by my preference for the PCM-to-DSD conversion mode, which doesn’t invoke either filter. The conversion to DSD was decidedly superior to any of the PCM upsampling modes, which all had a trace of glassiness overlaying the treble compared with the DSD conversion. Converting PCM to DSD resulted in a smoother and more relaxed treble, along with a greater sense of ease overall.

With these settings, and with the SA-50 driving the Pass XA100.5 amplifiers directly via its balanced outputs, the Esoteric player exhibited some outstanding qualities that were surprising given the machine’s extensive capabilities and reasonable price. The SA-50’s most salient characteristic was a palpability and immediacy in the midrange that fostered a sense of “you are there” realism. The presentation was incisive, upfront, and vivid, with crystal-clear delineation between images and the space around them. In its ability to present the music as individual instruments existing in space, the SA-50 was exceptional. The soundstage was the antithesis of thick, confused, or opaque. In addition, the SA-50 presented instruments against a jet-black background, along with a halo of air around the images.

The SA-50’s immediacy was partly the result of a slight tendency toward forwardness in the upper midrange that emphasized certain instruments. In addition to giving the presentation

greater presence, this slight “spotlighting” also tended to somewhat dilute the saturation of tone colors. For some systems, the SA-50’s somewhat forward rendering may be a liability. For my system and taste, the SA-50 was right at the threshold of being too assertive. Nonetheless, I greatly enjoyed the sense of palpability and the feeling that nothing was coming between me and the instruments. For example, Buddy Guy’s great fusion of modern and traditional blues, *Sweet Tea*, starts with a track that features just him and an acoustic guitar. The SA-50 beautifully conveyed the track’s eerily realistic presence and intimacy (both sonically and in the expression of the lyrics), projecting the images just a little farther in front of the loudspeakers than I’ve heard from my reference digital playback.

Going back to the SA-50’s soundstaging, the Esoteric’s excellent separation of musical lines greatly contributed to the player’s ability to convey a recording’s musical values. The clarity with which the SA-50 resolved the timbral and spatial qualities of instruments was no doubt a factor in the consistently powerful sense of music-making it produced. That is, the presentation never sounded like a collection of sounds. Rather, I heard a strong sense of musical coherence, meaning, and expression that not all digital front ends get right. It’s an intangible quality that has nothing to do with treble balance, timbral purity, or most other sonic criteria, but one that in many ways defines the listening experience.

The SA-50’s bottom end was full, tuneful, and articulate, with good dynamic impact on kick drum. I also enjoyed the Esoteric’s powerful rhythmic drive and expression. The extreme bass was slightly rolled off compared to that of

EQUIPMENT REVIEW - Esoteric SA-50 CD/SACD Player and DAC

other digital front ends I had on hand for comparison. This had only a very slight effect on the impact of bass drum, for example, but was audible with very low frequencies such as organ pedal point. Again, the bass roll off didn't affect the timbre of instruments, only the sense of weight and room pressurization from organ pedal tones such as those on Track 7 of Rutter's Requiem [Reference Recordings].

Esoteric has always been at the fore front of delivering great sound from the SACD format and the SA-50 continues that tradition. When playing SACD, the gap between the SA-50 and my reference narrowed considerably. SACDs through the SA-50 had tremendous resolution, ease, spaciousness, and delineation of instruments.

However, when I used the SA-50 as a DAC for my music server (connected via the USB input), I found that the sound noticeably dropped in quality. Switching to the USB input made the sound hard, grainy, and bright, lacking air and transparency. But even comparing CD playback from the SA-50's disc drive against the same music that had been ripped to the server, the disc playback was significantly better sounding in every way. This is at odds with my previous experience, which suggests that music read from a hard drive sounds better than the same data read from a CD (and decoded by the same DAC). The culprit is not the SA-50's digital-input circuitry

or DACs, but rather the USB interface itself. I discovered this by running USB from the server into a dCS U-Clock, which receives the data via USB and converts it to S/PDIF, and then feeding this S/PDIF to the SA-50. The U-Clock's Asynchronous USB interface eliminated the detrimental sonic effects heard when driving the SA-50 directly from the server. If you plan to connect a music server to the SA-50 via the USB interface, I suggest adding a USB-to-S/PDIF converter such as the \$495 Bel Canto USB Link 24/96. The Bel Canto lacks Asynchronous USB, but nonetheless should produce better sound than going straight into the SA-50 with the server's USB output. Moreover, I expect to see stand-alone Asynchronous USB-to-SPDIF converters on the market later this year.

Out of curiosity, I also used the U-Clock's clock output to drive the SA-50, resulting in another improvement in sound quality. One would probably never use a \$5000 clock with a \$5800 player, but the comparison was interesting, nonetheless. It's fascinating to listen to the effects of timing precision on digital-audio reproduction, and I jump at any opportunity to expand my knowledge and experience.

CONCLUSION

The Esoteric SA-50 is a remarkable piece of equipment, performing many of the different functions required of today's

evolving digital front ends. The SA-50 is the ideal solution for those with no analog sources who would like to forego using a traditional preamplifier. Even without these features, the SA-50 would stand on its own at the price for a CD/SACD player. The Esoteric also delivers musically, with a tremendous sense of palpability, clarity, transparency, and resolution. The presentation tends toward the incisive and vivid side, a characteristic that will suit some systems and listeners more than others.

My only reservation about the SA-50 is that the sound through the USB input doesn't begin to suggest the full quality of which the SA-50's outstanding DACs are capable. This is a fundamental limitation of an "adaptive mode" USB interface, but one that can be overcome with an outboard USB-to-SPDIF converter.

With that minor caveat, I can enthusiastically recommend the Esoteric SA-50—the Swiss Army Knife of the digital age. **tas**

SPECS & PRICING

CD/SACD player and DAC

Disc formats: CD, SACD, CD-R/CD-RW

Analog outputs: Unbalanced on RCA jacks, balanced on XLR jacks

Digital inputs: USB ("B" type connector, input up to 48kHz/16-bit), coaxial (input up to 192kHz/24 bit, TosLink (inputs up to 192kHz/24 bit))

Digital outputs: Coaxial, TosLink

Word clock input: TTL levels, 75 ohm, BNC jack (can lock to 44.1kHz, 48kHz, 88.2kHz, 176.4kHz, 100kHz)

Dimensions: 17 3/8" x 6" x 13 7/8"

Weight: 39.6 lbs.

ASSOCIATED COMPONENTS

Wilson Audio Sasha loudspeakers, Basis 2800 Signature turntable with Basis Vector 4 tonearm, Air Tight PC-1 Supreme cartridge, Aesthetix Rhea Signature phonostage; PC-based

music server (built by Goodwin's High-End), Classé Audio CDP-502 CD/DVD-A player, Berkeley Audio Design Alpha DAC, dCS Puccini/U-Clock CD/SACD player and DAC; Pass Labs X20 preamplifier; Pass Labs XA100.5 power amplifiers; MIT Oracle MA interconnects; MIT Oracle MA speaker cable; Running Springs Audio Dmitri, Shunyata Hydra-8, Hydra-2, and V-Ray AC conditioners, Shunyata Anaconda, Python, and King Cobra CX AC cables; Shunyata Dark Field cable elevators; room custom designed and built, acoustic design and computer modeling by Norm Varney of AV RoomService, acoustic treatment and installation by Acoustic Room Systems (now part of CinemaTech)

U.S.

Price: \$5800

TEAC AMERICA, INC.

Esoteric Division
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teac.com/esoteric

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Price: £3995

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dCS Puccini CD/SACD Player and Puccini U-Clock USB Converter/Clock

Virtuoso!

Robert Harley

I've lived with quite a few of the most ambitious digital-playback products in my twenty-one years as a full-time reviewer, but somehow never managed to audition a unit from England's Data Conversion Systems (dCS) until now. That's a shame, because the dCS Puccini CD/SACD player and U-Clock combination has turned out to be one of the world's great digital front ends.

The company dCS has a long history of technical accomplishments in both professional and consumer audio. The firm pioneered many cutting-edge advancements, including the proprietary "Ring" DAC found in all its digital-to-analog converters (see sidebar). Mike Story, dCS's founder, was also at the forefront of high-resolution digital audio long before it was a commercial reality. I attended a paper he presented at an Audio Engineering Society convention in the early 1990s in which he correctly posited that the sonic improvement rendered by high sampling rates was the result of improved time-domain performance due to the relaxed filter requirements. That's accepted wisdom today, but

it was revolutionary nearly twenty years ago. Over the decades dCS has addressed such topics as upsampling, PCM-to-DSD conversion, jitter, noise-shaping, the time-domain performance of digital filters, and other issues long before they became part of the high-end mainstream.

dCS is again taking the technology lead with the U-Clock, a device that vaults the sound of the company's Puccini CD/SACD player into new sonic territory while simultaneously expanding its functionality to incorporate state-of-the-art decoding of high-resolution digital audio from a PC-based music server.

The \$17,999 Puccini player is the same model Jonathan Valin commented on in his review of the Scarlatti, dCS's \$67,000 three-box statement product (Issue 183). Jonathan concluded that the Scarlatti was the best digital he'd heard, an opinion apparently shared by quite a few high-end manufacturers judging from the number who have purchased the Scarlatti for their own development work or trade-show demonstration. Jonathan also thought that the less-than-third-the-price Puccini was very nearly as



EQUIPMENT REVIEW - dCS Puccini CD/SACD Player and Puccini U-Clock USB Converter/Clock

UNDER THE HOOD

The Puccini features an Esoteric transport mechanism (with a custom drawer) under dCS's custom-software control. In fact, all the software inside the unit is written by dCS. This software can be updated by downloading new code distributed by dCS on a CD. The custom digital filter is implemented in two DSP chips and two field-programmable gate arrays. Four filter types are available, selectable from the front-panel menu system. Filter 1 has the widest bandwidth and is the recommended setting. Filters 2 and 3 roll off at progressively lower frequencies. Filter 4 is the "measurement" filter, and isn't intended for listening. The filter choice affects the amount of out-of-band noise allowed through the system. All the filters are FIR linear-phase types.

When you select PCM-to-PCM upconversion on the front panel, the digital filter feeds a modulator that converts the PCM data to the 5-bit format required by the Ring DAC. If you select PCM-to-DSD upconversion, the filter's output goes through an additional step of converting PCM to DSD before the modulator that creates the 5-bit Ring DAC code.

The Puccini features exactly the same Ring DAC found in the \$67,000 Scarlatti. This DAC, developed by dCS in 1992 and under refinement since, completely eliminates a source of distortion in conventional off-the-

shelf DAC chips. It is implemented with 20 discrete devices per channel. Its fundamental nature lends itself to converting DSD signals, which is one reason why the Puccini sounds the best in this upconverting mode. (For a cogent explanation of how the Ring DAC works, see Jonathan Valin's sidebar on page 109 of Issue 183.) The Ring DAC's balanced output feeds a fully discrete Class A output amplifier. This is the signal that appears on the XLR jacks. The single-ended signal is buffered by an op-amp-based circuit so that output levels are consistent between the balanced and single-ended outputs (a balanced circuit inherently is 6dB higher in level). The power supply is a hybrid of switching and linear supplies that was newly developed from scratch for this latest generation of products.

The Puccini is a very advanced product, both in its design and capabilities for the user. Note, however, that the Puccini requires greater owner involvement than other CD players with its selectable upsampling, selectable filters, upgradable software, and extensive menu system. **RH**

good as the reference-quality Scarlatti.

The \$4999 U-Clock improves the Puccini's sound quality by delivering an ultra-precise clock to the player, reducing jitter. As has become abundantly apparent, great-sounding digital audio requires extraordinarily precise timing in the conversion of digital data to an analog waveform. My review of the \$16,000 Esoteric G-0Rb rubidium clock (Issue 180) created skepticism among certain readers that human ears can detect timing variations that are measured in picoseconds (see, for example, the letter from Dave Martson in Issue 198). The objections to expensive outboard clocks are not based on these readers' own listening experience, but purely on theoretical grounds—conventional clocks should be good enough, in their view. But there's a simple way to determine for yourself if jitter is a factor in digital audio reproduction—listen to a Puccini with and without the U-Clock engaged. As we'll see in the report on my listening impressions below, the difference is not subtle.

The U-Clock's second important function is to allow the Puccini CD/SACD player to operate as a digital-to-analog converter for PC-based music servers that have a USB output. The U-Clock takes in digital audio data from a PC on the USB interface and converts it to S/PDIF for presentation to the Puccini. That might not sound like a big deal—one can buy a box for \$250 that does the same thing—but dCS has engineered a state-of-the-art USB interface that introduces absolutely no sonic compromises. Rather than considering USB a limiting factor in PC-based audio sound quality, dCS believes USB is the optimum interface if engineered correctly.

In most digital interfaces, including S/PDIF

SPECS & PRICING

Puccini CD/SACD player/DAC

Conversion: dCS Ring DAC

Sampling frequencies: Up to 96kHz/24-bit

Inputs: S/PDIF (x2) on RCA, clock on BNC

Outputs: S/PDIF (x2), balanced analog on XLR, unbalanced analog on RCA

Dimensions: 18.1" x 4.4" x 15.8"

Weight: 26.6 lbs.

U-Clock

Outputs: Clock signal on BNC (x4), S/PDIF on RCA (x2)

Inputs: USB

Dimensions: 18.1" x 2.3" x 16.1"

Weight: 16.7 lbs.

U.S.

Puccini CD/SACD player/DAC

Price: \$17,999

U-Clock

Price: \$4999

DCS NORTH AMERICA

3057 Nutley Street
Fairfax, VA 22031
(617) 314-9296
dcsltd.co.uk
jquick@dcsltd.co.uk

U.K.

Puccini CD/SACD player/DAC

Price: £11,299

U-Clock

Price: £3099

SYMMETRY SYSTEMS

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EQUIPMENT REVIEW - dCS Puccini CD/SACD Player and Puccini U-Clock USB Converter/Clock

and AES/EBU (a variant of S/PDIF), the source component (the CD transport or PC music server, for examples) is the master clock to which the receiving device must lock. Virtually all USB DACs operate in this way, which is known as “Adaptive Mode.” Asking the receiving device to lock to the source’s clock is problematic for several reasons. Although the USB interface was never designed for transmitting high-quality audio, it inherently has the ability to allow the receiving device to control the data rate from the source device—a feature not possible with S/PDIF, AES/EBU, or even FireWire.

dCS has developed its own technology for exploiting USB’s built-in “feedback” system which allows its own high-precision clock to serve as the master, forcing the source (the PC-based music server) to slave to that clock. This technique, called “Asynchronous Mode,” transforms the USB interface into a high-quality interface. Rather than the computer establishing the clock precision (not a good idea for many reasons), the entire audio system is clocked by a high-precision crystal inside the U-Clock. Note that an asynchronous USB interface doesn’t automatically confer low-jitter and better sound; it still must be implemented with a high-quality circuit.

Moreover, locating this asynchronous USB interface in a separate chassis (the U-Clock) rather than in the DAC itself has many benefits. First, noise in the PC is isolated from the DAC by the U-Clock. Second, the DAC needn’t incorporate another clock running at a frequency unrelated to the audio-based clocks. Multiple clocks running at different frequencies within the same chassis can introduce cross-contamination.

The U-Clock is an apparently simple, yet

brilliant, solution to adapting a CD player (the Puccini) to the needs of music-server owners. It solves sonic compromises of the USB interface with state-of-the-art design and implementation in a separate chassis, as well as allowing music-server users to decode files through the Puccini’s outstanding DACs.

Although Jonathan covered the Puccini as a CD player in his review, let’s recap the machine’s highlights. The unit is simply stunning visually, with gracious curves and an unusual surface pattern etched into the shiny aluminum front panel. My only complaint is that the front-panel button markings are small and hard to read, a problem that diminished with familiarity. The drawer mechanism of the Esoteric-sourced transport is all-metal and operates silently and smoothly. A front-panel display allows the user access to a wide range of controls through an extensive menu system. One of these controls allows the user to select whether and how the signal is upsampled. One option is to convert any resolution PCM (from CD or files from a music server) to DSD before decoding (the other option is PCM-to-PCM upsampling). I found that the PCM-to-DSD conversion sounded the best, and this was the option I used for nearly all my auditioning. The display shows the clocking status via a clever icon of two gears meshing. The Puccini will decode 44.1kHz, 48kHz, 88.2kHz, or 96kHz, all with up to 24-bit word length. Note that it will not decode 176.4kHz (such as Reference Recordings HRx files) or 192kHz.

The rear panel offers both balanced and unbalanced outputs, along with digital inputs and outputs (two each on RCA jacks). A BNC connector accepts the clock signal from the U-Clock.

The Puccini has a variable output, enabling it to drive a power amplifier directly. You can select a maximum output level of 2V or 6V; I recommend the 2V setting if you are driving a preamplifier.

The U-Clock matches the Puccini visually, and the two look stunning together. The front panel has just two pushbuttons and three LEDs. The leftmost button and accompanying LED is intriguing, to say the least. Marked “Dither,” it modulates the clock edges in a controlled way in an effort to improve sound quality. It’s counterintuitive that changing the timing of the clock edges could make the Puccini sound better, but dCS found that this small variation “exercises” the PLL in the Puccini and results in better sound. The modulation is easily filtered by the PLL. You can judge for yourself simply by turning dither on and off. The second button selects the clock frequency, either 44.1kHz (used for 44.1kHz sources and multiples of 44.1kHz, including SACD) and 48kHz (for 48kHz and 96kHz sources).

LISTENING

I started by listening to the Puccini as a CD and SACD player without benefit of the U-Clock. It was immediately apparent that this was one serious contender for the best digital I’d heard. The sound was immensely appealing, particularly the gorgeous, liquid, and glare-free midrange. The presentation was a bit set-back rather than forward, with tremendous depth, clarity, and transparency. There was also an intangible sense of sonic coherence that manifested itself as a kind of “musical rightness.” Whatever the Puccini was doing, it was different from other great digital I’ve heard.

After getting a general impression of the Puccini itself, I engaged the U-Clock. One little front-panel button-push vaulted what was already a spectacular sound into entirely new territory. The U-Clock snapped images into sharp(er) focus, increasing the sense of clarity, precision, and definition I had enjoyed from the Puccini alone. The heightened focus had a profound effect on the sense of instruments existing within an acoustic. Without the U-Clock, reverberation tended to be connected to the image itself, as though the image and the hall were merely variations of the same sonic cloth. With the U-Clock, the instrumental image was presented as a clearly defined object existing within an acoustic space rather than simply fused to it. The instrument and the surrounding acoustic were presented in a closer facsimile to what we hear it in life.

That was just the beginning of the U-Clock’s magic. The Puccini’s reproduction of timbre, which already had a bell-like clarity, was taken to a new level by the U-Clock. Timbres had greater palpability and realism, partly the result of less grain and edge (which were already very low) and partly because of greater resolution of textural detail. Similarly, the U-Clock made the Puccini’s reproduction of transient information even more lifelike. The leading edges of piano attacks, for example, had a trace of edge that vanished with the U-Clock engaged. Listen, for example, to the wonderful new recording of Vassily Primakov performing Chopin mazurkas on Bridge Records. The U-Clock made the piano more lifelike in transient attack, in richness of tone color, and particularly, in the sense of space surrounding the instrument. I pulled out this CD as a diagnostic tool to listen for specific sonic attributes of

EQUIPMENT REVIEW - dCS Puccini CD/SACD Player and Puccini U-Clock USB Converter/Clock



the U-Clock but immediately forgot about the sound and listened to the entire disc, completely captivated by the compositions and Primakov's expressive performance. Such an experience is always the sign of a great component.

In short, if you own a Puccini the \$4999 U-Clock is an essential upgrade.

The Puccini/U-Clock combination was "plug 'n' play" with regard to the USB interface. I connected a generic USB cable from my fan-less, drive-less PC server to the U-Clock, selected the appropriate input on the Puccini, and the system played back my music files at a variety of sampling rates. I listened to files at 44.1kHz, 88.2kHz, and 96kHz from the server, as well as CDs and SACDs played in the Puccini's transport.

Getting back to the sound of the Puccini/U-Clock combination, I found myself consistently and deeply engaged with the music. The dCS pair had a different presentation than I've heard before from digital that is difficult to describe. The Puccini/U-Clock was distinguished by a pristine clarity of timbre along with a crystalline-like transparency of soundstage. It simply lacked the artifacts we associate with digital, such as a synthetic gray pall overlaying tone colors, grain and glare embedded in timbres, and a sense of haze or opacity between you and the music. Instruments and voices were vivid and alive, yet the presentation was never forward. In fact, the sound was relaxed and engaging despite the sense of immediacy. Background vocals were

revelatory in that I could clearly hear the timbres of individual voices and how they blended into each other. I was also struck by the sheer realism of Neil Young's guitar on some 96kHz/24-bit tracks from Harvest sourced from the music server; it had more "guitariness" and less of a mechanical sound than I've heard from this track before. I got the impression of greater density of information, but not in an analytical way. I've heard a number of digital products that sound very clean, precise, and transparent, but those qualities are often accompanied by a mechanical character, a coldness or a stark sterility that doesn't foster musically intimacy. The Puccini/U-Clock's central triumph was the ability to sound super-pristine and precise, yet simultaneously warm and involving.

An analogy that came to mind to describe the Puccini/U-Clock's density of tone color and liquidity of timbre is of two identically colored bed sheets, one made from 600-thread-count cotton and the second made from 400-thread-count material. Put the 400-count sheet through the wash a few times and leave it in the sun for a day. Now compare the two sheets. The 600-thread-count sheet is finer in texture, smoother, and more continuous. It's also more richly hued and vibrant. The Puccini's rendering of instrumental timbre is like that of the 600-thread-count sheet, while most other digital is analogous to the 400-thread-count sheet.

In addition to this remarkably naturalistic rendering of timbre, the Puccini threw a stunning sense of space and depth, revealing the size of the hall and the spatial relationships between instruments. In addition, the background was jet-black which further highlighted the sense of image tangibility. The pair's exceptional low-level resolution

contributed to expansive sound as fine spatial cues in the back of the soundstage were rendered with great clarity. Reverberation decay was stunning in the way it maintained resolution down to the lowest levels, the smoothness of the decay, and the way it seemed to hang in space. This is one area where state-of-the-art modern digital is vastly better than earlier efforts, which truncated reverberation decay and sounded coarser and coarser at lower and lower levels.

I found the Puccini/U-Clock highly involving rhythmically. The bass was extremely punchy and dynamic, with a very tight and controlled quality. I heard a dynamic coherence from top-to-bottom, as though the music "gelled," heightening the feeling of musicians locking into a groove.

There's one area in which the Puccini/U-Clock significantly distances itself from all competition, and that is in the reproduction of very fine high-frequency transient detail. I was floored by the Puccini's resolution of micro-detail—think brushes on cymbals, shakers, the zils on a tambourine, gently struck triangles, and güiro. The lower the level and the more transient the nature of the signal, the greater the extent to which the Puccini outshone other digital I've heard. Information that was simply blurred by other digital was resolved with pristine and vivid clarity by the Puccini. For example, the triangle on Rachmaninoff's Symphonic Dances had a delicacy that vividly conveyed the mechanism by which the sound was made. It wasn't just a high-frequency transient, but a pitch accompanied by a strong sense of attack, ringing, and decay. But the track that most dramatically illustrated the Puccini's unmatched performance in this area is the beginning of "Valentino" by Victor Feldman on the JVC XRCD

EQUIPMENT REVIEW - dCS Puccini CD/SACD Player and Puccini U-Clock USB Converter/Clock

title Audiophile (a compilation of two records made in the 1980s, engineered by the great Alan Sides). The track starts with a rain stick behind Hubert Laws' gentle flute passage. I've listened to this track countless times over the years, but have never heard the individual beads moving through the rain stick with such startling clarity. I point this out not because I enjoyed this quality for its own sake, but rather to illustrate how the Puccini accurately conveyed very fine transient detail, and how this fidelity fostered a sense of hearing the instrument itself rather than a reproduction of it.

It occurred to me that one reason the Puccini/U-Clock rendered timbres with such realism could be this fabulous resolution of low-level detail, particularly low-level transients. Musical waveforms contain a richness of micro-dynamic structure (a reed moving back and forth, for example); accurately conveying that structure makes instrumental textures and tone colors more lifelike. Although we're not consciously aware that the timbral realism is derived from this micro-transient information, it's simply one less cue to the brain that we're hearing a reproduction rather than the instrument itself.

Although I don't have nearly as much experience with cutting-edge SACD playback as I have with CD, I thought the Puccini/U-Clock's rendering of SACD was the best I've heard. Interestingly, however, the Puccini/U-Clock's reproduction of CD was so good that it narrowed the gap I usually hear between CD and SACD.

Finally, you're probably wondering how the Puccini/U-Clock compares with the other great digital I've heard lately, including the Meridian 808.2 and Spectral SDR-4000 Pro CD players, as well as the Berkeley Alpha DAC. Starting with the Alpha DAC, the Berkeley unit was a bit more forward in spatial presentation, presenting the front of the soundstage a little closer to the listener. The Puccini's bass was leaner and tighter, with the Alpha DAC sounding "bigger" in the bottom end but somewhat less controlled. The Alpha DAC excelled at macro-dynamics with greater impact on timpani strokes, and also with a warmer and fuller rendering of bass guitar. As great as the Alpha DAC is, the Puccini/U-Clock combination bested it overall with a smoother rendering of midrange textures, a heightened sense of space, and, particularly, the resolution of transient detail. The Alpha DAC was at a disadvantage in the comparisons in that it was fed from the same

JV COMMENTS:

Well, I was supposed to write a sidebar comment to this review, but what can I say that Robert hasn't already said better in this brilliantly worded and precisely accurate assessment?

I was very curious to see how my best friend and colleague in this industry would react to the Puccini, since he has so much more experience with the finest digital front ends than I do (and than virtually anyone else in this business does). Don't take it as vanity on my part if I say I am delighted that he heard the Puccini as I do. It's not ego, believe me; it's relief. When I reviewed the Scarlatti/Puccini several moons ago, I thought both were "the best digital" I'd heard, but I thought this for a very specific reason and, let me add again, I thought this without having the vast comparative experience that Robert has with digital sources. My reason for loving the Scarlatti and Puccini was that both sounded like analog sources without sacrificing digital virtues. By sounding like analog sources I don't mean they made CDs sound like LPs, exactly. I mean that they shared with record and tape players a more "holistic" presentation than digital typically provides.

To my ear, digital has always sounded—to greater or lesser extents—flat in aspect and piecemeal in presentation. CD and SACD present the trees, all right, right down to the veins in the leaves, but they invariably seem to lose sight of the scope, spaciousness, and sheer volume of the forest. It's not that CDs and SACDs aren't often sonically impressive—and lifelike. LPs do not typically have the extension and dynamic impact of CD/SACDs, particularly in the bottom octaves; nor do they typically have the sheer crystalline clarity of digital sources. But...digital sources do not have what analog (at its best) has: a realistic warmth of timbre and richness of texture inextricably coupled with a lifelike bloom and body that make instruments and vocalists seem three-dimensionally "there"—perhaps a bit less "look-at-me" detailed than digital but more rooted, more present,

more complete, more real. CDs and SACDs make musicians sound the way highly detailed photographs look; LPs and tapes make musicians sound the way statues in a statue garden look.

With the dCS Puccini and the Scarlatti par excellence, this changed. The details they were adding didn't just amount to hearing, oh, three more second violins more distinctly in the string section (although you could hear three more second violins more distinctly); rather, I was hearing the whole string section (and each violin in it) with a new-found fullness of timbre and texture and an unparalleled (in the digital realm) three-dimensionality and ambient clarity. The dCS's details didn't stand out as individual parts; instead, the parts it was adding were making more complete wholes. Robert put this better than I did when he said that the Puccini "simply presents more musical information to the listener without calling attention to the fact that it's presenting more information." This is precisely correct.

With the addition of the U-Clock, the gap between the Puccini and the Scarlatti (which has its own clock) has narrowed. Robert once described the way timing errors (jitter) affect digital sound by analogizing an unclocked or poorly clocked CD player to hand-held binoculars—with their inevitable image blur caused by the shaking of your hands—and a precisely clocked CD player to image-stabilizer binoculars—which "freeze" what you're looking at, as if you've taken a jitter-free picture of it. Once again, I can't improve on this. This is exactly the difference that I heard with the U-Clock. What was a bit fuzzy—almost literally "jittery"—snapped into focus.

To an extent the U-Clock gives you the best of both the digital and analog worlds: increased (because better focused/timed) detail, and increased (because better focused/timed) wholes. The U-Clock is a no-brainer recommendation, as is the Puccini itself.

EQUIPMENT REVIEW

music server as the Puccini, but through an AES/EBU interface rather than through the U-Clock that locked the computer to its timing reference. Also, keep in mind that these are two very different products; the Alpha DAC will decode up to 192kHz sources and has no USB input, disc drive, or SACD capability, but costs less than one-quarter the Puccini/U-Clock's price.

The other contenders for the state-of-the-art in digital playback (at least in my experience), the Meridian 808.2 and Spectral SDR-4000 Pro, make an interesting contrast with the Puccini/U-Clock. The Spectral and dCS better the Meridian in resolution of low-level detail, transient fidelity, and bass definition. But the Meridian excels, uniquely, in its portrayal of dimensionality—the

Finally, you really need to hear the Puccini/U-Clock driving a power amplifier directly to fully appreciate its clarity and resolving power. Even the best preamplifiers shave off some detail and diminish the sense of immediacy and transparency that are the Puccini's hallmarks.

CONCLUSION

The dCS Puccini/U-Clock pair is an extremely sophisticated piece of engineering. Rather than working within the limitations of off-the-shelf technology, dCS has developed a number of innovative and advanced technologies to extract the maximum performance from digital media. That effort has paid off in the listening room—the Puccini/U-Clock delivers an enormously

appealing and involving musical presentation that is in many ways competitive with the state of the art, and in some aspects establishes a reference-quality level of performance.

The dCS' sound was different from other top contenders I've heard, and I struggled to put that difference, and its effect on musical involvement, into words. But if I

had to boil it down to a single idea, it would be that the Puccini/U-Clock simply presents more musical information to the listener without calling attention to the fact that it's presenting more information.

I can't overstate how much I enjoyed music through the Puccini/U-Clock; it was absolutely enthralling on CD, SACD, and high-resolution sources. This is a digital front-end I could live with for the rest of my life. **tas**



impression of three-dimensional instruments in three-dimensional space. The 808.2 is also remarkable in its reduction of hardness and glare, particularly in poor-sounding CDs. The Spectral's strengths are in its portrayal of soundstage depth and resolution of fine spatial and timbral detail. I thought the Puccini/U-Clock rendered midrange textures with greater warmth and palpability. All four products have their own virtues, and all are contenders for the state of the art.

Finally!

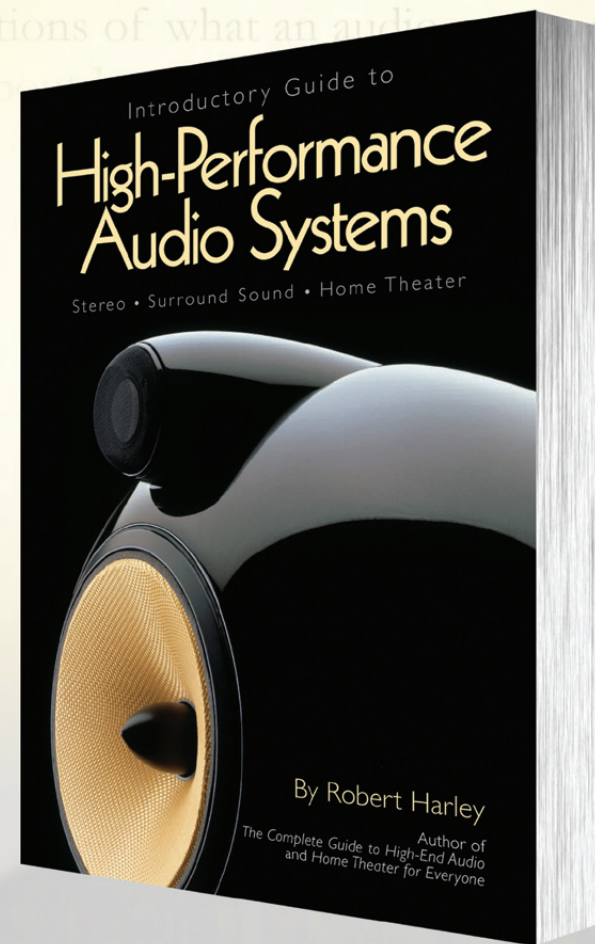
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Sound Advice

John Atkinson, Editor of Stereophile Magazine reported from the 2009 CES: ..."the sound was simply superb."

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Blue Circle Audio USB Thingee, High Resolution Technologies Music Streamer, and Music Streamer+

Three Inexpensive USB DAC Solutions

Steven Stone

I love music and inexpensive high-performance audio products. While I love music more, occasionally I get a product I adore almost as much as the music itself. Consider that a hint as to my feelings about one of the three products I'm about to review. But all three offer an elegant path from a computer's USB to analog music for less than \$300.

CIRCULAR LOGIC

"Don't Fight the Funk!" could be the corporate motto for Blue Circle Audio. Founded in 1988 by Gilbert Yeung, and based in Innerkip, Ontario, Canada, Blue Circle produces a complete line of products including preamps, power amplifiers, cables, and what must be among the strangest audio products ever devised, the Music Purse and Music Pump (available at classicpumps.com/mpumps.htm). These last products are a preamp in a purse and a pair of monoblock power amps encased in a pair of women's high-heeled pumps. Fortunately for those of us who aren't fashionistas, most Blue Circle products are housed in more conventional packages.

The USB Thingee's aesthetics sit at a halfway point between your standard black audio box and the Music Purse. The entire Thingee resides inside a dark gray PVC

tube 3½" by 2¼" in diameter. All its innards are potted in translucent silicone, which Blue Circle uses because "the silicone helps to avoid external vibration and, with the PVC pipe, makes the USB Thingee very strong." It also gives the USB Thingee a decidedly homemade look.

A THINGEE IS AS A THINGEE DOES

The Thingee functions as both a digital-to-digital converter and a DAC. It is available in four versions. The basic \$169 USB Thingee has a USB input and an S/PDIF RCA digital output as well as an analog 1/8" stereo output and a pair of RCA analog outputs. For \$179 you can have an additional AES/EBU digital output or a TosLink digital output. For another \$10 up-charge you can get a USB Thingee with both of the additional digital outputs. That's the unit I was sent for review.



EQUIPMENT REVIEW - High-Resolution Technologies Music Streamers

The USB Thingee supports both 44.1/16 and 48/16 digital outputs from USB. It will not support higher bit rates. I used it successfully as a digital converter with a variety of stand-alone DACs including the Bel Canto DAC3, April Music Stello DA 100, and the Meridian 518/561 combination. In every case the Thingee successfully interfaced and transmitted a digital music stream with no compatibility issues whatsoever. If you have a high-end DAC that lacks a USB input, the Thingee serves as an excellent bridge device to bring computer-based music files into your DAC.

I compared the Thingee with the built-in digital TosLink outputs from my Mac Pro Dual-core Intel Xeon computer. In direct matched-level A/B comparisons I couldn't hear any sonic differences. So with the Mac Pro the USB Thingee's primary appeal won't be sonic but ergonomic—it delivers the option to connect with DACs that don't have TosLink inputs (which many high-end DACs have dumped). The only connection that did yield a subtle but noticeable sonic improvement was when I hooked up the USB Thingee's AES/EBU output to the Meridian 518/561 combo. This connection had slightly better depth and image specificity. With other computers you may well hear more differences between their internal digital converters and the Thingee since some computers, especially portables, have converters inferior to those in the Mac Pro.

Although the USB Thingee worked nicely as a bridge device between my Mac and a wide array of standalone DACs, it was less sonically successful as a one-piece DAC. It puts out only 0.775V RMS, which may be insufficient for many passive preamp systems. Through the Reference Line Preeminence One preamp (which is a passive

unit) it produced adequate volume but the sound was flat with a one-dimensional, mechanical character. Compared to other DACs the Thingee's sound lacked midrange bloom and musicality. Every other DAC I had in house, including even the \$99 High Resolution Technologies Music Streamer USB DAC, sounded far more natural and appealing through the Reference Line preamp. When I hooked up the USB Thingee via its analog output to the Meridian 561 (which uses the Meridian's internal A/D to re-digitize the signal) the sound was less astringent but still less dimensional and less harmonically full-bodied than the direct digital feed from the USB Thingee's digital outputs to the Meridian. Finally I hooked the USB Thingee up to a Dell D620 portable. The Thingee's analog output sounded slightly better than the Dell's own internal soundcard.

While I would unequivocally recommend the USB Thingee if you need to transform a digital musical stream from USB to coaxial S/PDIF, TosLink, or AES/EBU, if you want to use it as a D/A device for going from digital to analog you would be sonically better served by other options, including the High Definition Technologies Music Streamer.

MUSICAL NOTES FROM A DIGITAL STREAM

Michael Hobson of Classic Records and Kevin Halverson of Muse Electronics officially launched High Resolution Technologies at the 2009 CES. Their stated goal was to produce budget-priced high-performance specialty products for the digital music age. Their first offering, called the Music Streamer, is a USB DAC with a list price of \$99. Can ten sawbucks actually get you a satisfying DAC? Oh yes, it can.

The Music Streamer doesn't look like much. It's a small, 4"-long, red, hexagonal box with a USB connection on one end and a pair of RCA analog outputs on the other. Inside you'll find a small USB input board suspended on top of a larger circuit board with the surface-mounted RCA outputs.

It is powered by the USB connection with no provisions for an outboard power supply.

I picked up a Music Streamer DAC at HRT's official press conference at CES. It took me a couple of weeks to clear the decks of prior commitments before I could install it in my

SPECS & PRICING

USB Thingee

DAC: Internal 16-bit/44kHz (can transfer up to 16/48)

Analog output: 0.775V RMS

Music Streamer

Output: 2.25V RMS

Frequency response: 20Hz-20kHz +.3dB/-1.8dB

S/N ratio: 82dB

Input data: 44.1/48kHz, 16-bit

USB type: 1.1

Dimensions: 4.1" x 2.1" x 1.2"

Music Streamer+

Output: 2.25 Volts RMS

Frequency response: 20Hz-20 kHz +0 dB/-1.7dB

S/N ratio: 100dB

Input data: 44.1/48kHz, 16-bit

USB type: 1.1

Dimensions: 5.1" x 2.1" x 1.2"

ASSOCIATED EQUIPMENT

MacPro Dual core computer with iTunes 8.1, Meridian 518, Meridian 561 pre/pro, Reference Line Preeminence One, April Music Stello DA100 D/A, Spender SA1 speakers, ATC SCM7 speakers, Paradigm S1 speakers, Earthquake Supernova Mk IV 10 subwoofer, Goertz M12 Veracity speaker cables, Goertz TQ2 alpha-core interconnects, MIT AVT1 interconnects.

U.S.

USB Thingee

Price: \$169

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EQUIPMENT REVIEW - High-Resolution Technologies Music Streamers

desktop-computer music system. At first I couldn't believe I was listening to the \$99 Music Streamer—I immediately dove under my desk to check all my cable connections and opened the sound settings in my Mac's System set-up panel to ensure I was listening to the Music Streamer rather than the April Music Stello DA100 that was also in my system. But I was listening to the Music Streamer! Even cold and unbroken-in the Music Streamer sounded startlingly good.

Unlike many inexpensive DACs, which may sound clean but lack the “juice” that makes recorded music sound right, the Music Streamer retains music's essential harmonic richness. Instead of a mechanical facsimile of music, the Music Streamer delivers that special spark that our brains immediately identify as the real thing.

Even the most hard-core detail freak will smile when he hears the low-level resolution the Music Streamer delivers. On the flute introduction of Muireann Nic Amhlaoihb's tune “Humours Of Whisky” from *Daybreak: Fainne anLae* it was easy to separate out the flutist's breath from the harmonics of the flute itself. This particular cut was a 320kbps MP3! On another MP3 file, Norah Jones's “Don't Know Why,” each back-up singer's voice had its own unique spatial envelope. The electric and acoustic guitars also retained their individuality even when they played the same melody lines. A final example of the Music Streamer's ability to retain and delineate musical subtleties, on my MP3 copy of Bryan Sutton's album *Ready To Go* mandolinist Sam Bush's right-hand attack comes through with his rhythmic pulse fully intact.

So what doesn't the Music Streamer do well? When I compared it with the Stello DA100 D/A

I noticed the Stello has slightly better back-to-front depth and three-dimensionality. On my own live concert recordings I was more conscious of the spatial separation between the individual players through the Stello than through the Music Streamer. Harmonically these two units were scarily similar, which means either they were both wrong or they were both right. I strongly suspect the latter.

For under \$100 the Music Streamer qualifies as the biggest bargain I've heard in a long time.

PLUS VERSUS MINUS

Any TV viewer who's found himself or herself face to face with a late night infomercial has probably heard this phrase, “But wait, there's more!” This bit of infomercial jargon rattled around in my brain when I first installed the Music Streamer+ in my system. But unlike overly hyped late-night trash hawked over the airwaves, the Music Streamer+ delivers as promised. It provides all the performance of the basic Music Streamer plus an additional dollop of depth, inner detail, and musical finesse.

Physically the Music Streamer+ closely resembles the basic Music Streamer. It's a similarly shaped hexagonal box, but the box is a satin-finished gray and slightly bigger. Inside is the same circuit-board layout. The upper USB-interface board appears to be identical to that of the original unit. The front half of the lower board is also very similar to the standard Music Streamer, but the back half of the board, closer to the RCA analog outputs, is very different. The Music Streamer+ has a PCM 1794 D/A chip instead of the PCM 1744 on the standard Music Streamer. Also the Music Streamer+ has a far

more sophisticated and robust analog-output topology with four individual op-amp ICs.

The Music Streamer+'s specifications boast 21dB better signal-to-noise, a 100uV RMS lower A-weighted noise floor, and 0.04% lower THD. Because the standard Music Streamer is so quiet, meaning I heard no noise whatsoever even at maximum listening levels, I wondered if these better specifications would translate into better sound. In level-matched comparisons (made easier because the two Music Streamers have the same output levels) I quickly noticed that the Music Streamer+ wasn't noticeably quieter or higher in resolution or inner detail, but it did deliver greater three-dimensionality and more precise image specificity. While the basic unit hadn't quite matched the imaging capabilities of the Stello DA100 D/A, the Music Streamer+ delivered every bit of the dimensionality of the Stello. In matched-level tests between the Stello and Music Streamer I could not reliably tell one from the other.

A DYNA STEREO 70 EPIPHANY

Near the end of the review period I replaced a pair of Bel Canto Ref 500 monoblock amplifiers in my desktop system with a Dyna Stereo 70 I had purchased at the Denver Vintage Voltage Audio Show. This Dyna has a stock circuit, but new tubes, resistors, and capacitors. The system signal path was as simple as possible—it went from the Music Streamer to a Reference Line Preeminence One passive pre to the Stereo 70 and finally to the speakers. The signal chain didn't have a single transistor in the circuit except for the op-amps in the Music Streamer+ itself. I was floored by how good it sounded.

I've been using various solid-state Class A, B, and D power amplifiers for the last five years or so. Perhaps that was a mistake. In the interim I had forgotten how electronically grainless a tube amplifier can sound. I'd also forgotten just how much depth a solid-state amplifier removes from the soundstage. Even the “lowly” Dyna Stereo 70 tethered to the Music Streamer+ delivered so much additional spatial information that the expression first used by Harry Pearson (with a bow to Coleridge) to express the depth characteristics of solid-state power amplifiers—“paper ships upon a paper ocean”—was still very appropriate. Even commercial pop recordings on MP3 files displayed spatial characteristics that I'd never heard before.

After a couple of days I went back and compared the Stello DA100 D/A to the Music Streamer+. Again in matched-level tests I couldn't discern any sonic differences between these two D/As. On Hal Ketchum's latest CD, *Father Time*, which was recorded live in studio without overdubs, the soundstage width and depth through both units went well past the outer edges of my monitor speakers. On my own live concert recordings it was easy to separate out the directly radiated sounds from the reflected sound coming off the back of the stage.

STREAM ON, STREAM ON

The Music Streamer+ may be an even bigger value than its little brother, the Music Streamer. Couple it with transparent electronics and a pair of good speakers and be prepared to get closer to your music than you ever thought possible from a \$299 USB DAC. **tms**

Cambridge Audio DACMagic

Magic Act!

Alan Sircom

Cambridge Audio is not a name you see often in the pages of *Hi-Fi+*. It's a UK-designed, Chinese-built range of audio electronics that's designed to fit snugly into the low to medium end of the separates hi-fi market. Nevertheless, looking past the price tags, the company has some exceptionally high-tech and distinctly hi-fi-friendly products in its line, of which the \$429 DACMagic is merely the latest. Except that it's also one of the most important products to hit the stores this year.

There's a deep-seated sense of no-BS about Cambridge Audio products that could be considered an inversion of some aspects of high-end sensibilities. Although well-made, there's no brushed-gold, inch-thick casing, no heatsink carved to spell out the name of the designer's cat, no Nuclear Football remote control. These products are functional on the outside, built smart on the in. And the DACMagic is no exception; it's a black or silver paperback (in size and weight), with a separate plug-top power supply. The front panel has buttons to control power, source selection (USB and two sets of TosLink or S/PDIF coaxial inputs) and choice of filter slope, and five LEDs to determine the incoming sampling rate. It upsamples to 24-bit/192kHz precision thanks to Adaptive Time Filtering, developed in partnership with Anagram Technologies in

Switzerland. The chipset features a pair of Wolfson's 8740 DACs coupled to a 32-bit Texas Instruments DSP, and it has balanced XLR and single-ended RCA outputs, as well as a TosLink and S/PDIF coaxial out. OK, dedicated DAC twitchers will crow that the Wolfson 8741 is the chip du jour, but re-read this paragraph again, cross-referencing it with the following words—"four-hundred-twenty-nine dollars"—and try not to be impressed.

We've seen DACs before. We've even seen cheap DACs before. What makes this one so important? Simply that this isn't just a digital-to-analog converter; it's a human-to-audiophile converter. You see, insert this little box in between someone's PC or PS3 and an amp, and the regular muggle turns into a hi-fi buff by the end of the first bar or the at the sound of the first gun report. And that's the point of this DAC, and in particular this review.

Viewed from the perspective of *Hi-Fi+*, the DACMagic is the kind of money one might spend on a power cord. On the other hand, the idea of a DAC itself, let alone one costing as much as \$429, is absurd to real people. That is, until they hear one. Then they change... they nod their heads and give you that knowing "now I get it" look.

So, there are two options for you, to spread our particular concept. Buy one and loan it to your friends or buy lots and give them to friends. The result is the same thing—if you loan it out, you won't get it back.



EQUIPMENT REVIEW - Cambridge Audio DACMagic

We did just that. We pitched up to what is arguably the least audiophile bunch around—a handful of twentysomething gamers huddled round a Sony PlayStation 3 and a copy of Guitar Hero. Turning up with an amp, speakers, and a DAC was dangerously “dad stuff” for them, but less than a minute into the experience, the guy wielding the plastic Gibson did precisely what we expected...up went the volume, a broad smile emerged, and he became more and more animated. A quick rendition of “Back in Black” and “Paradise City” (some things never change) and they started asking prices and asking questions about iPods and laptop outputs. Where not more than 20 minutes earlier, there was a look of outright disgust at all this “old man” hi-fi gear, now they were asking where they could buy the stuff (which one subsequently did within a week). Getting the product back to finish off the review was tough; I could out-manoeuvre them easily, but their superior thumb speed was a bit of a problem.

The DACMagic has been dipped in a lot of purple prose in the media. There are those touting it as the best converter that’s on the market, possibly the best that’s ever been heard. Let’s be sensible; it’s a remarkable \$429 DAC, but it’s still a \$429 DAC. It will help make a cheap CD player sound like something between a Cambridge Audio Azur 740C and an 840C (which is still saying a lot... these are a fine pair of CD players, and take the resampling up to dizzy 384kHz heights). It won’t intrinsically improve a good, current player costing more than about \$1500, or a decade old player that cost \$2200 or more when new. It does, however, have an uncanny habit of latching on to some frankly shonky datastreams, the sort of back-of-the-attic digital relics that are only dragged out to see how

good a lock some DACs have. The DACMagic is very, very good at reading less-than-frisky digits from tired old players, then.

Sonically, what you get is a fundamentally clean and honest presentation, one that stays just the right side of brightness. It’s a paragon of neutrality (that’ll be the Swiss connection) making the most of even old acoustic recordings of bluesman Blind Blake come to life. Stereo is wide, not especially deep or high, but extremely solid. Even when handling large-scale orchestral works, instruments are locked down in their own distinct spaces within the mix. But the big thing is detail; there’s loads of it, precise from top to bottom, and every Hertz an accurate one. No rolled-off highs, suppressed mids, or flattened bass lines. Far from it; in fact, the bass manages to balance perfectly between energy and depth. Bass lines—even those found in dub reggae—are easy to define and full of drama.

Like any good DAC, it makes its presence felt more by the lack of sonic signature than its intrusiveness. In fairness, this doesn’t make for a big step up for most CD players, but the USB option is a very different story. Suddenly, iTunes becomes a legitimate audiophile source option (the DACMagic is easy to hook to PC and Mac alike) and the freedom it imparts to the sound of Apple Lossless files is little short of revelatory.

The filter options are interesting. They represent mild shaping of the sound, instead of fundamental changes from filter to filter. Both “linear” and “minimal” phase seemed to work best, with CD mildly better through the cleaner, deeper-bass presentation of the “linear phase” setting and Apple Lossless files more suited to the more cuddly and warm “minimal phase.” The

Steep filter didn’t have a big place in my listening tests, but neither was it out of place compared to the others; it gets lost with orchestral music but was wonderful for making sense of those really early Louis Armstrong Hot Fives recordings, through both CD and computer audio sources. It’s a mild preference, only determined by lengthy listening sessions; when it’s right, the sound just snaps into some kind of temporal focus, making transients more precise.

There are two schools of thought here, depending on your anal-retentive score. Some will fiddle with the filters, find what they like best, and leave well alone. Others will determine what filter shape goes best with every single recording on each source and adjust accordingly. Fortunately, the DACMagic isn’t bothered either way.

What limits does the \$429 price tag impose? Well, the case itself is thin, and the lettering on the case is printed and will probably rub off in time. We’d also love to hear what it would sound like with something a bit more potent than the plug-top power supply it comes with. Oh, and if we were being really picky, ST optical and AES/EBU would be nice. Notice though... none of these price tag limitations affect either the performance or the build of the DACMagic, but are really just idle musings.

Cleverly, Cambridge Audio’s DACMagic does everything right. It fights impressively above its weight, but not to the point where the likes of PS Audio should be worried. More importantly, the combination of keen price and easy connectivity to computer audio and gaming products adds a new dimension, turning gamers and iTunes users into proto-audiophiles, seemingly in a matter of seconds. Say ‘hello’ to the hi-fi wow factor, 21st Century style.

SPECS & PRICING

Cambridge Audio DACMagic

- D/A Converters:** Dual Wolfson WM8740 24-bit DACs
- Digital filter:** Texas Instruments TMS 320VC5501 DSP upsampling to 24-bit/192kHz
- Analogue filter:** 2-Pole Dual Differential Bessel Double Virtual Earth Balanced
- Frequency Response:** 20Hz to 20kHz (+/-0.1dB) - steep filter disabled
- Signal to Noise Ratio:** -112dB
- Digital input word widths supported:** 16-24bit (16-bit for USB)
- Digital input sampling frequencies supported:** 32kHz, 44.1kHz, 48kHz, 88.2kHz, 96kHz
- Audio output up-sampling:** Fixed 24-bit/192kHz
- Weight:** 1.2kg/2.6lbs

U.S.

Price: \$429

AUDIO PLUS SERVICES

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audioplusservices.com

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Price: £230

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Bryston BDA-1 and Audio Research DAC7

Two Revolutionary DACs

Alan Taffel

From the founding of this magazine, Harry Pearson did our industry a great service by establishing a reference: the sound of unamplified live music in a natural space. As a result, designers began to pay attention to such crucial sonic phenomena as soundstages, timbres, dynamics, and the localization of musicians. However, an unintended consequence of HP's radical reference was that the industry became so wrapped up in recreating the sound of live music, it often paid less attention to the experience of hearing live music.

Listening to live music differs from listening to a recording, and not just in sonic terms. I find, for instance, that when I am at a live concert I can comfortably absorb and grasp new material on a first hearing. Yet when listening to a recording of new music, I usually need several playings to reach the same level of appreciation. Also, at a live performance an audience witnesses not only the physical but also the musical interplay between performers. In contrast, even very good-sounding audio systems often fail to convey the interplay that made a particular performance unique. And though stereo setups strive mightily to present a facsimile of the recording venue within our listening space, that is very different

from the feeling of having a live venue—and its attendant acoustics—surround you. To cite one final example, consider how refreshed one feels after a live performance, as opposed to the fatigue that can result from even a short home listening session.

This dichotomy between live and recorded listening experiences began to occupy my noggin after I spent time with two new DACs from Bryston and Audio Research, the \$1995 BDA-1 and \$3495 DAC7, respectively. These components are, in my view, at the vanguard of a new digital era. Like the best analog systems, they deliver not only state-of-the-art sonics, but propel the listener right into the heart of performances. This is exactly what



EQUIPMENT REVIEW - Bryston BDA-1 and Audio Research DAC7



happens in the live listening experience.

What these two DACs do is a bit difficult to convey because our industry has not spent decades establishing a vocabulary to describe the nature—as opposed to the sound—of live music. However, here goes. HP often used photographic terms to help readers, through visual analogies, understand his sonic descriptions. I will enlist another of the senses—taste. For those who have ever eaten truly sublime food, you know what happens: You put a bite in your mouth; at first, individual flavors assert themselves, some more urgently than others; then those tastes begin to intertwine, playing off each other; finally, they form an integrated whole that is in perfect balance and makes complete sense. The wondrous part about this experience is that it requires absolutely no effort on the part of the diner; the process washes over you, explaining itself as it goes, leaving you with nothing to do but enjoy and appreciate the artistry that made it.

This is also what happens during a live concert—just substitute instruments, notes, and musical lines for flavors. I submit that

it is what should happen when we listen to an audio system. Unfortunately, most audio systems deliver the sonic equivalent of a heavy-handed stew. Flavors are inextricably mashed together, and sorting them out takes real work. This phenomenon is so pervasive that I believe most audiophiles do not even know they are hard at work. The system tells them “what” is happening musically, but the listener is left to fill in the “how” and the “why.” This is tiring!

The Bryston and ARC DACs reveal, Linn-style, the individual strands that make up the music’s fabric. But, as with tasting miraculous food, that is only the first step. They go further, allowing the listener to then hear how each instrumental line relates to the others, how they trade off, and why the composer wrote the music as he did. The same goes for the musicians themselves. Each has decided to play his line a particular way, yet each is simultaneously listening to his fellow musicians and making adjustments so his part fits and enhances the whole. Believe it or not, these DACs make all this plain as day.

Listen, for example, to the first in the

lovely collection of Dvorák’s *Serenades from Bohemia* [Praga]. Through either of these DACs, one can clearly hear the purposefully steady tempo set out by the violin; the trading of the thematic line from strings, to piano, to woodwinds; the way each instrument uses dynamics to momentarily take the spotlight or step out of it; and the perfect synchrony of the ritard as the piece concludes. Sure, the recording also sounds good, with sweet timbres and a finely rendered soundstage, but this is so much more.

Reading the above, without hearing the units themselves, one might too easily plop the BDA-1 and DAC7 into the category of “analytical” components. In a way, they are, in that they reveal a great deal about what is going on below the surface. But we typically associate the term “analytical” with cold-sounding products that lack cohesion and soul, and require the listener to synthesize all the information into an integrated whole. That is manifestly not the case here. Instead, both these DACs are warm as the sun and, like that great bite of food, not only reveal the ingredients, but explain and combine them

SPECS & PRICING

BRYSTON BDA-1

Inputs: Two (each) digital USB, RCA, TosLink, AES/EBU, BNC

Outputs: Analog balanced XLR and single-ended RCA

Resolution: 192/24 (S/PDIF), 48/16 (USB)

Dimensions: 17" x 1.75" x 11.25"

Weight: 18 lbs.

AUDIO RESEARCH DAC7

Inputs: Digital USB, XLR, RCA, BNC, TosLink

Outputs: Analog balanced XLR and single-ended RCA

Resolution: 192/24 (S/PDIF), 48/16 (USB)

Dimensions: 19" x 5.25" x 10"

Weight: 11.5 lbs.

U.S.

BRYSTON BDA-1

Price: \$1995

BRYSTON LIMITED

677 Neal Drive
Peterborough, Ontario,
Canada K9J 7Y4
(705) 742-5325
bryston.ca

AUDIO RESEARCH DAC7

Price: \$3495

AUDIO RESEARCH CORPORATION

3900 Annapolis Lane N.
Plymouth, Minnesota USA
55447-5447
(763) 577-9700
audioresearch.com

U.K.

BRYSTON BDA-1

Price: £2200

PMC LIMITED

43-45 Crawley Green Road
Luton
LU2 0AA
+44 (0) 1582 405694
pmc-speakers.com

AUDIO RESEARCH DAC7

Price: £3063

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EQUIPMENT REVIEW - Bryston BDA-1 and Audio Research DAC7

for you. This makes these DACs not only the most informative I have ever heard, but also the easiest and most relaxing to listen to. This is no mean feat. Indeed, it is revolutionary.

Although these abilities go a long way toward recreating the live experience, that experience is still not quite complete. One thing neither of these DACs can do is transport listeners to the original performance venue, a limitation inherent in their ability to play only two channels. Stereo will never enfold listeners in an acoustic embrace the way good multichannel can. However, for a host of practical reasons, most of us must simply set that particular dream aside.

In terms of sheer sonics, the Bryston and ARC share many qualities—but also differ in presentation and operation. By now this may go without saying, but both DACs deliver richly detailed timbres, have astoundingly high resolution, offer dynamics both nuanced and bold, and can paint wide deep soundstages. Both can be exquisitely delicate, as on the opening of the Beach Boys’ “Wouldn’t It Be Nice,” and both can rock out, as they do on the Stones’

classic “Gimme Shelter.” To my chagrin, both the BDA-1 and DAC7 handily put my reference unit to shame.

The ARC is the brighter of the two, but not in any negative sense of the term. The DAC7 just shines a brighter floodlight on the proceedings, and places the listener closer to the musicians than does the Bryston. The ARC also boasts better bass—with terrific definition and character—which gives it a warmer overall tonality. For its part, the Bryston offers more precise timing, slightly purer timbres, and sharper leading edges. This last characteristic renders the Bryston a bit more revealing, but also makes the ARC more forgiving on inferior recordings.

Differences between these DACs also relate to musical presentation. Although both DACs deliver the “heart of the performance” experience, they do not go about doing so in quite the same way. The Bryston is the more probing of the two, relaying the greater wealth of information about the composition and the performance. To extend the food analogy, the Bryston is more like deconstructionist cuisine. The ARC, on the other

hand, is more organic. One is less aware of the whys and wherefores of the music, and more aware of how it fits together. These comments should not be taken as mutually exclusive; the Bryston also pulls everything together, and the ARC also presents gobs of musically relevant information. The difference is a matter of subtle emphasis.

The biggest sonic difference between these two DACs is heard only when comparing their USB inputs. Neither of them surmounts USB’s inherent limitations, and neither supports high sampling rates or deep bit-depths. However, the ARC’s USB input is clearly superior to the Bryston’s, which sounds dull and cloaked. With the help of a bright-leaning USB cable to compensate, such as the Synergistics Tricon, the Bryston achieves a satisfactory result—which is about as good as USB gets. But the ARC needs no such assistance, since its USB input is neutral from the get-go. Indeed, using the Synergistics cable with the DAC7 places much more emphasis on USB’s high-frequency foibles than anyone should be forced to endure.

From an operational perspective, each DAC has its own advantages. The BDA-1’s front panel features an incredibly useful LED arrangement that displays both the incoming sample rate and the upconverted rate. Two things to note here: First, upconversion is switchable on the Bryston, allowing purists to bypass it (though it really does improve the sound); and, second, the Bryston always upconverts to an integer multiple of the incoming rate rather than to some fixed maximum. The LEDs confirm, at a glance, the incoming rate (all the way up to 192/24 for S/PDIF), whether upconversion has been selected, and, if so, the

new rate. The ARC has no comparable display.

Both the Bryston and the ARC offer a bounty of digital source options—though the BDA-1 has more of them—including a BNC connection. Here again, the Bryston is more user-friendly, allowing direct selection of the desired source from the front panel. The ARC’s front panel requires the user to scroll through inputs round-robin style, though its remote does permit direct selection. The DAC7’s remote also enables users to control the “transport” (play, stop, pause, skip) functions of their PC’s music server software, a slick and highly convenient feature. The BDA-1 does not ship with a remote, but the company separately offers the BR2 (\$350), which also boasts the PC transport feature.

Clearly, though, the big news is not their feature sets but the level of live-performance musicality both of these DACs achieve. Choosing between them comes down to matters of preference and priorities. There is a lot of buzz right now about various digital products, some of which have astronomical prices and some of which have exotic designs. The fact that these two DACs have neither only reinforces their revolutionary nature. Believe me, this is where the buzz belongs. **tbs**



Accuracy and Musicality

Berkeley Audio Design Alpha DAC

Robert Harley

Most audio products designed for professional use are sonically inferior compared to the best high-end “consumer” components. That’s because, in the pro world, features, functionality, and reliability under harsh conditions take precedence over sound quality. And odd as it might sound, most professionals are more price-sensitive than audiophiles.

A notable exception is the new Alpha DAC digital-to-analog converter from Berkeley Audio Design. Although outfitted with professional features, the Alpha DAC is designed to bring first-rate digital-to-analog conversion to both pros and audiophiles. That’s not such a stretch considering that the Alpha DAC’s design team also created High Definition Compatible Digital (HDCD), as well as the Pacific Microsonics Model Two, widely considered among both pros and knowledgeable consumers as the finest analog-to-digital and digital-to-analog converters extant. The Model Two is the professional high-resolution A/D converter and HDCD encoder found in the world’s best mastering rooms. Most of the Pacific Microsonics design team reformed



as Berkeley Audio Design, turning its attention to making a D/A converter capable of decoding high-resolution sources.

The Alpha DAC’s professional orientation is apparent from the unit’s form factor, features, and front-panel layout. The small chassis is sturdy and nicely finished, but utilitarian by high-end standards. Similarly, the front panel is all business and no fluff; the panel is loaded with essential controls and indicators. A large alphanumeric display shows the input sampling rate, from 32kHz to 192kHz. Small LEDs indicate the selected input, signal lock, HDCD decoding, polarity inversion, and the selected digital filter. A pair of buttons next to the display adjusts the output level; the Alpha DAC is designed to

drive a power amplifier directly. The display automatically switches to show the output level when the output level is being adjusted. Although you can, of course, treat the Alpha DAC like any other source component and run its output through your preamplifier, the Alpha DAC only reveals its full potential with no preamplifier in the signal path—particularly when decoding high-resolution sources. A remote control allows you to adjust level, channel balance, polarity, muting, input selection, and display dimming.

Another of the Alpha DAC features that reveals its professional roots is the selectable digital filter. This feature isn’t provided so that you can “tune” the DAC to your system or personal preference. Rather, there’s one filter that is

absolutely optimum (Filter 1), while the other filters allow mastering engineers to hear how their work will sound on the digital filters typically found in consumer CD players. One of the filters is identical to the Pacific Microsonics PMD-200 found in many high-end CD players. Incidentally, the availability of the PMD-100 and PMD-200 in the mid-1990s greatly improved the sound of CD players at the time. The Pacific Microsonics 8-X oversampling filter (with HDCD decoding) replaced the ubiquitous NPC filter chip, rendering a wholesale improvement in CD sound.

A rear-panel RJ-45 jack marked “BADA” (Berkeley Audio Design Alpha) is designed to accept encrypted high-resolution from an outboard decoder of DRM-protected music. The

EQUIPMENT REVIEW - Berkeley Audio Design Alpha DAC

idea is that the outboard box would strip music of DRM and then encrypt the data for transmission over the BADA interface. This arrangement meets the licensing laws while providing listeners with uncompromised playback of DRM-protected files. Although such forward-thinking is welcome, record labels are quickly abandoning DRM. Another forward-thinking touch is the Alpha DAC's ability to receive upgraded firmware simply by playing a CD with the upgrade encoded on it and feeding the CD transport's output into one of the Alpha DAC's digital inputs.

The Alpha DAC's design and build-quality are somewhat paradoxical. On one hand, the unit employs unusual and extremely sophisticated circuits. On the other, it doesn't look like a conventional high-end product, lacking the massive power transformers, banks of power-supply regulators, large discrete output stages, and other staples of high-end DACs. The unit features Analog Devices DACs followed by op-amp output stages (the op-amps' markings have been removed). Berkeley says the op-amps were chosen not to save cost or board space, but because they best realized the technical and sonic goals of the Alpha DAC. The unit employs some proprietary technologies and is meticulously hand-tuned: Each unit is aligned, burned-in under load for seven days, aligned again by hand, and listened to before being boxed for shipment.

The Alpha DAC is based largely on the body of knowledge developed by the Pacific Microsonics design team in

creating High Definition Compatible Digital (HDCD) and the professional Model Two HDCD encoder/decoder. The Alpha DAC's primary designer is Michael "Pflash" Pflaumer, a Pacific Microsonics co-founder who, among other achievements, wrote the DSP code that realized HDCD encoding and decoding (including the PMD-100 and PDM-200 digital filters). For the Alpha DAC, he wrote a new and advanced digital filter that runs on an Analog Devices SHARC processor. Although the Alpha DAC's components and circuit topology are considerably different from that of the Model Two, this new product reflects the fundamental insights gained during the multi-million-dollar design effort on the Model Two.

LISTENING

Evaluating the Alpha DAC was more complicated than auditioning a conventional D/A converter. Rather than simply connect a CD transport to one of the Alpha DAC's digital inputs, I had the ability to play high-resolution and standard-resolution files courtesy of a PC-based music server described elsewhere in this issue in the article on Reference Recordings' HRx format. My description in that article of the sound of the 176.4kHz/24-bit HRx files is in large part a description of the sound of the Alpha DAC.

Starting with the Alpha DAC decoding standard-resolution (44.1kHz/16-bit) sources from the music server, the Alpha DAC delivered some of the best-sounding

CD playback I've heard. First, the Alpha DAC has that rare (and musically important) quality of resolving lots of information without sounding analytical, hyped, or "hi-fi-like." The Alpha DAC presents to the listener a tremendous amount of low-level detail such as delicate spatial cues, the finely filigreed harmonic structure that defines instrumental timbres, and the gossamer-like quality of the very end of reverberation tails. Most digital products truncate this information, or present it as coarse and grainy rather than with a silk-like delicacy. A visual analogy is a pixilated image on a digital TV transmission with poor reception. The lower the signal level, the greater this effect.

The Alpha DAC is highly resolving at all signal levels, but it's this ability to dig down into the lowermost levels that elevates its performance into the top level of digital playback. Just as important, the Alpha DAC doesn't call attention to its resolution; rather, it is suave, understated, and refined. It's the kind of resolution that conjures a vivid impression of the mechanism by which an instrument created a sound, the palpability of tone color, and the precise spatial relationships between instruments within a recorded acoustic. All this information is delivered in a completely natural and unforced way, fostering a tremendous sense of ease, relaxation, and musical involvement.

The Alpha DAC is also capable of huge dynamic contrasts, along with a lightning-fast portrayal of transient information. The

SPECS & PRICING

Berkeley Audio Design Alpha DAC

Input sampling rates: 32kHz-192kHz

Input word length: Up to 24-bit

Digital inputs: AES/EBU on XLR jack, S/PDIF on BNC, optical on TosLink, BADA-encrypted RJ-45

Analog outputs: Balanced on XLR jacks, unbalanced on RCA jacks

Digital filtering: Multiple options

Analog output level: Variable in 0.1dB steps; Channel balance adjustment in 0.05dB steps

Dimensions: 16.5" x 1.75" x 10.4" (19" rack-mount option)

Warranty: Three years parts and labor

Weight: 9 lbs.

ASSOCIATED EQUIPMENT

Basis 2800 Signature turntable with Basis Vector 4 tonearm,

Dynavector XV-1S cartridge, Aesthetix Rhea phonostage; PC-based music server (built by Goodwin's High-End), Spectral SDR-4000 Pro CD player, Classé CDP-501 CD/DVD-A player, Sony SCD-9000ES SACD player; Spectral DMC-3OSS preamplifier; Spectral DMA-360 and Pass Labs XA100.5 power amplifiers; MIT Oracle MA interconnects; MIT Oracle MA loudspeaker cables; Shunyata Hydra-8, Hydra-2, and V-Ray AC conditioners, Shunyata Anaconda and Python AC cables; Shunyata Dark Field cable elevators; room custom designed and built, acoustic design and computer modeling by Norm Varney of AV Room Service, acoustic treatment and installation by Acoustic Room Systems (now part of CinemaTech)

U.S.

Price: \$4995

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EQUIPMENT REVIEW - Berkeley Audio Design Alpha DAC

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music swings effortlessly from quiet to full-scale with tremendous speed, but with no sense of etch on the transient leading edges. The rest of my system is particularly adept dynamically (Spectral DMA-360 amplifiers, MIT Oracle MA interconnects and cable, and Wilson X-2 Series 2 loudspeakers) which allowed me to hear the full measure of the Alpha DAC's extraordinary lifelike reproduction of transients, lack of smearing, and ability to present music's dynamics intact.

Perhaps because of this tremendous agility I was more aware of the musicians' rhythmic and dynamic inflections. There was a distinctly greater sense of the music sounding upbeat and lively, of the band "locking into" the groove, and of a heightened physical involvement in the music. The music had a greater coherence, energy, and life that was akin to the difference between a tight band playing on a good night vs. on a great night. This is a DAC that involves your whole body in the music in a visceral and emotional way, not just in an intellectual abstraction of the sound's component parts.

The Alpha DAC's sense of transparency was startling. The presentation had a pristine clarity and vividness that seemed to strip away a fine scrim between the soundstage and me. Although the sound had a sense of precision, definition, and alacrity, it was never cold, sterile, or analytical. I've heard digital products that cover up the digital nasties with a syrupy romantic sound, as well as others that one might admire intellectually for their precision but not enjoy musically. Never before have I heard an outboard DAC that combines musical vividness with such ease, grace, and involvement as the Alpha DAC. Similarly, timbres were simultaneously immediate and palpable, yet

gentle and relaxed. There's long been a conflict in the high-end about "musicality vs. accuracy." I believe this is a false dichotomy; accuracy is musicality when the sound is truly accurate and not merely a hi-fi-like representation of reality.

Finally, the Alpha DAC is simply sensational in its soundstaging. Instruments and voices are localized with scalpel-like precision within a huge and transparent acoustic. In addition to getting right the macro-aspects of depth and width, the Alpha DAC was supremely adept at resolving very fine spatial details that define an instrument's relation to the surrounding acoustic. I heard a wonderful sense of bloom and what Jonathan Valin calls "action"—the impression of air expanding dynamically from an instrument.

The Alpha DAC was so good it invited comparison with the best CD playback I've heard, the Spectral SDR-4000 Pro CD player. This comparison wasn't definitive; playing the same music in the Spectral via its transport mechanism, or through the Alpha DAC sourced from the music server, introduced variables. The Spectral had the advantage of no digital interface in the signal path and thus lower potential jitter. The Alpha DAC, on the other hand, was fed the output of a solid-state memory which, in my experience, produces a better sound than reading data from an optical disc on the fly. In addition, the Alpha DAC and the Spectral both fed a preamplifier via unbalanced outputs, obviating the Alpha DAC's advantageous ability to bypass a preamplifier and drive a power amplifier directly. It was also impossible to compare the two devices on a level playing field when sourced from the same transport mechanism; the Spectral's digital output is coaxial on an RCA jack; the Alpha

DAC's coaxial digital input is on a BNC connector. Although a BNC transmission line is technically superior to one terminated with RCA connectors, introducing an RCA-to-BNC converter would not have provided a fair comparison.

Nonetheless, the juxtaposition was interesting; the two products sounded remarkably similar. The Alpha DAC was a bit more forward and lively through the midband and lower treble, with timbres sounding more "illuminated from within." The SDR-4000 Pro had a slightly more distant spatial perspective and greater midrange liquidity. This character of the Alpha DAC was, however, somewhat dependent on the AES/EBU cable feeding it. The Alpha DAC and Spectral had similar degrees of resolution, although the Spectral had a bit more air and space around instrumental images. The SDR-4000 was also a bit warmer in the midbass, with greater texture.

I describe the Alpha DAC's sound relative to the Spectral not because they compete with each other; they are very different products that serve different needs. Rather, I compare them to illustrate just how close the Alpha DAC comes to the state-of-the-art (at least in my experience) in CD playback, and indeed, to note how similar they sound. Interestingly, they both employ a custom digital filter that incorporates HDCD decoding running on an Analog Devices SHARC DSP.

But listening to the Alpha DAC with only 44.1kHz/16-bit sources is like driving a Ferrari without leaving first gear; it's thrilling, but only hints at the possibilities. When decoding 176.4kHz/24-bit files from the music server, the Alpha DAC is jaw-dropping. The resolution of fine detail I heard from CD was taken to an entirely new level. In fact, I concluded that the Alpha DAC sounds so

detailed with 44.1kHz/16-bit sources because it was designed fundamentally to resolve the extraordinarily low-level detail of high-resolution sources. When fed Reference Recordings' 176.4kHz/24-bit files from the music server, the Alpha DAC driving the Spectral DMA-360 amplifiers through MIT Oracle MA and Wilson Alexandria X-2 Series 2 loudspeakers produced the most thrilling audio experience of my life. See my accompanying article on Reference Recordings' HRx format for more on the Alpha DAC's sound with high-resolution sources.

CONCLUSION

The Berkeley Audio Design Alpha DAC is the best-sounding outboard digital-to-analog converter I've heard. The fact that it decodes high-resolution sources of any sampling rate and word length is icing on the cake. Although the Alpha DAC is spectacularly great on CD, this converter really shows its prodigious resolution, dynamic agility, and soundstaging capabilities when fed 176.4kHz/24-bit digital audio. Moreover, the Alpha DAC's feature set, operation (instant locking to changing sampling rates, for example), and ability to drive a power amplifier directly expands the product's utility and makes it ideal for the next generation of high-resolution music servers that is just around the corner.

The real story, however, is that this performance and functionality is possible at \$4995. Although not inexpensive, the Alpha DAC nonetheless competes with, and outperforms, much more expensive converters. At \$5k, the Alpha DAC is a spectacular bargain. It is my outboard converter of choice for both CD and high-resolution sources—regardless of price. **tas**

EQUIPMENT REVIEWS Integrated Amplifiers/DACs





Making iPods and PCs “Sing”

NuForce Icon Mobile Battery-Powered Headphone Amp/USB DAC

Chris Martens

Probably the first two questions most people ask me about the tiny NuForce Icon Mobile are “what is it?” followed shortly by “why would I need one?” The answer to the first question is that the Icon Mobile is a compact, rechargeable, battery-powered headphone amp/USB DAC. And the answer to the second question is that a device like this can help you achieve significant improvements in sound quality from your iPod, iPhone or PC, opening up new levels of performance and musical enjoyment.

USING THE ICON MOBILE

Since a number of people have asked me why one would need a device like the Icon Mobile, or how such devices are used, I thought I should describe two of the most common real-world use scenarios one might encounter.

THE PORTABLE SCENARIO

Say you’ve got an iPod, iPhone, or other portable music player plus a nice set of headphones (in-ear, on-ear, over-the-ear, etc.) but feel your player isn’t tapping the full potential of your ‘phones. Now imagine that instead of powering your ‘phones directly from your player, you instead run a “jumper cable” from the headphone jack on your player to the input jack on the Icon Mobile and plug your ‘phones into the Icon Mobile. Voilà, the NuForce now does all the heavy lifting in terms of powering your headphones giving

you an immediate and obvious improvement in sound quality in the process. What is more, the Icon Mobile also gives you the option of using serious, high-performance, audiophile-grade headphones—headphones your portable player would not be capable of driving effectively on its own. Cool, no?

THE DESKTOP SCENARIO

You’ve got lots of music files stored on your PC or Mac and like to listen through headphones but find that sound quality isn’t as good as you’d hoped it would be. Now imagine that instead of plugging your headphones into a jack on your computer and listening through whatever DACs and amplifier circuits the PC provides, you connect the Icon Mobile to a USB port on your computer and let it both decode your computer audio files and amplify the audio signals to drive

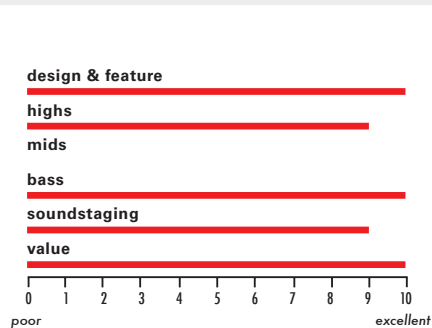
EQUIPMENT REVIEW - NuForce Icon Mobile Battery-Powered Headphone Amp/USB DAC

OVERVIEW

Consider this portable headphone amp/DAC if: you like the idea of an affordable, compact, rechargeable headphone amp/DAC that can make just about any in-ear headphone sound better than it ordinarily would and that has enough oomph to drive big, over-the-ear headphones, too. The Icon Mobile's USB DAC does a much better job of decoding computer audio files than most computers.

Look further if: you find it a pain to use add-on devices with your computer or portable digital music player (the Icon Mobile is not for everyone). Also look further if you require very long battery life per charge or seek products that have an elegant, upscale look and feel (certain higher-end competitors look/feel better than the Icon Mobile, and can play longer on a charge, but they cost quite a lot more).

RATINGS



your headphones. Once you insert the Icon Mobile into the equation, you'll hear a very impressive jump in apparent resolution and focus (as if your music files themselves suddenly got better) and other sonic improvements. Once again, the Icon Mobile

FEATURES

- Compact chassis (about the size of a business card case) with an anodized, brushed aluminum top plate (in black, silver, blue, or red), with a wraparound rear housing made of soft-feel, no-mar plastic
- Controls:
 - High-quality, thumbwheel-style volume potentiometer
 - Recessed, two position gain switch (high gain is for full-size headphones, low gain is for in-ear headphones and headsets)
- Four status indicator lights:
 - Power On (a blue LED lights whenever a headphone is plugged in and the amp/DAC is thus turned on)
 - USB (a white LED lights when a USB connection is established, and blinks when the Icon Mobile's USB port is receiving data)
 - External Line In (a yellow LED lights when a line-level analog device has been plugged in to the Icon Mobile's analog input, and blinks if the input device is a headset whose microphone is muted)
 - Battery (a two-color LED lights up in green when the battery is charging, turns off when the unit is playing and the battery has power remaining, and lights up in red when the battery is low and needs to be charged)
- Two audio inputs:
 - USB 2.0 input jack
 - Line-level analog input via 3.5mm mini-jack (the analog input takes precedence over the USB input when both are connected)
- Two headphone outputs:
 - Dual analog outputs via 3.5mm mini-jacks, with one jack supporting 4-pin iPhone style headsets
 - Both output jacks can be used simultaneously
- USB DAC/ADC
 - USB port is USB 2.0-compatible
 - USB DAC supports 44.1kHz and 48kHz native sampling rates
 - Microphone input (for headsets) provides 16-bit ADC (analog-to-digital converter)
- Built-in Lithium Ion battery
 - Charges in 2.5 hours via USB port
 - Runs for 13 hours (at maximum power output) per charge
- Accessories:
 - A soft silicone band allows users to strap the Icon Mobile to an iPod, iPhone, or other portable player
 - High-quality cables, one mini-jack to mini-jack cable and one USB cable
 - Small non-conductive screwdriver allows users to adjust the Icon Mobile's recessed gain control switch

lets you plug in full-size, high-end headphones that your PC alone would not be capable of driving well.

Are you starting to catch the vision for what a good portable headphone amp/USB DAC can do? I certainly am.



SONIC CHARACTER

Many people think amplifiers sound more or less the same (or at least very similar), but in my experience, that isn't necessarily true—especially when you compare the intensely cost-constrained amps that are included in portable music players or PCs versus a more focused, dedicated design such as the Icon Mobile provides. In short, you can expect to hear readily discernible improvements with the NuForce in play.

The Icon Mobile headphone amp offers deeply extended yet very taut and well-defined bass and an impressive ability to delineate and resolve very fine, low-level midrange and treble details. Together, these qualities add up to a sonic presentation that is at once refined yet also robust and full-bodied. Note: you may find, as I did, that the Icon Mobile exhibits a touch of midrange/lower treble forwardness, which can be mitigated

EQUIPMENT REVIEW - NuForce Icon Mobile Battery-Powered Headphone Amp/USB DAC

by giving the little amp/DAC some “run-in” time. After some burn-in, its sound becomes smoother and more neutrally voiced.

Does the Icon Mobile have enough grunt to drive power hungry full-size headphones? In my experience it certainly does. I tested the Icon Mobile with an oldie-but-goodie pair of full-size Sennheiser HD-580s (predecessors to the current generation HD-650s) and found that the Icon Mobile drove them easily and effortlessly.

While the Icon Mobile represents a worthwhile step forward when you use it purely as an amplifier, it brings even greater benefits when its built-in DAC is brought in to play—as would be the case if you plug into your PC or Mac. My main office computer is a current generation iMac, and

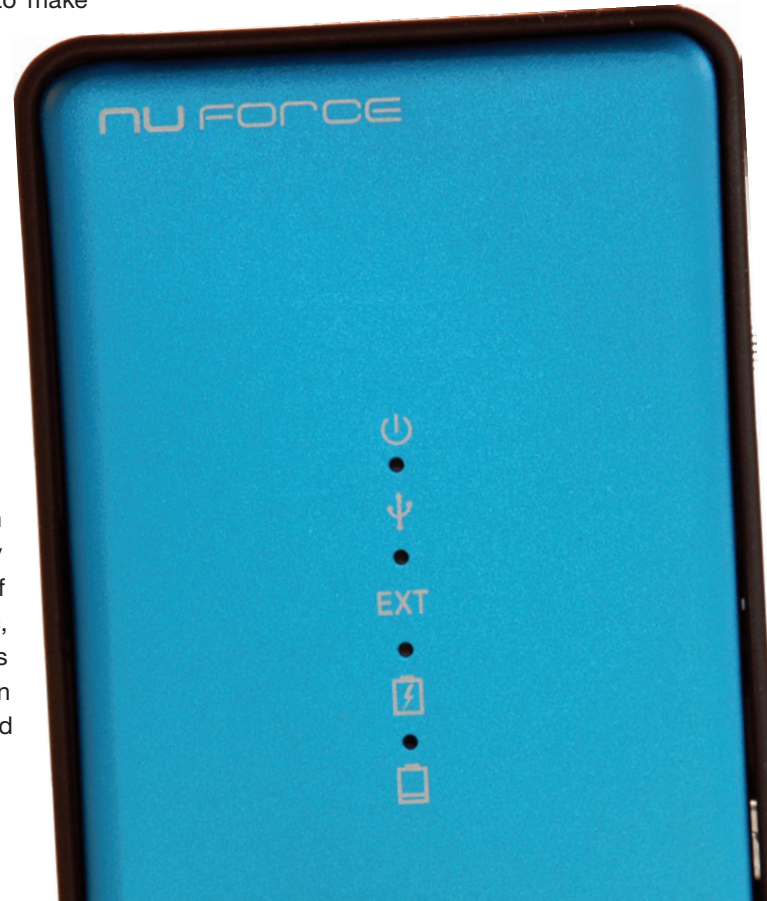
I tried listening to high-quality in-ear headphones (e.g., the Klipsch Images and Sennheiser IE7s), first through the Mac, and then through the Icon Mobile. With the NuForce connected, I enjoyed superior resolution of delicate musical textures and details and tighter yet also more potent bass. In fact, the illusion was that my digital audio files had magically improved in quality, though in reality the files stayed the same while the DAC and audio circuits got better—together revealing more of the music information that had been stored in the iMac all along.

MUSICAL EXAMPLE

One of the more impressive characteristics of the Icon Mobile involves its ability to make well-recorded tracks sound even better than they normally do. One such example would be the classic Tom Waits song “Falling Down” as performed by Holly Cole on *Temptation* [Metro Blue]. Right off the bat, you’ll notice an increase in the delicacy, purity, and vividness of individual instruments and voices—especially the soulful, reedy moan of Howard Levy’s harmonica and the melancholy, baritone rumble of David Piltch’s acoustic bass. The subtle high frequency “splish” of gently struck cymbals and the “snap” of snare accents also sound terrific, perfectly complementing Cole’s voice, which alternates between a lilting croon and full-throated

crescendos on the song’s distinctive chorus lines.

One might reasonably ask, “Aren’t these sonic qualities always present in this recording?” and the answer is that they are, but to a much less explicit and detailed degree. The difference the Icon Mobile makes is a little like the difference between a well-rendered drawing versus a photograph. Both try to convey the same shapes and spatial relationships, but the photograph (and by extension the sound of the Icon Mobile) offers much finer shadings and representations of finely filigreed details. The result is a musical presentation that invites you to explore the inner contours of each sound, instrument, and voice. **tas**



SPECS & PRICING

NuForce Icon Mobile portable headphone amplifier/USB DAC

Power Output: 80mW x 2 channels at 16 Ohms

Power Source: Lithium Ion battery

Inputs: One analog (3.5mm mini-jack), one digital (USB port)

Outputs: Two analog (via 3.5mm mini-jacks, with one output capable of supporting the microphone functions of iPhone 3G-compatible headsets)

USB DAC/ADC: USC port is USB 2.0-compatible, USB DAC supports 44.1kHz and 48kHz native sampling rates, microphone input (for headsets) provides 16-bit ADC (analog-to-digital converter)

Accessories:

- High-quality cable: mini-jack-to-mini-jack, USB cable
- Silicone band (for strapping Icon Mobile to players, phones)
- Small non-conductive screwdriver (for accessing, adjusting recessed gain controls)

Dimensions (HxWxD): 3.46" x 2.17" x 0.47"

Weight: 1.9 oz.

Warranty: One year, parts and labor

U.S.

Price: \$99

NUFORCE, INC.
(408) 627-7859
nuforce-icon.com

U.K.

Price: £120

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Peachtree Audio Nova Hybrid Integrated Amp/USB DAC

An Integrated Amp for the New Age

Chris Martens

Peachtree Audio is a division of Signal Path International—a firm headed by audio veterans David Solomon and Jim Spainhour. More so than many people in our industry, David and Jim have demonstrated a gift for developing products that combine the best elements of old-school, two-channel audiophile thinking (where sound quality always, *always* comes first) plus a new-school, digital/computer audio-savvy mindset. The end result is a series of new-age hybrid (that is, tube/solid-state) integrated amplifiers that incorporate built-in DACs with coax, optical, and USB inputs, and other connectivity features, as well.

First came the Peachtree Decco, a sweet sounding little 50Wpc amp/DAC that sold for \$799. The Decco was well received in the marketplace and was a very good performer, though its amplifier section arguably did not have enough “oomph” to handle all types of speakers well. Down deep, however, David and Jim knew they could do even better if they built a more accomplished, upscale “big brother” to the Decco: one that offered a

better preamplifier section, a more powerful amplifier, and a better built-in DAC. Now, that hypothetical upscale product has become a reality in the form of the new 80Wpc Peachtree Audio Nova hybrid integrated amplifier with built-in USB-capable DAC (\$1199), which we will review here. But before we jump in, let’s step back to get a better “big picture” view of what the Nova is and does.



The Nova, of course, can be used as a traditional high-quality integrated amp, but in principle it is much more than that. The versatile Nova can, for example, also serve as a high-quality preamplifier or headphone amplifier with—at the user’s option—either solid-state or Class A tube circuitry engaged, or as the front-end of a variety of all-digital systems (systems fed by PCs or Macs, Squeezebox or Sonos devices, and the like). But

one role you might not anticipate is that the Nova can also function as an ultra high-quality “remote switchable” 24-bit/96kHz standalone DAC—one that sounds so good, according to Peachtree, that it invites comparison with dedicated high-end DACs selling for more than the Nova does. An outlandish claim? Perhaps, but it’s one we’ll enjoy putting to the test.

EQUIPMENT REVIEW - Peachtree Audio Nova Hybrid Integrated Amp/USB DAC

OVERVIEW

Consider this amplifier/DAC if: you value sonic refinement, versatility, and value in roughly equal measure. The Nova makes an ideal starting point for those looking to build seriously good yet also sensibly priced high-end audio systems, and it provides a DAC section good enough for use in very high-end systems. The key to the Nova is that it combines multiple functions, each of which is a strong performer in its own right, but which together add up to a stunning value. For about the price of a good integrated amp, the Nova is all that and so much more.

Look further if: you have power-hungry, low-impedance, or otherwise hard-to-drive loudspeakers (e.g., Magnepans). The 80Wpc Nova amp is pretty stout, but not *that* stout...

Ratings (relative to comparably priced integrated amps)

- Treble: 10
- Midrange: 9
- Bass: 8
- Soundstaging: 10
- Dynamics: 9
- Value: 10

Ratings (relative to comparably priced DACs)

- Design & Features: 10
- Tonal Balance: 8
- Timbral Purity: 10
- Detail & Resolution: 9
- Imaging/Soundstaging: 9
- Dynamics: 9
- Value: 10

FEATURES

Solid-state/vacuum tube switching: one of the Nova's most distinctive and enjoyable features is a switch on the unit's remote control, simply labeled Tube. Here's how it works: whenever the Nova is used as an integrated amp, preamp, or headphone amp, you have the option of engaging either a solid-state or Class A vacuum tube-based input stage (the tube used is a 6922) by pressing the Tube switch. As a cool visual detail, a blue LED illuminates the vacuum tube viewing window in the Nova's front panel whenever the tube input stage is engaged.

Preamplifier: the Nova's preamp section offers both variable and fixed level outputs (the fixed outputs are driven by solid-state circuitry only), making it easy for you to use the Nova to drive an outboard power amplifier or subwoofer, if you wish.

Headphone amplifier: the Nova can be used as a standalone headphone amplifier. As a thoughtful detail touch, the Nova is set up so that, when a headphone plug is inserted into its headphone jack, the Nova's power amplifier section automatically disengages, effectively muting the speakers.

Power amplifier: the power amplifier section of the Nova is a Class A/B solid-state design that puts out a respectable (and conservatively rated) 80Wpc.

Flexible inputs: the Nova incorporates an onboard "switching" DAC, and as a consequence it offers a much different mix of inputs than most

integrated amplifiers do: five direct digital inputs (one USB, two coax, and two optical) plus three stereo analog inputs. Peachtree notes that this combination of inputs allows users to connect a wide variety of digital sources such as the "Squeezebox, Apple TV, Wadia iTransport, Airport, Sonos, and XM or Sirius tuners."

Home Theater bypass: the Nova's analog "Aux" input can, via a rear panel switch, become a "Home Theater Bypass." With the home theater bypass engaged, the Nova can operate as a "slave" amplifier that can be driven from the preamplifier outputs of an A/V receiver or controller.

Going wireless: the Nova provides a convenient rear panel chamber (normally sealed off with a cover plate) where users can house wireless digital audio receiver modules from Sonos systems and the like.

A "remote switchable" 24-bit/96kHz high performance onboard DAC: the Nova's versatile, onboard DAC is arguably its strongest single feature. In fact, Peachtree's David Solomon recently told *Playback* that some listeners think of the Nova as a high-end DAC that just "happens" to come with an amplifier. Highlights of the Nova's DAC section include:

- The impressive new ESS 9006 Sabre DAC chip, which incorporates a patented jitter reduction circuit and promises a stunning signal/noise ratio of 122dB (or 118dB when measured "in system"). Peachtree's Jim Spainhour comments that, "we chose the Sabre DA not just for the sound in an ideal setting, but when it's being fed a less-than-ideal digital signal,

- too. That's where it is the hands down winner."
- 11 regulated power supplies for the DAC.
- Transformer coupling for each digital input to eliminate "noise associated with grounding problems and switching power supplies."
- A distinctive "galvanically isolated" USB input that eliminates computer power supply noise that otherwise "travels down the USB ground and manifests itself as a major source of jitter."
- Rear panel switch that allows users to select "Sharp" or "Soft" DAC filter slopes (the "Sharp" setting generates better lab measurements, but many Peachtree says many audiophiles prefer the sound of the "Soft" setting).

Sleek, art deco-inspired styling: like the original Peachtree Decco, the Nova's faceplate features gently rounded corners and a rectangular "viewing window" through which you can see the Nova's glowing 6922 vacuum tube at work. The amp comes housed in a svelte, upscale, round-edged sleeve finished in cherry, rosewood, or black lacquer. The Nova's appearance says "pride of ownership," loud and clear.

SONIC CHARACTER, AMP

Based on my listening tests, the Nova would hold its own quite nicely in comparison to like-priced integrated amplifiers—even if it didn't include a killer onboard DAC. Three sonic qualities define the Nova's sound. First, its tube-driven front end confers a gentle (but definitely not sloppy-sounding) touch of organic warmth and harmonic richness that make the Nova sound much more "alive" than many of the solid-state-only integrated amps I've heard. The Nova also sounds

EQUIPMENT REVIEW - Peachtree Audio Nova Hybrid Integrated Amp/USB DAC

good in solid-state only mode, but with a presentation that, while very clean, is somewhat less rich, three-dimensional, and involving than when the tube circuit is engaged. Second, the Nova has a remarkably focused and well-defined character, and handles low-level details very well. As a result, imaging and soundstaging details are conveyed with the sort of precision and solidity that remind me of far more expensive integrated amps. Third, the amp's bass sounds very tight and well controlled, exhibiting none of the looseness I've observed with some

all-tube integrated amps. In short, the Nova, like many hybrid-integrated amps, is a best-of-two worlds design—one that marries tube warmth and harmonic richness with solid-state tautness and control.

The only drawback I noted, and it seems almost unfair to mention it, is that the 80Wpc amp does not have quite as much dynamic “grunt” or low bass punch as some higher-powered amps in its class. But don't get me wrong: the Nova offers good dynamics and bass with the limits of its power envelope. It's just that certain speakers require a bit more wattage than the Nova has on tap in order to really clear their throats and sing. But to put things back in perspective, remember this: virtually none of the Nova's higher-powered competitors can match its versatility.

SONIC CHARACTER, DAC

The strengths of the Nova DAC parallel those of the Nova amp, and one of the first qualities



you might notice about the DAC would be the strikingly clear, delicate way in which it renders low-level sonic details. If you listen carefully to the decay of percussion instruments through the Peachtree, for example, you'll hear the shimmer of cymbals or the shudder of bass drums trailing off for a much longer period of time than through most DACs. Similarly, the Nova lets you hear instruments reverberating within recording spaces long after other DACs would have buried their sounds in background noise—a quality I attribute to the Peachtree DAC's excellent claimed signal/noise ratio. On paper these might sound like subtle or potentially hair-splitting distinctions, but in practice they mean that the Nova lets you enjoy noticeably more nuanced and finely shaded renditions of your favorite recordings. The sensation is the equivalent of finding sonic buried treasure; the Nova is your “all-access pass” to valuable layers of detail that simply weren't audible before.

I was also mightily impressed by the Nova's ability to convey a flowing, expansive sense of dynamic “bloom” whenever the music called for it. Some DACs seem to handle dynamics in a relatively crude, “color by numbers” fashion, but not so the Nova. It faithfully renders both subtle as well large-scale shifts in dynamic emphasis (and all points in between), making good recordings sound unusually expressive and vibrant—almost as though you can feel the music breathing. At more than a few points when listening through the Nova DAC, I found myself thinking (put on your best Dr. Frankenstein accents, now, please), “It is *alive*...”

Performance tip: For best sound, Peachtree's Jim Spainhour recommends “at least a 72 hour break-in period due to the organic caps (capacitors) in the DAC.”

Sharp and Soft DAC filter switch settings: I

tried flipping back and forth between the Nova's “Sharp” and “Soft” filter settings and found the “Soft” setting gave consistently superior results. The “Sharp” setting, while pleasant enough for casual listening, dilutes some of the signature liveliness and harmonic richness of which the Nova is capable. The “Soft” setting, by comparison, yields a noticeably more detailed and dynamically responsive sound.

What of Peachtree's claim that the Nova can compete with more costly DACs? I compared the Nova side-by-side with Benchmark Media's

critically acclaimed and award-winning DAC1 Pre (\$1595) and found the Nova was thoroughly competitive with its more expensive counterpart, though the two DACs each offered a somewhat different take on the music. The competing DACs are about equal in overall resolution, though I would say the Nova enjoys a slight edge in handling upper midrange and treble details while the Benchmark offers an equally slight edge in bass definition and solidity. The Benchmark is arguably the cleaner sounding and more neutrally voiced of the two (owing to its superior bass), but it has a somewhat flatter and more dry-sounding sound, while the Nova has a warmer, more three-dimensional and more dynamically expressive presentation. Personally, I would have a tough time choosing between the two, which speaks volumes for how good the Nova DAC really is. But for many prospective buyers, I suspect the tiebreaker will be that the Nova offers better versatility and greater overall value vis-à-vis the

EQUIPMENT REVIEW - Peachtree Audio Nova Hybrid Integrated Amp/USB DAC

Benchmark. Here's why. The Nova costs roughly \$400 less than the Benchmark, offers comparable though arguably more flexible features (the Nova offers three analog inputs compared to the Benchmark's one) and incorporates an 80 Wpc hybrid integrated amp (whereas the Benchmark is a DAC/headphone amp/preamp only). Advantage, Peachtree Audio.

SONIC CHARACTER, HEADPHONE AMP

Much though I enjoyed using the Nova as an integrated amp and as a standalone DAC, I felt its performance as a headphone amp brought many of its best qualities to bear in a remarkably synergistic way. Part of why many of us enjoy listening through headphones is to savor the up-close and intimate perspective on the music that they afford, and the role of any good headphone amp is to help take that perspective to the next level—yet without imposing any cold, sterile, or

edgy artifacts. The Nova fills that bill to a “T”, especially so when its tube-powered front end circuitry is engaged. Some listeners worry that tubes might impart an artificially lush, loose, or romantic sound, but with the Nova headphone amp I found the opposite to be the case. Headphones suddenly sounded more detailed, more focused, and better controlled than they otherwise might, and they were enlivened by the Nova's powerful yet nimble dynamics.

MUSICAL EXAMPLE

Stevie Ray Vaughan's classic “Tin Pan Alley (aka Roughest Place in Town)” from *The Real Deal: Greatest Hits, Vol. 1* [Sony] makes an almost perfect vehicle for showcasing the Nova's strengths, but also for exposing its minor weaknesses. Instrumentation on this beautifully recorded track is very sparse—just the sound of bass, drums, electric guitar, and, of course, Stevie Ray's vocals—so that every little textural and dynamic nuance is exposed and open for careful examination. Early on in the track, you'll hear incisive snare drum rim shots whose attack sounds, through the Nova, fairly crackle with explosive energy and whose reverberations within the recording space sound like the sonic equivalent of “contrails” lingering in the air and then slowly dissipating. Few if any amp/DAC combos in the Nova's price range can match its ability to capture attack/decay information so well.

Later, Stevie Ray's solo Stratocaster guitar lines give the Nova's dynamic capabilities a real workout. If you stop to think about it for a moment, part of Vaughan's genius as a guitarist involved not only his brilliant note choices and amazing

finger dexterity, but also his remarkable control of moment-to-moment dynamics within solo lines. One moment might show a slow, restrained melancholy phrase while the next might bring an almost volcanic eruption of anguish and anger, only to be followed by soft, almost “muttered” flurries of notes adding musical afterthoughts. Many DACs I've heard have trouble capturing the ebb and flow of Vaughan's abrupt and sometimes quite violent dynamic mood swings, but the Nova does not. No matter how big a surge or how sudden a recession in volume level, the Nova stays glued to the recorded performance—never adding compression or overload artifacts of its own.

The Nova's only shortcoming—namely, very slightly lightly balanced mid- and low-bass—is also exposed in this track if you listen closely to Tommy Shannon's electric bass and to the lower register of Vaughan's voice. Shannon's bass is closely mic'd and sounds very clean while exhibiting, at times, Tsunami-like waves of low-frequency energy that, under ideal circumstances, seem to lift listeners from their seats and carry them forward through the sheer force of the music. Those waves of bass energy are clearly reproduced by the Nova, but they lack the “Nth” degree of weight and wallop—qualities I heard both from my reference Musical Fidelity kW SACD player and from the Benchmark Media DAC1 Pre I had on hand for comparison.

Similarly, if you listen carefully to the timbre of Vaughan's voice, you should hear a fair amount of upper register smoke, grit and growl supported, ideally, by darker, more full-bodied undertones down below. Through the Nova, those dark undertones were recessed just a

bit, giving Vaughan's voice a lighter, breathier character, whereas both my reference player and the Benchmark DAC captured more of the depth in the singer's voice. Even so, these differences in tonal balance were quite subtle and in no way limited my enjoyment of the Nova. Again, the tradeoff is that the Nova does an exceptional job with inflections in Vaughan's voice, so that you can enjoy the full emotional impact of every vocal swell or decrescendo. **tas**

BOTTOM LINE

The Peachtree Audio Nova is a versatile, well-conceived and well-executed product that fulfills a number of roles with astonishing refinement, polish and panache. Do the math: the Nova would be well worth its asking price, whether evaluated as an accomplished hybrid integrated amplifier or as a high-end audio DAC. But the fact that the Nova plays both roles at once makes it a bargain—and a platform we can confidently recommend as a foundational element for use in very good, yet still sensibly-priced, high end audio systems. **CM**

SPECS & PRICING

Peachtree Audio Nova integrated amplifier/DAC

Power: 80Wpc @ 6 ohms

Inputs: five digital (one USB, two coax, two optical), three stereo analog

DAC Upsampling: 24-bit/96kHz

DAC signal-to-noise: 118dB “A-weighted”

Outputs: two pre-amp outputs (one variable level, one fixed level), one headphone output (1/4-inch jack)

Dimensions (HxWxD): 5” x 14.75” x 14”

Weight: 26 lbs.

Warranty: One year, parts and labor

U.S.

Price: \$1199

U.K.

Not distributed in U.K.

PEACHTREE AUDIO

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Peachtree Audio iDecco Integrated Amp/DAC

Chris Martens

When I reviewed the Peachtree Audio Nova integrated amplifier/USB DAC (\$1199) in Playback 21 I was very favorably impressed and called it “a versatile, well-conceived and well-executed product that fulfills a number of roles with astonishing refinement, polish, and panache.” Let me begin this review of Peachtree’s new iDecco integrated amp/USB DAC/iPod Dock by telling you that the iDecco offers much of the flexibility and essentially all of the sonic excellence of its big brother, while adding a digital (not analog) iPod dock and selling for—get this—an even lower price (\$999).

To really get what the iDecco is about, it is important to understand that it is really five different products in one:

- A hybrid solid-state/vacuum tube (6N1P) preamplifier with a Class A output buffer stage.
- A Class A headphone amplifier (when the tube circuit is enabled).
- A multi-input (USB, S/PDIF, TosLink, iPod) 96kHz/24-bit upsampling DAC with a solid-state output stage.
- A digital iPod dock with, of course, a built-in integrated amplifier.
- A 40Wpc MOSFET-powered, solid-state integrated amplifier.

Now all of the features and functions in the world aren’t worth much unless they are well

executed, and happily solid execution is one area where the iDecco really shines. As you’ll see in a moment, the iDecco is a seriously refined audio component that is so good at each of its several roles that you might willingly pay its asking price to enjoy any one or perhaps two of them. But bundle all five functions together, throw in a generous helping of sonic sophistication, and the iDecco’s value proposition skyrockets, pushing it up into “screamin’ good deal” territory.

FEATURES

Preamplifier

Digital Audio Inputs: The iDecco incorporates an onboard “switching” DAC with four switch-selectable digital audio inputs (USB, Coax, TosLink, and the iPod dock), whereas the Nova provides five digital inputs (but no iPod dock).



iPod Controls: The iDecco remote control has dedicated buttons that allow users to control an iPod plugged into the iDecco’s dock.

Analog Audio Inputs: The iDecco also provides a single stereo analog input, whereas the Nova provides three sets of inputs.

Analog Audio Outputs: The iDecco’s preamp section offers both variable and fixed level analog outputs (the fixed outputs are driven by solid-state circuitry only), making it easy for you to use the Nova to drive an outboard power amplifier or subwoofer, if you wish.

Solid-state/vacuum tube switching: The iDecco preamp section is based on a circuit that is virtually identical to the one used in the Nova. As with the Nova, the iDecco remote control provides a switch that is simply labeled “Tube.” When the iDecco is used as a preamp, integrated

amp, or headphone amp, you can use the Tube switch to engage a Class A vacuum-tube-based output stage. Interestingly, the tube used in the iDecco is a 6N1P rather than the 6922 tube used in the Nova. Jim Spainhour of Peachtree audio explained that the 6N1P is essentially a higher-current version of the 6922, meaning that—if you wished to do so—you could substitute a 6922 tube in place of the iDecco’s standard tube (but note: Spainhour advises that Nova owners cannot substitute a 6N1P tube in place of the Nova’s standard 6922, since the Nova circuit is not set up to handle the 6N1P’s current requirements). A blue LED illuminates the vacuum-tube viewing window in the iDecco’s front panel whenever the tube output stage is engaged. One subtle yet significant difference between the Nova and the iDecco is that the latter uses a slow ramp-

EQUIPMENT REVIEW - Peachtree Audio iDecco Integrated Amp/DAC

OVERVIEW

Consider this amplifier/DAC/dock

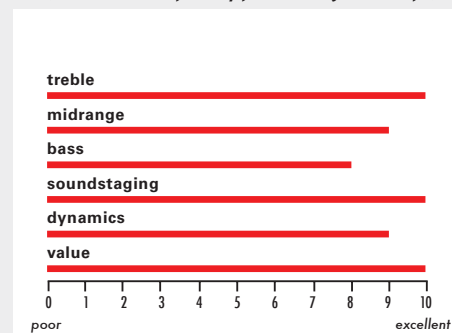
if: You like the idea of getting the sonic refinement and versatility of the Peachtree Nova, plus digital iPod dock functions, but at an even lower price (though you will step down from the Nova's 80Wpc amp to a smaller 40Wpc amp in the iDecco). The iDecco makes good sense in several contexts. You might use it as a fine standalone DAC, headphone amp, or preamp, or you could employ it as an incredibly flexible front-end component upon which to base a superb yet sensibly priced high-end audio or computer-based music systems. One important note: Given its moderate power output, the iDecco shines brightest when

driving smaller and/or higher sensitivity loudspeakers.

Look further if: You plan to use power-hungry, low-impedance, or otherwise hard-to-drive speakers (e.g., Magnepans). While the iDecco amplifier section is quite good, it simply does not have the muscle to handle those kinds of workloads. But note: As you'll see in this review, the iDecco can work beautifully when used as a DAC/preamp driving higher-end power amps.

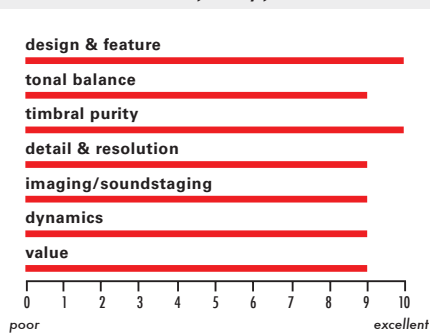
RATINGS

(relative to comparably priced integrated amps)



RATINGS

(relative to comparably priced DACs)



up circuit whenever the tube is brought into play. This allows you to hear a more gradual transition from the iDecco's solid-state sound to its tube sound.

Top-mounted digital iPod dock

The iDecco incorporates a top-mounted digital iPod dock that is similar in concept to the dock provided in the Wadia Digital Model 170 iTransport. By pressing the iDecco's iPod input selector button, users can send digital audio datastreams from iPods directly to the iDecco's built-in 96/24 upsampling DAC. Note that there is no digital audio signal pass-through since Peachtree's working assumption is that you will want to use the very high quality DAC built into the iDecco, rather than an outboard DAC.

A set of component-video outputs is provided on the rear panel of the iDecco, should you wish to play video content through your iPod.

24-bit/96kHz Upsampling DAC

Remote controlled input switching (four inputs: USB, Coax, TosLink, and iPod).

Features ESS9006 Sabre DAC chip, which incorporates a patented jitter reduction circuit.

11 regulated power supplies for the DAC.

Transformer coupling for all digital inputs for ground isolation.

A "galvanically isolated" USB stage.

USB input accepts data at 16-bit/44.1kHz resolution, but upsamples to 24-bit/96kHz.

Rear-panel switch allows users to select "Fast" or "Slow" DAC filter slopes (the "Fast" setting generates better lab measurements, but Peachtree says many audiophiles prefer the sound of the "Slow" setting).

Rear-panel switch allows users to select "Narrow" or "Wide" jitter adjustments for the S/PDIF (coax) and TosLink (optical) digital inputs. According to Peachtree,

the "Narrow" setting sounds better with low-jitter sources, while the "Wide" setting is recommended for use with high-jitter sources.

Signal/noise ratio of 122dB.

Jitter: <1 picosecond as measured at the Master Clock (Super Clock).

Headphone Amplifier

The iDecco can be used as a standalone headphone amplifier with a Class A tube output circuit (the headphone amplifier shares circuitry with the iDecco preamp).

As a thoughtful detail touch, the iDecco is set up so that, when a headphone plug is inserted into its headphone jack, the iDecco's power amplifier section automatically disengages, effectively muting the speakers.

Amplifier

The power amplifier section of the iDecco is based on stereo MOSFET devices and puts out 40Wpc.

Art deco-inspired styling

Like the original Peachtree Decco and the Nova, the iDecco's faceplate features gently rounded corners and a rectangular "viewing window" through which you can see the iDecco's glowing 6N1P vacuum tube. The amp is housed in a svelte, round-edged sleeve finished in black lacquer, which gives the iDecco a decidedly upscale appearance.

SONIC CHARACTER, PREAMP/HEADPHONE AMP

Since the iDecco preamp and headphone amplifier share common circuitry, my comments here will apply to both functions.

Not surprisingly, the iDecco preamp sounds nearly identical to the Nova preamp. In fact, when used in solid-state mode they do sound identical, so that minor differences between the tube circuits of the two products

EQUIPMENT REVIEW - Peachtree Audio iDecco Integrated Amp/DAC

can likely be attributed to differences between the 6N1P and 6922 tubes. To my ears, the iDecco—with tube circuitry engaged—sounds perhaps a hair sweeter in the treble region, with a bit more harmonic bloom and greater three-dimensionality than the Nova, though some might interpret the Nova's sound as being a touch cleaner and therefore slightly more accurate. In any event, sonic differences between the preamp sections of the iDecco and the Nova are small.

I compared the solid-state versus tube sound of the iDecco and found that, as with the Nova, the solid-state output section was very clean, but also somewhat less rich, three-dimensional, and involving than the tube circuit. Candidly, if I owned the iDecco I would leave the tube circuit engaged probably 95 percent of the time. For this reason my comments, below, refer to the sound of the iDecco preamp with the tube circuit in play.

The core sound of the preamp has three defining characteristics. First, the preamp offers excellent clarity, with plenty of focus and definition. More so than many products at its price point, the iDecco offers lots of resolving power, meaning that it handles low-level textural, transient, and especially spatial or soundstaging cues in the music with remarkable acuity. Second, the preamp delivers bass that is very tight and well controlled, exhibiting none of the looseness or sloppy romanticism you might hear in other affordable tube preamps. Finally, the iDecco preamp does a great job of capturing the sheer richness of tonal colors in the music—in this respect sounding much more like an expensive standalone vacuum tube preamp, rather than an inexpensive integrated amp/DAC.

In my tests, I used the iDecco preamp to drive

a pair of NuForce Reference 9 v.3 Special Edition monoblock amps and though the power amps cost many times what the iDecco does, the Peachtree did not seem at all out of place. On the contrary, the match seemed a very good one, with the two products playing off of one another's strengths in a beautiful and musically satisfying way. But one thing the wide-bandwidth NuForce amps did reveal—and please consider this a minor nit—is that there is a bit of noise produced when switching between the iDecco's various inputs (or when turning the tube output stage on or off).

But let me be clear: Though there is obviously more to the iDecco than its preamp section, I would be very hard pressed to name a preamp at the iDecco's price that I would rather use in a high-end system. It's that good.

SONIC CHARACTER, DAC

When used as a standalone DAC the iDecco, like the Nova, provides solid-state outputs only. For the most part, the strengths of DAC parallel those of the iDecco preamp. The DAC resolves low-level sonic details beautifully, which helps the DAC create highly believable, three-dimensional soundstages. Through the Peachtree, for example, you'll hear long reverberation tails on individual sounds and can easily hear how those sounds interact with the acoustics of recording spaces. The DAC also captures both large and small-scale dynamic contrasts very effectively, letting listeners not only hear but also feel the living, breathing pulse and flow of the music.

If your reactions are anything like mine, you may be struck by the fact that the iDecco DAC doesn't conform to your mental image of a budget DAC.

In fact, it doesn't really sound like a "budget" anything, because it produces the sort of big, richly textured, wide and deep soundstages that are traditionally the hallmarks of higher-end audio components. In short, the iDecco DAC offer overall levels of sonic refinement and acuity typically experienced with DACs that cost as much as, if not more than, the entire iDecco does.

I switched back and forth between the iDecco's "Fast" and "Slow" filter settings and found that the "Fast" setting seemed to sap some of the iDecco's typical dynamic vividness and sense of life. The "Slow" setting, on the other hand, restored a more detailed and dynamically responsive sound.

I switched back and forth between the iDecco's "Narrow" and "Wide" jitter adjustment settings and found the "Narrow" setting gave a clearer and more focused sound. The "Wide" setting has a slightly softened and perhaps more forgiving sound that is appealing in its way, but a sound that also limits the absolute accuracy and vividness of the overall presentation. That said, I could see how the "Wide" setting might be just the ticket when using the iDecco with high-jitter sources.

Among DACs that provide both USB and S/PDIF inputs, the common wisdom is that the S/PDIF inputs will always sound better than the USB inputs, and in most cases the common wisdom holds true. But frankly, the iDecco DAC really surprised me in that its USB and S/PDIF inputs sounded essentially the same, which is pretty remarkable. I did numerous back-to-back comparisons, first feeding full resolution WAV files via USB to the iDecco, and then playing the same musical content via CDs in my reference

disc player and sending the resulting digital audio streams to the iDecco's S/PDIF inputs. The sonic results were so similar that I couldn't reliably characterize substantive differences (if any) between them. I've never had that happen when comparing USB and S/PDIF inputs in a DAC before.

During my listening tests, I compared the iDecco DAC both to a PS Audio Digital Link III DAC (\$995, but currently offered at the special price of \$700 in the U.S.) and to the output section of my reference Musical Fidelity kW SACD player (no longer in production, but a very costly player in its day).

I found that the PS Audio DAC produced a subtly sweeter, darker and subtly more "romantic" sound than the iDecco DAC, while the iDecco offered a more resolved, open, and transparent sound with—by comparison—an ever-so-slightly more lightly balanced presentation overall. I also found that the PS Audio DAC's S/PDIF input sounded better than its USB input, whereas the iDecco's USB and S/PDIF inputs, as mentioned above, sounded equally good.

In comparison to the DAC/output stage of my Musical Fidelity kW SACD player the iDecco offered many similarities, though I thought the Musical Fidelity offered slightly better resolution of low-level details and low-level dynamic contrasts, and a bit more defined and nuanced bass. On the other hand, you could argue that the iDecco offered a more relaxed presentation. In any event, the sonic differences between the iDecco DAC and the DAC/output section of the Musical Fidelity player were relatively small—especially in light of the big price differential between the products.

EQUIPMENT REVIEW - Peachtree Audio iDecco Integrated Amp/DAC

Given these results, I've come to think that the iDecco's DAC section alone could more or less justify the product's entire asking price, which is remarkable when you consider that there is so much more to the iDecco than just its DAC section

SONIC CHARACTER, AMP

Having listened to the iDecco DAC/preamp sections driving a powerful and accomplished pair of outboard monoblock power amps (the NuForce Reference 9 v.3 SE pair), I felt I was in a pretty good position to assess what the iDecco's own amplifier section could do by comparison. My conclusion, not too surprisingly, is that the iDecco's amplifier section is very good for what it is: namely, a high quality, mid-priced and moderately powered amplifier offered as part of an affordable, multifunction integrated amp. But that said, I would also observe that the iDecco amp is not quite the equal of a high-end standalone power amp, nor should we expect it to be.

On the plus side of the ledger, the iDecco amp delivers a rich, clear, and evocative sound with excellent soundstaging characteristics. When coupled with speakers that can be driven well by 40Wpc, the iDecco amp can produce huge, three-dimensional soundstages that leave the sound of many modestly priced integrated amps in the dust. During my tests, I used the iDecco in conjunction with a pair of Monitor Audio's superb (and quite easy to drive) Silver RX8 floorstanders (\$2000/pair) and found the combination to be one of those rare instances of "sonic serendipity," where the whole was much greater than the sum of the parts. Think of it this way: You could buy an iDecco and the Monitor Audio speakers

I mentioned above for about \$3000, then add either a PC-based music server and/or an iPod as source components, acquire an obligatory set of high-performance cables, and wind up with a music system that—I kid you not—could easily do battle with many of the five-figure systems I've heard at trade shows.

Good though the iDecco amplifier section is, however, I would say it is perhaps not quite as impressive as other elements of the product are. The main sonic differences you would observe between the iDecco amp and higher-end powerplants (such as the NuForce monoblocks I used in my tests) involve the iDecco's slightly reduced levels of resolution and detail from top to bottom and somewhat less tightly controlled and less deeply extended bass response. There is, too, a difference in sheer power output to be reckoned with (remember, the iDecco produces an honest 40Wpc at 6 ohms, while the NuForce monoblocks each belt out 335 watts at 4 ohms). In practice, this means you'll want to keep the iDecco's power output limitations in mind and plan your speaker acquisitions accordingly.

But let's keep things in perspective. While the iDecco's amp section may not enjoy the quasi-giant-killer status that its DAC and preamp sections do, it nevertheless offers very solid performance and—more importantly—unfailing musicality for the money.

MUSICAL EXAMPLES

I can't speak for you, but I sometimes enjoy playing well-made recordings that show unexpected combinations of instruments at play, partly because they draw your attention to the musical ideas being expressed, but also because

they seem like celebrations of the sheer beauty of sound, itself. One such recording is Marilyn Mazur and Jan Garbarek's *Elixir* [ECM], where two favorite tracks are "Bell-Painting" and "Talking Wind." Both tracks employ distinctive high-pitched percussion instruments of various kinds, highlighting differences in the attack, voicing, and decay characteristic of each instrument within a reverberant recording space. On good equipment, the sonic effect of hearing these tracks is not unlike running your fingers through a treasure chest full of variegated jewels—so many different shapes, textures and colors to take in at once. On both tracks the iDecco not only did not disappoint, but positively excelled.

On "Bell-Painting," the shorter and more delicate of the two musical selections, you initially hear a round of differently pitched small bells and chimes being struck, followed by a similar round of slightly deeper-pitched bells and gongs being sounded. The iDecco deftly captured the variations in attack between the bells, appropriately giving each its signature voice, and showing how decay characteristics help define the bells' timbres—with some fading quickly to silence as others continue to shimmer and ring for several seconds after being struck, their voices lingering and floating on the air. Most importantly, the iDecco captured—but did not overdo—the fundamentally metallic character of the bells, something that in practice is easier to say than to do on this revealing track (some amps, for example, make the instruments sound much too "dry," almost like bursts of white noise, which isn't right). The iDecco served up levels of realism and nuance that not many amp/DACs in its price range could muster.

On "Talking Wind," the longer and more dynamically challenging of the two tracks, the iDecco got an even tougher workout, as the performers unleash an array of high and mid-pitched cymbals, gongs, and bells, and then introduce a musical theme propelled by low-pitched drums. The iDecco impressed me with its ability to navigate gracefully the track's complicated combinations of pitches and wildly fluctuating dynamic envelopes (indeed, some of the percussion strikes captured on the track are downright violent). What's more, the iDecco simultaneously managed to catch the complex interplay between the instruments while also showing how their sounds interacted with, and reverberated within, the relatively live-sounding recording space. Faced with such vigorous musical demands, some amps lose focus and retreat into a region where their sound becomes diffuse and compressed, but not the iDecco. It hung right in there, tapping into and beautifully expressing the richness and dynamic liveliness of the song, while presenting the instruments on a wide, deep, and precisely delineated soundstage. Well done, Peachtree.

If you play music that demands very high levels of bass power and finesse at the same time, such as the bass guitar solos found on "Lil' Victa" from Stanley Clarke, Marcus Miller, and Victor Wooten's *Thunder* [Heads Up], you might observe one of the few limitations of the iDecco amp: namely, a tendency to run out of steam down low and to deliver bass that, while rich and nicely weighted, is not the last word in definition. Through the iDecco amp you can hear differences between the voices of Clarke's, Miller's, and Wooten's basses (Clarke plays an

EQUIPMENT REVIEW

SPECS & PRICING

Peachtree Audio iDecco

Power: 40Wpc @ 6 ohms

Inputs: Four digital audio (USB, S/PDIF-coax, TosLink optical, iPod), one stereo analog

DAC upsampling: 24-bit/96kHz

DAC signal-to-noise: 122dB "A-weighted"

Outputs: Two pre-amp outputs (one variable level, one fixed level), one headphone output (1/4-inch jack), main speaker taps

Dimensions: 5" x 14.75" x 14"

Weight: 25 lbs.

U.S.

Price: \$999

U.K.

Not distributed in U.K.

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Alembic bass, Miller plays a highly modified Fender Jazz bass, and Wooten plays a Fodera bass), but the lines of distinction aren't quite as crisply drawn as they might be in higher-end amps. Similarly, there's a sense that the iDecco almost but not quite captures some of the finer textural and dynamic nuances of the three bass virtuosos' playing styles. But on the whole, the iDecco's sound is incredibly accomplished and refined—especially when you take its price and amazing versatility into account.

BOTTOM LINE

The Peachtree Audio iDecco is a worthy little brother to the firm's excellent Nova, as it combines remarkable flexibility (highlighted by the iDecco's signature digital iPod dock) with levels of sonic finesse and refinement so high that they really belie the product's modest asking price. As we observed at the outset, the iDecco can play many different roles, each at a very high level of performance. But whether you buy one to use as a DAC, a preamp, a headphone amp, or as one of the coolest DAC/integrated amps we've yet seen, the iDecco will more than give you your money's worth. **tas**

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Bel Canto Design S300iU Integrated Amplifier/USB DAC

Energy and Life

Chris Martens

Not long ago, Minnesota-based Bel Canto Design seemed like a technically innovative but otherwise traditional high-end audio company, complete with top-tier products that sold at decidedly upper-crust prices. With the advent of the firm's e.One-series components a few years ago, however, Bel Canto reached a turning point of sorts, where it was able to offer very high performance products at much more manageable, real-world prices—a welcome turn of events for budget-minded music lovers. For the past few months I've been getting to know one of Bel Canto's most versatile e.One models: the S300iU integrated amplifier/USB DAC, which sells for \$1995.

Like other e.One models, the S300iU is housed in a compact enclosure that is deeper than it is wide, sized so that pairs of e.One components can fit side by side on typical equipment racks. Pictures, I discovered, don't do justice to the S300iU, which is solidly built and blessed with the exquisite fit and finish reminiscent of old school, metal-bodied cameras. So, while small in stature, the S300iU nevertheless pushes all the right high-end pride-of-ownership buttons.

The S300iU is simple in appearance and in use—its only visible user controls are an illuminated display window (which shows amplifier status,

input channel selections, and volume settings) plus a single, ingeniously designed, multifunction control knob. By pressing or rotating the knob, users can select inputs, invoke mute or home-theater bypass settings, or adjust volume levels. A full-function remote is also included.

The S300iU's integrated amplifier consists of a low distortion, wide-bandwidth preamplifier coupled with a potent, 150Wpc, dual-mono Class D power amplifier based on modified ICEpower modules. The amp provides four line-level analog audio inputs plus a fifth modular input bay that—in the case of the S300iU—provides a digital audio

input in the form of a 24-bit/96kHz USB DAC (Bel Canto offers other input modules, too, such as a phono stage).

The input side of the DAC incorporates a built-in version of the circuitry from Bel Canto's well-regarded 24/96 USB Link, which is said to reduce jitter and noise for improved sound quality. Interestingly, though, the USB Link circuitry probably performs better in the S300iU than it does as a stand-alone product because it is positioned on the same circuit board as the DAC—eliminating the Link's traditional outboard housing, digital audio cable, and connectors as

possible sources of noise and jitter.

Judged solely as an integrated amp, the S300iU was simply excellent, producing a tight, punchy, well-defined sound that was unfailingly well controlled—a “take charge” sound, if you will. When I first installed the Bel Canto in my system, I was surprised by the powerful, expressive way in which it handled dynamic swells, vividly conveying the sense of energy and life in the music. It also did a great job of resolving subtle, low-level sonic details and of navigating tricky passages featuring densely layered transient information. Compared to many ICEpower-based amplifiers I've heard in



EQUIPMENT REVIEW - Bel Canto Design S300iU Integrated Amplifier/USB DAC



the past, the Bel Canto offers a noticeably more lively, open, and transparent sound, conveying qualities of immediacy and focus that make it a blast to hear in action.

During my listening tests, I used the Bel Canto both to drive two excellent but challenging speaker systems: the superb Usher Mini Dancer Two and the classic Magneplan MG 1.6. The highly revealing Ushers reward amplifiers rich in subtlety and finesse, but tend to expose amplifiers that have even faint problems with edginess or glare. The planar magnetic Maggies, in turn, also reward sonic refinement while demanding serious muscle—wimpy amps need not apply. To its great credit, the S300iU did a fine job with both speakers, offering up power and refinement in equal measures.

The only minor limitation I noted was that the S300iU didn't reproduce very-high-frequency harmonics or the elusive sense of "air" surrounding instruments quite as effectively as my reference hybrid tube/solid-state integrated amp (which costs nearly four times what the Bel Canto does). Given this huge price differential, I

thought Bel Canto's performance was thoroughly admirable—good enough that, if my reference amp ever failed, I could see using the Bel Canto as a long-term substitute. One thing is certain: The S300iU is thoroughly competitive with—and in some respects superior to—other fine integrated amps I've heard in this price class. This is really significant when you consider that the Bel Canto also has a "secret weapon" most other integrated amps do not provide: a built-in, high-quality USB DAC.

The Bel Canto's USB DAC offers taut, rock-solid bass and smooth, articulate mids, and it produces—when fed lossless digital audio files—remarkably stable and sharply focused stereo images (each performer simply takes his or her place on stage, and stays put—no matter how complicated the music becomes). Some of my colleagues at The Absolute Sound have questioned whether USB DACs are capable of capturing the rhythmic and timing-oriented aspects of music, but I found no such problems with the S300iU. On the contrary, I thought it had terrific rhythmic drive and that it did a fine job of

conveying the sense of "pulse" and "flow" within the music.

The Bel Canto offers higher levels of resolution than some, but not all, competing USB DACs I've heard, and it does a fine job of teasing out complicated musical lines, and of rendering subtle textural details that define instrumental voices. One drawback I noted, however, is that the Bel Canto DAC occasionally exhibits a somewhat hard-edged, spitty, or splashy sound on abrupt, vigorous upper midrange or treble transients—a problem I've encountered with other USB DACs as well. But don't misunderstand me: The S300iU certainly does not sound bright, harsh, or edgy. It is just that sounds such as sibilant "S's" in vocals, vigorous cymbal strikes, sharp reed noises from wind instruments, or abrupt violin bowing changes can occasionally disrupt the DAC's otherwise smooth, articulate sound. I found transient problems of this sort could be minimized, though not completely eliminated, by using a high-quality USB cable such as the Furutech GT2 cable I used during my listening tests

I've spoken about the Bel Canto's ability to capture the "energy and life" in well-made recordings and to experience those qualities firsthand, try putting on the track "Tommy" from bassist Dean Peer's stunning *Ucross* [XLO Recordings]. Peer puts on a dazzling display of bass guitar techniques, including conventional finger-style playing, slapping, lift-offs, hammer-ons, overhand tapping, and perhaps most amazing of all, very-high-frequency harmonics that give the bass an otherworldly, chime-like sound. If you've ever had the pleasure of hearing such a performance live, you know it

SPECS & PRICING

Bel Canto Design S300iU Integrated Amplifier/USB DAC

Power output: 150Wpc @ 8 ohms

Inputs: Four stereo analog (one with "home-theater" bypass), one digital audio (USB)

DAC upsampling: 24-bit/96kHz

Outputs: Preamp out, record out

Dimensions: 3" x 8.5" x 13.5"

Weight: 12 lbs.

ASSOCIATED EQUIPMENT

Musical Fidelity kW 500 integrated amplifier and kW SACD player, Chordette Gem Bluetooth decoder/USB DAC, Peachtree Audio Nova integrated amplifier/USB DAC, Usher Audio Mini Dancer Two and Magneplanar Magneplan MG1.6QR loudspeakers, Furutech cables (signal, speaker, coaxial and USB digital audio), PS Audio power conditioners and power cords, Solid Tech Reference Rack-of-Silence, RPG and Auralex room treatments

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EQUIPMENT REVIEW

can be characterized both by sheer dynamic punch and—paradoxically—by great delicacy (Peer's harmonic techniques give the bass an almost gamelan-like quality where harmonics and fundamentals merge in exquisitely complex ways).

The Bel Canto just waded right in and owned this track, providing sufficient power and control to enable my speakers to create a good facsimile of a live bass guitar performance (something that—trust me on this—most amps have a very hard time doing). But it was in Peer's upper register playing that the S300iU really came into its own, keeping up with Peer's blazingly fast, rapid-fire techniques without skipping a beat, and beautifully displaying his high harmonics in their full glory.

Another track that shows the Bel Canto's strengths to good advantage is "Talking Wind" from Marilyn Mazur and Jan Garbarek's *Elixir* [ECM]. The song is a percussion tour de force, displaying an astonishingly diverse array of high- and low-frequency instruments performing within a pleasantly reverberant space. On this complicated track, the S300iU captured the distinctive transient signatures and voices of the instruments with surprising realism. As instruments were struck, their sounds and positions on stage seemed so lifelike and vivid that I felt the almost child-like urge to point toward empty spaces between or beyond my speakers and to say, "That gong/drum/chime sounds like it's right there." Better still, the Bel Canto beautifully reproduced the slowly decaying reverberant "tails" of individual notes gradually fading to silence within the recording space.

During my listening test, I compared the DAC

section of the S300iU to both the Chordette Gem USB DAC (\$799) and to the USB DAC section of the Peachtree Nova amp/DAC (\$1195). I found the S300iU offered considerably better resolution and delineation of small sonic details than the Chordette Gem, but that the Gem consistently sounded smoother on upper midrange/treble transients and offered more convincing, holographic 3-D imaging. The Bel Canto and Peachtree DAC sections were much closer in character, though a careful comparison revealed that the Peachtree offered even higher levels of resolution, slightly tighter and better-defined bass, and somewhat smoother upper mids and highs.

Because the two products are conceptually similar, I also compared the amplifier sections of the S300iU and the Peachtree Nova and found the Bel Canto was hands down the superior performer. Good though the Nova is, the S300iU's amp section was audibly cleaner, quieter, more powerful, and capable of resolving finer levels of sonic details.

First, the Bel Canto S300iU is a compact lion-hearted integrated amplifier that can stand tall beside just about anything I've heard in its price class. The Bel Canto's built-in USB DAC is also very good, though perhaps not quite as good as its terrific amplifier section. Nevertheless, the USB DAC gives the S300iU an extra dimension, making it a very serious, plug-and-play front end for use with computer- or server-based audio systems. **tas**

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Simaudio Moon i3.3 Integrated Amplifier and CD3.3 CD Player Amplifier

Sim-ply Superb

Neil Gader

“Wow, this baby’s loaded,” I muttered to myself as I scanned the back panel of the Simaudio Moon i3.3 and its sister, the CD3.3, which was idling nearby. I do my own fair share of high-end tire-kicking, but the Canadian firm’s latest mid-priced integrated amplifier and CD player caught me off guard. Particularly the amp, with its four digital inputs plus an on-board DAC to service them. It turns out this DAC is only one of three options that Simaudio offers to prospective i3.3 buyers—packages that when fully installed transform a handsome 100Wpc integrated amplifier into a system hub for sources that might include a satellite TV, a computer, a turntable, and more. (For technical particulars see the accompanying sidebar.) However, there are two items that seem to be standard equipment on every Simaudio I’ve reviewed—rewarding sonics and surefire performance. The i3.3 and CD3.3 certainly follow suit here.

THE I HAS IT

Simaudio and I have a history. Beginning with the Celeste PW-5000 integrated amp, and later the Moon Equinox CD player and Moon Evolution SuperNova, I’ve listened to and written in admiration about the consistent musicality and fidelity of Simaudio gear. Sonically the new i3.3 and CD3.3 remain faithful to Simaudio virtues. What’s even more interesting is that you can hear

what is basically the same sonic signature in both the amp and the player, which is why, unless otherwise noted, my impressions are mostly an aggregate of listening to both.

Like a lit fuse the Moon 3.3 Series embodies a familiar sensation of eagerness relative to the reproduced signal. Call it Jonathan Valin’s jump factor, or a freedom from lag time, or a lack of leading-edge distortions, or all three,



EQUIPMENT REVIEW - Simaudio Moon i3.3 Integrated Amplifier and CD3.3 CD Player

THE GOODIES AND EXTRAS

Options for the i3.3 fall into three categories—a digital package which includes inputs for USB-2, two for S/PDIF, a TosLink, plus a built-in DAC, in this case a Burr-Brown PCM 1793 24-bit/192kHz convertor. The Old School package is an internal RIAA phono preamplifier with circuitry and layout derived from the Simaudio LP3. It's selectable for impedance, capacitance-loading, and gain adjustment for either moving magnet or moving coil. Finally, a set of balanced line-level jacks is offered as an option on both the i3.3 and CD3.3. Available singly or in any combination, these options can be acquired at the time of purchase or as future upgrades.

However you fill out the order form—fully loaded or box stock—the Moon i3.3 and CD3.3 player are beefier versions of the Moon 1 series that Wayne Garcia reviewed last year. Under the hood, the i3.3 does business with a 100Wpc into 8 ohms, a figure that doubles to 200Wpc into 4 ohms. There are five line-level inputs including a front-mounted 1/8" mini-jack for media players and a 1/4" headphone jack.

The Moon CD3.3 uses a proprietary CD drive system mounted on Simaudio's M-Quattro gel-based 4-point floating suspension for vibration damping. In fact, Simaudio has always paid significant attention to resonance control, and both units utilize rigid chassis construction that minimizes the effects of external vibrations.

but the Moon 3.3 launches rhythmic volleys, percussive accents, and transient cues with the speed and smoothness of Usain Bolt bursting from the starting blocks. And it's not adding a scalpel-edge analytical signature to produce this impression. It's not grafting etch or grain onto leading-edge transients. Rather, it reproduces them as a continuous and organic part of the entire instrument or voice.

Whether driving a full-range loudspeaker like the new Sonus Faber Liuto (review to come) or my own ATC compacts the i3.3 had terrific bass control, good extension, and a smooth, refined top-end. Instruments seem to pop out of the blackness and silence of the soundstage with a purity and lack of noise that foster an almost addictive involvement in every performance. Although I've usually felt that Simaudio amps had the "speed thing" down, my experience suggested that the earlier amps tended to lean a bit toward the cooler side of the harmonic spectrum. I believe this has changed with the i3.3. On Clark Terry's "Just For A Thrill" from *One on One* [Chesky], Geri Allen's piano has all the drive and energy that I recall from the 3.3's predecessors but also a warmer expression of tonality and dynamics, as if the player had found a greater range of tonal colors that revealed more of Allen's inspired touch.

On orchestral works the Simaudio tandem are nothing less than spirited, high-output performers. Even at sometimes extreme levels during the Korngold Concerto for Violin and Orchestra [DG], the duo maintained an iron-fisted command and control that culminated in a final deep crescendo that seemed to settle in the hall's foundations, gradually vaporizing

into the earth below. Did the i3.3 have quite the terrifying impact of the 300Wpc Plinius Hiato integrated that I'll be reviewing soon? Well, maybe not, but believe me, it was a horse race.

For those with analog playback systems the optional phonostage proved itself a very capable unit. On Ricki Lee Jones' scrumptious cover of "The Second Time Around" from Pop Pop [Geffen], the Simaudio duo exhibited a full and slightly forward midrange. Its extension, though solid, softens slightly at the frequency extremes so that the cumulative sonic picture has just a slight midband emphasis. Although not up to the ultra-quiet, lush, layered standards of my reference JR Transrotor, it's a surefire mid-level option that will please most vinyl fans. Uncompromising analog die-hards, on the other hand, should keep the Simaudio LP5.3 in mind—a 2009 Editor's Choice Award and 2008 Product of the Year winner.

Sonically the i3.3 doesn't make a conspicuously wrong move, and where it misses the mark it does so without undermining the essence of the music. At times I could perceive a slight foreshortening of soundstage depth—a minor quibble—which created an audience perspective a row or two back from the "seat" I'm accustomed to. The amp's a little casual in delineating complex groupings of images and a little lightweight on certain demanding high-output deep bass cues, or when an orchestra throws its full energy behind a finale. However the i3.3 never loses its composure. Rather, when pushed really hard on a track like Steve Winwood's "The Finer Things" from Back In The High Life [Island], it slightly softens the

SPECS & PRICING

Moon i3.3

Power Output: 100Wpc @ 8 ohms

Analog inputs: Four single-ended RCA, one balanced XLR

Digital inputs: Two S/PDIF, USB, TosLink

Outputs: Two single-ended, fixed and variable

Dimensions: 16.9" x 3" x 12.75"

Weight: 22 lbs.

Moon CD3.3

Input: One S/PDIF

Output: One pair single-ended RCA, one pair balanced XLR (opt); one S/PDIF

Dimensions: 16.9" x 3" x 12.75"

Weight: 18 lbs.

U.S.

Moon i3.3

Price: \$3300 (\$4000 with all three options: \$400, DAC; \$300, phono; \$200, balanced inputs)

Moon CD3.3

Price: \$3000 (\$200 option with balanced outputs)

SIMAUDIO LTD.

95 Chemin du Tremblay,
Unit #3
Boucherville, Quebec
CANADA J4B 7K4
(877) 980-2400

U.K.

Moon i3.3

Price: £2450 (£2990 with all three options: £250, DAC; £250, phono; £150, balanced inputs)

Moon CD3.3

Price: £2400 (£150 option with balanced outputs)

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EQUIPMENT REVIEW - Simaudio Moon i3.3 Integrated Amplifier and CD3.3 CD Player

The CD3.3 includes a digital input for use with a PC, music server, or standalone transport, a digital output, and optional balanced analog outputs (also available for the i3.3). Other specs include internal upsampling with 24-bit/1.411MHz processing, a Burr-Brown PCM1798 ultra-high-resolution 24-bit/192kHz DAC (used in Simaudio's premium Moon Evolution SuperNova player), an 8x oversampling digital filter, and a precise 25ppm digital clocking system

For both components, Simaudio's customary attention to detail, fit, and finish abounds. For example, the PCBs feature copper tracings and gold plating, which yields low impedance characteristics. Buttons and dials and rear-panel connectors have a quality feel. Only the generic plastic remote control puts a momentary damper on the fun. However, adding to the units' already superior connectivity, both the amp and CD player have a SimLink controller port, which allows for two-way communications between them and other compatible Moon components. For example, I could hit play on the CD player and the integrated would instantly switch inputs to CD. Nice touch. **NG**

aggressive energy of the snare and crash cymbal and loses a bit of subterranean punch and timbral information on the massive downbeats. Or on an acoustic track like Tierney Sutton's "Alone Together" from *Something Cool* [Telarc], the string pop from the stand-up bass loses a certain resonant sustain while the harmonic details tighten up ever so slightly, like the winding up of a mainspring.

As rock solid as the i3.3 is, it's even harder to imagine wanting much more in a Red Book CD player than the CD3.3. It's that good. While the i3.3 and the CD3.3 share a house sound, there is even more potential to be mined from the CD3.3 in the company of a no-holds-barred amp. (Simaudio offers a broad lineup of high-powered models.) In such company, it can dig a little deeper, reach a little higher, and sound more open in ultimate extension. "The Finer Things" regains much of its stomach-churning punch on the drummer's downbeat. And during the Korngold the sound of the CD3.3 loosens up just a hair and finds inner dynamics hitherto hidden—like the gathering strength of the harp beneath the orchestra as the concerto nears its end. Anna-Sophia Mutter's violin is all the more effortless as it glides and soars above the orchestra. Sure, at twice the money, players like the Esoteric X-05 and Simaudio's own Moon SuperNova slip past the CD3.3 with a bit more top-end air and transparency, but it doesn't take a genius to figure out where the bargain is amongst this trio.

By way of another comparison I listened to the same material through the onboard DAC of the i3.3 via the CD3.3 transport and S/PDIF, as well via a USB input from my Mac. It's close, but the CD3.3 with the higher-spec Burr-Brown DAC is the

hands-down winner. On a track like Jen Chapin's "Renewable" from *ReVisions* [Chesky] the sound via the i3.3 DAC is a little glassier and loses some of the organic warmth and dimensionality of the standalone CD3.3. The space and the air flowing over the reed of the baritone sax is not quite as silken, its texture a bit coarser. USB was a similar story—highly listenable but spatially there was just a bit less elbowroom.

When a company is on a roll as Simaudio has been, it might seem that nothing can slow it down. Like the line goes, nothing succeeds like success. But that's not entirely true—complacency kills.

And failure to read the market is equally deadly. So kudos to the smart cookies at Simaudio for listening at every level. For listening to the iTunes junkie, listening to the server-surfer, or just the pure-analog Old Guard like me. The Moon i3.3 and CD3.3 have what it takes to make audiophiles of us all. **tas**

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NAD M2 Direct Digital Amplifier

Inventing the Future of Audio

Robert Harley

The term “digital” is often erroneously applied to amplifiers with Class D (switching) output stages, but in the case of NAD’s new M2 Direct Digital Amplifier that word is appropriate. In fact, the M2 represents a major rethinking of audio-system architecture, directly converting standard-resolution or high-res digital bitstreams into signals that can drive loudspeakers.

Functionally, the M2 is an “integrated amplifier” that replaces a DAC, preamplifier, and power amplifier. The M2 eliminates from a traditional signal path all the electronics of a DAC as well as the active analog gain stages of a preamplifier and power amplifier. It does this by converting the PCM signal from a digital source directly into a pulse-width modulation (PWM) signal that turns the M2’s output transistors on and off. That’s it—no digital filter, no DACs, no multiple stages of analog amplification, no interconnects, no jacks, no analog volume control, no preamp.

The conversion from the digital domain to the analog domain occurs as a by-product of the switching output stage and its analog filter. This is as direct a signal path as one could envision. (See sidebars for the technical details.)

NAD’s M2 is a significant departure for the company that made its reputation building simple and affordable electronics. For starters, the M2 costs \$5999, a new price level for a NAD “integrated amplifier.” Second, the M2 is NAD’s first amplifier to use a switching output stage. The company had previously rejected the technology

in favor of linear amplifiers because switching output stages just didn’t sound good. But the M2’s output stage is significantly different from any other currently offered (see sidebar). Third, NAD believes that the M2’s technology could eventually become the basis for nearly all of its amplification products. In fact, NAD suggested that the M2 was not designed to capitalize on Class D’s functional advantages, but rather to establish a new benchmark of performance in amplification, no matter what the technology.

Let’s look at the M2 Direct Digital Amplifier

in operation. The unit looks and functions like one of NAD’s upscale Masters Series integrated amplifiers, with a row of front-panel input-select buttons, a volume control, and a display. The rear panel, however, reveals that the M2 is not a conventional integrated amplifier. Five digital inputs are provided (two RCA, one AES/EBU, two TosLink, plus a TosLink loop) along with one single-ended and one balanced analog input. The digital inputs can accept any sampling frequency from 32kHz to 192kHz. Analog signals fed to the M2’s analog-input jacks are converted to digital.



EQUIPMENT REVIEW - NAD M2 Direct Digital Amplifier

TECHNOLOGY: NOT JUST ANOTHER SWITCHING AMPLIFIER

The M2 is different in two important ways from other amplifiers that use a Class D switching output stage. In a conventional switching amplifier, analog input signals are converted to a series of pulses that turn the output transistors fully on or fully off. The signal's amplitude is contained in the pulse widths (see sidebar "Pulse-Width Modulation"). An output filter smooths the pulses into a continuous waveform. But in the M2, PCM digital signals fed to the amplifier's input (from a CD transport, music server, or other source) stay in the digital domain and are converted by digital-signal processing (DSP) to the pulse-width modulated signal that drives the output transistors.

This difference might not seem that great at first glance, but consider the signal path of a conventional digital-playback chain driving a switching power amplifier. In your CD player, data read from the disc go through a digital filter and are converted to analog with a DAC; the DAC's current output is converted to a voltage with a current-to-voltage converter; the signal is low-pass filtered and then amplified/buffered in the CD player's analog-output stage. This analog output signal travels down interconnects to a preamplifier with its several stages of amplification, volume control, and output buffer. The preamp's output then travels down another pair of interconnects to the power amplifier, which typically employs an input stage, a

driver stage, and the switching output stage. In addition to the D/A conversion, that's typically six or seven active amplification stages before the signal gets to the power amplifier's output stage.

To reiterate the contrast with the M2, PCM data are converted by DSP into the pulse-width modulation signal that drives the output transistors. That's it. There are no analog gain stages between the PCM data and your loudspeakers. The signal stays in the digital domain until the switching output stage, which, by its nature, acts as a digital-to-analog converter in concert with the output filter. The volume is adjusted in DSP.

The second point of departure between the M2 and all other Class D amplifiers is the switching output stage itself. NAD partnered with the U.K. design team of the American semiconductor company Diodes Zetex, who had developed a novel switching-amplifier technology. NAD engineers worked with Diodes Zetex for more than four years to improve upon Zetex's basic idea before it was ready for the M2. Diodes Zetex calls its amplifier a direct digital feedback amplifier (DDFA). The primary innovation is the use of feedback around the output stage to reduce distortion. Feedback, used in virtually all linear amplifiers, takes part of the output signal, inverts it, and sends it back to the input. The technique

Once you've connected an analog or digital source to the M2 (such as a CD transport or music server) and loudspeakers via the output binding posts, the M2 functions just like a traditional integrated amplifier. You select the source from the front panel and control the volume with the large front-panel knob or from the remote control. The front-panel display shows the input sampling frequency and volume setting.

Purists will note that the M2 requires that analog signals, such as a phono stage output, be converted to PCM digital. Similarly, those who enjoy SACD will be loath to convert their SACD player's analog output to PCM, and then back to analog in the M2.

The M2 offers a number of features not found on a traditional integrated amplifier. Pushing the MENU button allows you to select the sampling frequency of the analog-to-digital converter (for analog input signals) as well as engage an upsampling feature that converts, for example, 44.1kHz to 96kHz. Analog signals are digitized at up to 192kHz/24-bit. You can also attenuate the level of the analog inputs by up to 9dB. A "Speaker Compensation" adjustment is a five-position adjustment that "allows fine tuning of the top octave to match the speaker impedance." An absolute-polarity switch rounds out the menu-accessible features. A rear-panel switch engages NAD's "Soft Clipping" feature, which limits the output to prevent audible distortion if the amplifier is overdriven. An RS232 port allows external control via a PC or control system such as Crestron or AMX. The full-function remote control selects between sources, adjusts the volume, dims the display, and can also control a NAD CD or DVD player.

The M2 doesn't seem like a switching amplifier in operation; it is heavier than most Class D amps and although it runs cooler than a traditional Class AB amplifier of comparable output power, it produces more heat than any other Class D amplifier I've had in my home.

LISTENING

I lived with the M2 for a couple of months, driving the Wilson Audio Alexandria X-2 Series 2 loudspeakers as well as the YG Acoustics Kipod Studio (review forthcoming). When driving the Kipod, the M2 could drive only the upper module, not the powered woofer that accepts a line-level input. I also heard the M2 with the Volent Paragon VL-2, a \$5000 stand-mounted two-way employing a Heil Air-Motion Transformer (also on-deck for review).

I compared the M2 to my usual system of a Berkeley Audio Design Alpha DAC, Pass Labs XP20 preamp, and Pass Labs XA100.5 Class A power amplifier, all connected with MIT MA-X interconnect and MIT Oracle MA loudspeaker cable. Note that the M2 functionally replaces this entire Berkeley DAC/Pass preamp/Pass power amp/MIT system, and costs about one-tenth the price. The digital source for both systems was the AES/EBU output from a Classé Audio CDP-502 to play CDs. I tested the M2 with high-resolution bitstreams sourced from the fan-less, drive-less, PC-based music server built by Boston retailer Goodwin's High-End and described in Issue 189. When I connected the AES/EBU output from the server into the M2's AES/EBU input, the M2 instantly locked to any sampling frequency and was glitch-free.

I experienced two minor operating problems

EQUIPMENT REVIEW - NAD M2 Direct Digital Amplifier

lowers distortion. But feedback isn't practical in switching amplifiers because of the delay involved in sending part of the output signal back to the input. Switching stages operate on extraordinarily precise timing; a glitch of a nanosecond can cause the output stage to lock up. The Zetex innovation is to compare the actual high-level PWM signal (at the transistor outputs) to a low-level reference PWM signal. Any difference between the actual and reference PWM signals represents a voltage error. The actual PWM signal can deviate from the theoretical ideal because of power-supply noise or droop (a drop in voltage), slight changes in the pulse widths, transistor tolerances, or variations in the rise-time of the pulse edges. All these potential sources of errors affect the area under the pulses, which is how the analog amplitude is encoded. This error shows up as a voltage, which is digitized at a conversion rate of 108MHz, processed to compensate for subsequent modulation cycles, and then fed into a noise-shaper that adjusts the pulse shape, on a continuous basis, to compensate for errors in the output stage. In addition to decreasing distortion, this technique also lowers the amplifier's output impedance.

The reference PWM signal must be essentially perfect or else the system will correct "errors" that aren't present. The pulse widths must be precise to within five picoseconds, a level of performance commensurate with the lowest clock jitter in state-of-the-art digital-to-analog converters. In fact, you can think of the M2 as a DAC with gain and judge its technical

performance using the same metrics as those employed in evaluating D/A quality. For example, at -120dB, the M2's linearity error is less than +/-0.1dB (an amazing spec, by the way), and the unit provides useful resolution down to an astounding -135dB.

The M2's topology has interesting ramifications for a system's overall noise performance. In a traditional system of digital source, analog preamplifier, and analog power amplifier, any noise introduced ahead of the power amplifier greatly degrades the system's signal-to-noise ratio (SNR). For example, if we start with a CD player with a SNR of 115dB, feed its output to a preamplifier with a SNR of 108dB, and then drive a power amplifier whose intrinsic SNR is 115dB (all great specs), the system's overall SNR is only 84.1dB referenced to 1W (all SNR numbers are unweighted). Noise at the front of the chain gets amplified by the power amplifier, no matter how quiet that amplifier is. In the M2, the only source of noise is in the DSP and the switching output stage, and the noise level is completely independent of the gain. That is, the SNR doesn't degrade at low volume. The DSP's noise is kept low in part because of the 35-bit data path. The M2 has an SNR of 91dB (unweighted, referenced to 1W) at any signal level. Indeed, I turned the gain all the way up and put my ear next to the tweeter of the sensitive Wilson Audio Alexandria X-2 Series 2 loudspeaker (95dB 1W/1m) and heard no noise.

There's no free lunch, however. Switching amplifiers require a serious output filter (typically a large inductor and a capacitor) to

with the M2. First, the protection circuit triggered a couple of times, even with no music playing. Turning off the power reset the circuit. Second, when I turned on the M2 on one occasion I heard noise from the right channel. Turning off the unit and turning it back on corrected the problem. This happened only once in dozens and dozens of power-up cycles.

Long-time readers will know that I'm no fan of switching amplifiers. They have their virtues—small size, very little heat dissipation, light weight, and usually a considerable amount of output power for the money. But when the music starts, Class D amplifiers have left me cold. They can sound very dynamic, but exhibit considerable variability in sound quality depending on the loudspeaker they are driving, the cables, and other factors. The switching amplifiers I've heard (admittedly, I have not heard many) have exhibited a mechanical character, along with a "chalky" coloration in the midrange that robs instruments of their distinctive tone colors.

But the M2 sounded completely unlike any other Class D amplifier I've heard. It had no characteristic fingerprint that identified its technology. Rather, the M2 tended to get out of the way, reflecting the virtues and verities of the recording. Unlike other switching amplifiers I've heard, the M2's departures from neutrality were subtractive rather than additive. That is, it commits sins of omission rather than sins of commission. The M2 sounded like a very high-quality conventional (linear-amplification) playback system in many ways, with one notable exception; this amplifier was dead-quiet at any listening level and with any loudspeaker—even the 95dB-sensitive Wilson X-2. Backgrounds were truly and totally black, a

SPECS & PRICING

NAD M2 Direct Digital Amplifier

Continuous output power: 250Wpc (8 ohms); 250Wpc (4 ohms); 300Wpc (2 Ohms)

IHF dynamic power: 300W (8 ohms); 450W (4 ohms); 600W (2 Ohms)

Peak output current: >60A

Signal-to-noise ratio: >120dB (A-weighted, referenced to 200W)

Digital inputs: S/PDIF on RCA jacks (x2), AES/EBU (x1), TosLink optical (x2) plus TosLink in/out loop

Sampling frequencies supported: 32kHz-192kHz up to 24 bits

Analog inputs: Unbalanced on RCA jacks, balanced on XLR jacks

Analog-to-digital converter: Fully balanced, 192kHz/24-bit

Dimensions: 17.12" x 5.24" x 17.87"

Weight: 44.45 lbs.

U.S.

Price: \$5999

NAD ELECTRONICS INTL

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Pickering, Ontario,
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EQUIPMENT REVIEW - NAD M2 Direct Digital Amplifier

remove high-frequency switching noise from the output, and to smooth the waveform. This filter is conceptually similar to the reconstruction filter in traditional digital-to-analog conversion. Switching amplifiers are also very susceptible to audible degradation if the power supply feeding the output transistors isn't perfectly clean. Switching amplifiers thus require an extremely quiet supply. Nonetheless, many switching amplifiers skimp on the power supply in an effort to keep size, weight, and cost low. The M2 has a more substantial power supply than I've seen in any other amplifier with a switching output stage. Three separate supplies are used, one for each audio channel and one for the control circuitry and housekeeping.

Each of the M2's amplifiers is contained on a roughly 6"-square circuit board and heat-sink assembly that attaches to a mother-board below it. It appears that each channel employs two pairs of output transistors. The rear panel is shielded, presumably to prevent radiated switching noise to get into the signal after it has been filtered. The chassis is segmented into two additional shielded modules, again to protect against switching noise pollution generated by the output stage.

quality that gave instrumental images a greater tangibility, both spatially and texturally. The dead-silent background seemed to throw instrumental images into sharper relief, enhancing the impression of three-dimensional objects existing in space. This palpability was also partially the result of the M2's somewhat forward spatial perspective which puts the listener around "Row E." The M2 also tended to "spotlight" the midrange to some degree, again adding to the impression of presence and the palpability of instrumental and vocal images. This was generally an appealing quality, although some forward-sounding and midrange-emphasized recordings, such as *In Other Words* from The Teodross Avery Quartet, were not complimentary to the M2. Conversely, naturally recorded vocals such as the outstanding *ReVisions: Songs of Stevie Wonder* by Jen Chapin, took on a "you are there" quality that was extremely involving.

The M2's bass was simply great—extended, rich, warm, powerful, and muscular. The bottom end was rich and densely saturated in tone color, wonderfully nuanced and articulate, and very fast and dynamic. I greatly enjoyed the M2's combination of weight and agility on acoustic and electric bass, particularly with virtuoso players—Stanley Clarke's acoustic bass on *The Rite of Strings* with Al DiMiola and Jean-Luc Ponty, for example. Left-hand piano lines were also well served by the M2's dynamic agility and powerful bottom-end (the Beethoven Piano Concertos led by Sir Colin Davis on the Pentatone label). The M2 conveyed the impression that it took tight-fisted control over the woofers, backed up by tremendous energy reserves. The articulation in the midbass was extraordinary; I could easily

hear the initial transient of plucked acoustic bass strings, followed by the rich resonance of the instrument's body.

When an audio product performs in many ways above its price class as the M2 does, there's a tendency to judge all areas of performance against its strengths. In other words, the product itself raises its own performance bar. Keeping that in mind, I noticed a trace of hardness in the upper midrange that manifested itself as a glare on certain instruments, particularly the upper range of trumpet. This is a common characteristic of amplifiers of this price, but it was different in the M2. Where most amplifiers impose this characteristic over a wide band that makes itself nearly always audible, the M2's coloration was confined to a relatively narrow band. Consequently, I heard it only occasionally when there was energy in that region. This slight coloration didn't bother me during extended listening to the M2 alone, but was apparent when I compared it to my reference system of the Berkeley Alpha DAC and Pass XA100.5 pure Class A power amplifiers. The M2 didn't have quite the timbral liquidity and midrange warmth of the reference system. Nonetheless, the M2's overall sound was smooth and relaxed.

The treble tended to favor ease over the last measure of detail. The top octave wasn't quite as open, extended, or transparent as my reference system. Listening to a straight-ahead jazz CD I had engineered live to two-track (Confirmation by the Chiz Harris Quartet), drummer Harris' cymbals were not quite as vibrant. Similarly, Conte Candoli's flugelhorn took on slightly more of a golden and burnished hue than it had in life. If a component departs from neutrality, it's better

that this departure be in the direction of slightly softening of the treble rather than emphasizing it. I should reiterate that you can adjust the M2's treble balance to match your system via the front-panel menu.

The M2 sounded quite detailed, although the very finest inner detail was not as nuanced as that heard in the reference system. The M2 didn't resolve the last measure of information that conveys the mechanism by which a sound was created. For example, there's a passage in "Sorceress" from *Return to Forever's Romantic Warrior* (on the newly re-mastered *The Anthology* CD) in which Lenny White overdubs an intricate percussion figure on timbales in counterpoint to his drumming. The reference system better revealed the nature of the timbales, making them

THE M2'S PREDECESSOR

The M2 isn't the first switching amplifier to convert PCM to PWM. That distinction belongs to the TacT Millennium, which I reviewed at its introduction in 1999. But the M2 isn't simply a more modern version of that topology. Rather, the M2 employs an entirely new and radically different switching output stage (see sidebar). In addition, the Millennium adjusted the volume by changing the voltage of the power supply rails feeding the switching output transistors. The M2 adjusts the volume in the digital domain with the same digital signal processing (DSP) chip that performs the PCM-to-PWM conversion.

EQUIPMENT REVIEW - NAD M2 Direct Digital Amplifier

PULSE-WIDTH MODULATION

How can a series of pulses represent the continuous waveform of music? In exactly the same way that Direct Stream Digital (DSD), the encoding format behind SACD, produces music from a bitstream. In fact, PWM and DSD are conceptually identical.

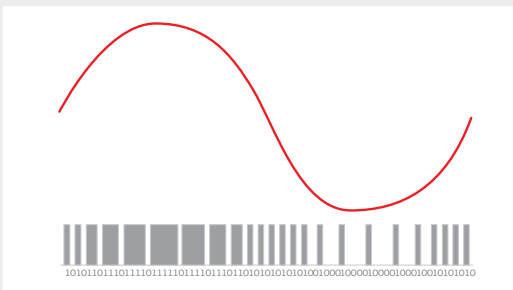
Fig.1 shows the relationship between a DSD bitstream and the analog waveform that bitstream represents. The bitstream is a series of pulses of varying lengths, with the pulse length encoding the analog signal's amplitude. The pulse-train generated by DSD encoding looks remarkably "analog-like." That is, you can look at the pulse train and get an idea of what the analog waveform looks like. The relationship between the analog signal and the bitstream is so close that in theory, a DSD signal can be converted to analog with a single capacitor (DSD-to-analog conversion is more complex in practice). The bit rate of DSD as used in SACD is 2.8224 million bits per second.

In a switching amplifier, the output transistors are turned fully "on" or fully "off" by the pulse-width modulated signal.

The analog signal's amplitude is encoded as the "area under the pulses"; longer pulses (longer "on" times for the output transistors) represent a higher analog-signal amplitude. This is contrasted with traditional "linear" amplifiers in which the output transistors are in a continuously variable state of conduction.

The output of the PWM stage is a series of high-level pulses that must be smoothed into a continuous waveform. Every amplifier with a switching output stage employs a large filter (an inductor and a capacitor) between the output transistors and loudspeaker terminals to perform this smoothing function and to remove switching noise.

In the Diodes Zetex amplifier module, the pulses are quantized at 108MHz. This frequency determines the number of discrete pulse widths available to represent the audio waveform. That number is 128, which appears at first glance to be too low to encode a complex musical signal. But even at 20kHz, there are many modulation cycles available within the period of a 20kHz waveform.



Pulse-Width Modulation represents an analog waveform with a series of varying-length pulses.

sound more like instruments being struck and less like mere transients.

The M2 was outstanding in its ability to unravel complex musical lines. Many amplifiers of this price tend to have a flat homogeneity that prevents one from hearing quieter instrumental lines in the presence of louder ones. This aspect of music reproduction is crucial to understanding the intent of the composer or performers. The M2 was the antithesis of smeared, congested, or confused. Instead, it laid out with exquisite resolution everything that was happening in the music. Moreover, it did this in a completely natural and organic way, with no trace of the analytical.

Partly as a result of this quality, and partly a result of the M2's fabulous way with dynamic contrasts and shadings, music always had an energetic and upbeat quality. I could feel the spontaneous music-making on the previously mentioned Confirmation disc I'd engineered and remembered from the session. The M2 had a rhythmic coherence and sense of life that thrilled me and riveted my attention on the music. Interestingly, I noticed this quality most on bebop; Freddie Hubbard's solo on his great composition "Birdlike" from pianist George Cables' Cables' Vision positively soared.

Finally, the M2's A/D converter (fed by the Aesthetix Rhea Signature phonostage) was very good, but not completely transparent. It shaved off a bit of resolution at lowest levels and very slightly hardened timbres.

CONCLUSION

Despite costing one-tenth as much as my reference system (all the components of which are outstanding), the M2 was extremely engaging

musically. Overall, I preferred the reference system, but not by as much as the price disparity would suggest. I usually wouldn't judge a \$6000 product against one costing more than \$50k, but the M2's outstanding performance in many areas invited the comparison. Moreover, the M2 represents a radically different approach to amplifier design, digital-to-analog conversion, and system architecture. As such, I evaluated how the M2 sounds not just in comparison with similarly priced conventional amplification and digital-to-analog conversion, but how its new technology stacks up on an absolute basis. (You should consider this when reading how the M2 falls short of a reference-quality system. I included those observations not to diminish the great achievement the M2 represents, but to put this new technology in context.)

As for the M2 as an alternative to a \$3500 conventional integrated amplifier and a \$2500 digital-to-analog converter, it's a slam dunk. I haven't heard, nor can I imagine, any combination of amplification and DAC at the price approaching the M2's performance. Moreover, the M2 delivers, in one chassis, decoding of high-resolution digital audio, the source-switching and control functions of a preamplifier, and 250W of amplification—all with outstanding ergonomics. I can envision the M2, or its descendants, as part of a three-piece playback-system: music server, M2-like product, and loudspeakers.

NAD's M2 is a triumph on many levels, not the least of which is that it points toward a new direction in amplifier design and system architecture. I predict that years from now audiophiles will look back on the M2 as the progenitor of the next generation of audio. **tbs**

EQUIPMENT REVIEWS Music Servers



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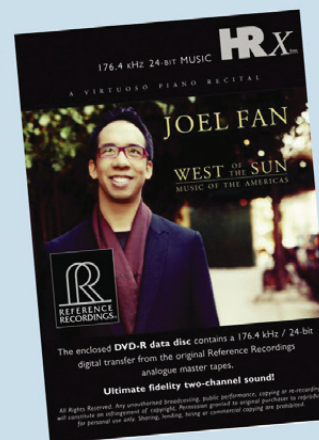
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Removing the Sword from the Stone

Wadia 170 iTransport iPod Dock

Robert Harley

As great a product as the iPod is—and it is truly spectacular—it has an Achilles' heel for discriminating listeners: its digital-to-analog converter and analog output stage. The iPod's D/A converter and output amplifier are by necessity sonically compromised, restricting the iPod's usefulness. No serious listener would use an iPod at the front end of a high-end system. That's a shame, because the iPod is a brilliant device in its functionality, execution, and user interface. It can also store hundreds of hours of music with perfect bit-for-bit accuracy to the source.

Leave it to Wadia Digital to create a product that capitalizes on the iPod's strengths while completely eliminating the sonic shortcomings that have relegated it to ancillary listening environments. That product is the 170 iTransport, the first Apple-sanctioned dock to tap into the iPod's digital bitstream and present that bitstream to an outboard digital-to-analog converter of your choice. The iTransport allows you, for the first time, to bring the iPod's functionality to a high-end system with no excuses—for just \$379.

The 170 iTransport looks like a traditional Wadia product in miniature, all

the way down to its pointed feet. The flat top surface holds the docking connector, which accepts all iPod models courtesy of a supplied variety of dock inserts. The rear panel presents the iPod's digital output in S/PDIF format on an RCA jack. You simply connect this output to any outboard D/A converter and the iPod's sound quality is now determined by the quality of that D/A converter. For those of you without an external D/A converter, the iTransport offers analog outputs. Note that the iTransport doesn't have an internal DAC; rather, the iTransport simply routes the iPod's analog outputs

to the iTransport's rear-panel jacks. For those with video iPods, the iTransport offers S-video and component-video outputs. An external power supply plugs into a rear-panel jack.

Controlling the iPod via its click-wheel is made easier by the open iPod-mounting design (iPod docking stations in which the iPod is flush-mounted make operating the click-wheel difficult). With certain iPod models (Nano G1, iPod Video), the click-wheel interface is disabled when inserted into the iTransport, and a small supplied remote control provides basic functions, such as track forward/backward and pause/play.

The iTransport was extremely simple to set up and use. I unpacked it, popped in my iPod Classic, and was listening to music within two minutes of opening the box.

As expected, the iTransport sounded like the DAC to which it was connected. I store music on my iPod using Apple Lossless, which provides perfect bit-for-bit accuracy to the original with about a 40% reduction in storage requirements compared with uncompressed WAV files. In listening comparisons between the iTransport and the CDs from which the music was ripped, I thought the iTransport had a slight advantage. The iTransport had just a bit more space, bloom, and ambience than the CD. The recorded acoustic was slightly bigger, the spatial perspective was a bit more distant, and the sense of air surrounding instrumental images was somewhat more tangible and defined. The differences were slight, but noticeable. This impression is consistent with what I've heard when comparing music on CD with the same music read from a hard-disk drive.

The iTransport's slightly-better-than-CD sound quality is a bonus; the real reason to buy the iTransport is that it turns your iPod (which you probably already own) into a music server worthy of feeding a high-end system. Anyone who's used the iPod knows how much easier it is to access music using the click-wheel than finding the CD and inserting it in a player. It equates to more time listening and less time looking through racks of jewel boxes. **tas**

SPECS & PRICING

Wadia 170 iTransport iPod Dock

Outputs: S/PDIF on coax, analog output on RCA jacks, S-video, component video

Dimensions: 8" x 2.75" x 8"

U.S.

Price: \$379

WADIA DIGITAL

1556 Woodland Drive

Saline, MI 48176 (734)

786-9611

U.K.

Price: £400

MUSICAL DESIGN CO.

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Bel Canto USB Link 24/96 and Focusrite Saffire Format Converters

Upgrading the Sound from Your PC

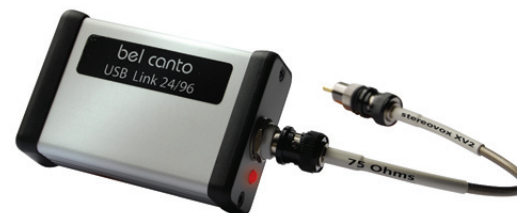
Alan Taffel

Suppose your mind is captivated by the possibility of using your PC as a music server, but your system is saddled with an ancient—that is, more than a year old—DAC that does not support USB. Short of buying a whole new DAC, are there other options? Don't worry; Bel Canto's got your back. The company recently released the USB Link 24/96, a cleverly conceived USB-to-S/PDIF converter that is less expensive, more flexible, and better-sounding than the alternative of a USB DAC.

Even those who never made it through *PCs for Dummies* will have no trouble installing the Link. The size and shape of an aluminum cigarette pack, the device has no controls and sprouts but one USB input and one BNC S/PDIF output. Bel Canto generously packages the Link with a short BNC-to-BNC S/PDIF cable as well as a BNC-to-RCA adapter. Simply connect that cable between the Link and your DAC, snake a USB cable from your PC to the Link, and you are pretty much ready to roll. No need to load any drivers, or even to plug the Link into a wall since, like many USB devices, it draws its juice from the host PC. You must, however, point your operating system's audio output to the new device—a simple process. Once in operation, the Bel Canto invisibly goes about its business.

That business, of course, is not just reconciling formerly incompatible PCs and DACs, but doing so in a musically satisfying way. In this, the Link has some long odds to overcome since its raw material is the sonically challenged USB interface. Fortunately, the Bel Canto does a fine job of moving the sound significantly closer to good S/PDIF.

Indeed, in every system I tried, having this converter in the loop actually sounded better than directly connecting a PC to a USB DAC. How, you ask, can that be? Isn't it always best to have fewer boxes and a pure signal path? Normally, yes. But the Link in effect replaces the cheap, off-the-shelf USB input chip found in most DACs with a far more sophisticated and costly module. Then it delivers its payload to the DAC's S/PDIF input,



which is invariably the best-sounding. These advantages apparently outweigh any losses caused by the Link's conversion process.

To illustrate, consider the sound of two USB DACs with and without the Link. Straight-through USB to the Bryston BCD-1, for example, yields a pallid, airless, "mid-fi" sound. The Audio Research DAC7's USB input is notably more extended, tuneful, and tonally rich than the Bryston's, but the ARC in straight-through mode still exhibits flashes of USB's tell-tale traits: sloppy rhythms, flat dynamics, and a vacuum-sealed soundstage.

Placing the Link in front of either DAC—especially the needier Bryston—substantially elevates the sound. Listen, for instance, to the highly illuminating Dvorák *Serenades from Bohemia* [Praga] that I used throughout these



tests. The Link produces tighter timing, a whiff of fresh air around instruments, tonality captured in pastels rather than black-and-white, and dynamics with hints of actual bloom. Plus, the violins aren't nearly as irritating. To reap these benefits, be sure to use a good USB cable, such as the Belkin Gold Series (\$49.99). And although the supplied Stereovox VC2 BNC cable is quite good, I was able to eke out a tad more air, greater bass authority, and a slightly quieter, more relaxed presentation by swapping in my reference Empirical Design 118 (\$105).

EQUIPMENT REVIEW - Bel Canto USB Link 24/96 and Focusrite Saffire Format Converters

Yet for all its superiority to straight-through USB, parity with straight-through S/PDIF eludes the Link's grasp. The Bel Canto minimizes but cannot completely eliminate USB's unfortunate attributes. This is not the Link's fault; it is USB's fault. Still, the fact remains that where USB through the Link provides whiffs of air, S/PDIF offers pillows. Where the Link elevates USB's colors to pastel, S/PDIF delivers enamels. And even modest S/PDIF is perfectly capable of steady timing, ripe dynamics, and strings that do not shriek. Partial USB, the Link seems to tell us, is better than total USB; but the best USB is no USB at all.

Unfortunately, if this conclusion holds true for other USB converters, as I suspect it does, it creates a quandary for would-be PC music server users. Once again the question arises: Are there other options? Well, some PCs do have an S/PDIF output, but that is usually TosLink—hardly a step up from USB. At the same time, quite a few PCs include a FireWire interface. In the pro- and home-recording communities, FireWire is the standard for PC audio. These facts led me to wonder how FireWire might compare to USB.

Finding out was easy. Because of its preference for FireWire, the pro recording industry offers a plethora of boxes that can, among other things, convert FireWire-to-S/PDIF. Even more conveniently, I happen to own one, the Focusrite Saffire, which I use in my home studio. The Saffire's primary mission is to bring microphones and line-level musical signals into a PC to be recorded. However, along the way it does perform the desired

conversion function, coincidentally at the same price point as the Link. (A less elaborate version, the Saffire LE, offers identical conversion capability for a hundred dollars less.)

Like the Link, the Saffire handles files with resolution up to 96/24. Otherwise, though, the two are quite different. For instance, the Saffire requires loading multiple sets of drivers, only one of which (ASIO) permits on-the-fly sample rate adaptation. And whereas the Link has and needs no user interface, the Saffire's operation is governed by a non-intuitive PC-based control panel. Finally, the Link offers a high-performance BNC output whereas the Saffire must make do with RCA.

But the biggest difference between these two converters—and where the Saffire comes out on top—is in their sonics. Frankly, the Saffire's sound bowled me over. From it emerges a gorgeously rich, relaxed, airy, rhythmically cohesive, flesh-and-blood presentation that is the antithesis of USB. No, this converter cannot match reference-level S/PDIF in inner detail, instrumental body, or bass definition. Perhaps someday these, too, will arrive courtesy of a FireWire converter built to high-end standards. In the meantime, the Saffire's blissful freedom from USB's foibles constitutes a genuine breakthrough in extracting audiophile-grade sound from a PC.

The contrast between the Saffire and the Link was evident no matter the source material. I heard it on the intricate, aforementioned *Serenades*, but also on extremely simple tracks like "That Dress Looks Nice on You" from Sufjan Stevens' *Seven Swans*. This song

has very little going on instrumentally; Stevens' vocal is backed by a plaintive acoustic guitar figure, supplemented occasionally by a banjo. There are no big dynamic swings, no depth-charge bass notes, not even many expressive nuances. In other words, there are not a lot of bits (of information) to work with. And yet, with FireWire as the PC output and with the Saffire managing the digital hand-off, the song comes into its own. Timing snaps into place, the banjo strings acquire realistic bite, and the vocal and guitar sound both more lifelike and more coordinated with each other.

On high-resolution material, the difference between interfaces and converters is even more striking. Listen, for example, to Rebecca Pigeon's "The Raven," which can be downloaded at 96/24 from HDtracks. The high-res version of this song is awesome in its purity, regardless of interface. But what a relief it is to revel in the benefits of that resolution—the effortlessly open highs, the wealth of timbral information—without any accompanying USB crud. Through the Link, this HD music file sounds better than the CD, but only marginally so. The Saffire/FireWire version utterly stomps the CD.

For those with a suitable PC and the willingness to tackle a greater operational challenge, the Focusrite Saffire is the best way I have found to derive high-end audio from a PC. But FireWire's surprise showing in this test should take nothing away from Bel Canto's achievement. The USB Link 24/96 is a smart and timely idea, a piece of cake to install, and invisible in operation. For those who opt for USB's simplicity and ubiquity, it is easy to recommend. **tas**

SPECS & PRICING

Bel Canto USB Link 24/96

Inputs: One USB

Outputs: One S/PDIF BNC

Dimensions: 2.2" x 1" x 4.2"

Weight: 3.5 ounces

Focusrite Saffire

Inputs: Two FireWire 400, one RCA S/PDIF, two microphone XLR, two TRS, one MIDI

Outputs: One RCA S/PDIF, one MIDI, eight TRS, one headphone

Dimensions: 2.6" x 6.7" x 6.7"

Weight: 2.4 lbs

U.S.

Bel Canto USB Link 24/96

Price: \$495

BEL CANTO DESIGN, LTD.

221 North 1st Street
Minneapolis MN 55401
(612) 317-4550
belcantodesign.com

Focusrite Saffire

Price: \$499

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Sound Science Music Vault II

The Fort Knox of NAS Drives

Steven Stone

The words Music Vault conjure up the image of a stainless-steel safe full of CDs. That's what the Music Vault is—almost. Except that the CDs are virtual and the vault is made of silicon. The Music Vault II is a custom-configured NAS (network-attached storage) hard drive/network server that has been designed to work seamlessly with any Logitech Squeezebox, Sonos, Denon, or other networked music server. But wait, as they say on all those late-night infomercials, there's more. The Music Vault II also allows you to connect a Squeezebox to your music library without having to keep your computer constantly on.

While this may not sound like a big deal, being able to turn your computer off while still maintaining access to all your music files is difficult to do with a Logitech Squeezebox system. Setting up a NAS drive so you can access your music library while your computer is off requires at least a network administrator's level of computer skill. Even if you do have "the skills," only a few NAS drives have the right interior topology to support all the software and hardware needed to host Logitech's SqueezeCenter software and ancillary programs.

What the Music Vault promises is a pain-free way to liberate your Logitech Squeezebox music system from the tyranny of an always-running computer. Does it deliver the goods? Yes, it does.

INSTALLING THE MUSIC VAULT

Sound Science's Neal Van Berg lives about 40 miles away from me in Castle Rock, Colorado. So instead of shipping a unit he delivered it in person. But to demonstrate how easy it is to set up a Music Vault he unboxed the unit and said, "Now *you* install it."

Installation proved to be almost glitch-free. All I had to do was hook up the Music Vault to my home network via an Ethernet cable, attach its AC cable, turn it on, and wait for the Music Vault to appear on my main computer desktop as a network hard drive. Everything went almost as planned.

This is a good time to explain that the Music Vault is really nothing more than a dedicated PC/server with a big honking hard drive. It runs a

EQUIPMENT REVIEW - Sound Science Music Vault II

version of Windows called “Windows Home Server” that hosts Logitech’s SqueezeCenter software. If you have a PC-based home network, the Music Vault will appear in your networked workgroup as another PC.

But if you are an Apple guy like I am, setting up the Music Vault will be a bit more involved. While it appears on a home network as a hard drive once you click on your Mac’s network globe, you will not have access to any of the Windows-based .exe programs (including SqueezeCenter). This makes configuring Squeeze Center from your Mac difficult. You can load a special Microsoft program that’s supposed to let you run a PC remotely, but many Mac users will balk at adding it to their system. A better solution is to access the Music Vault via Safari’s Web browser, since the Music Vault has its own HTTP address. But the address information in the Music Vault’s instruction book didn’t work on my review sample, so I had to play detective to find its address. Eventually I was able to access it from my Mac. For immediate gratification I resorted to another way to configure SqueezeCenter. I simply hooked up a monitor, keyboard, and mouse to the Music Vault. As long as you have an extra monitor with an RGB input, a USB mouse, and a USB keyboard, this solution works fine.

The next step when setting up the Music Vault, regardless of whether you’re a PC or Mac person, is to transfer all your music files onto it. My library, which is approximately 80GB, took almost four hours to move via an Ethernet hardwired connection. A wireless connection would have taken even longer, though a USB 2.0 connection would have been slightly quicker. Regardless of what kind of connection you use

to do the file transfer, the bigger your music library is, the longer it will take to transfer it to the Music Vault.

Once your library has been placed into the Music Vault you must run SqueezeCenter’s music scan to update its database. This initial scan can take several minutes, but subsequent scans are very rapid—usually under a minute. After the library is scanned you can turn off the monitor and disconnect the keyboard and mouse, because you shouldn’t need them any more except when you want to make some changes to your SqueezeCenter settings.

The final step to completing a wireless music server system is to link it to your Logitech units. With the Duet you merely look in the remote’s menu for the Music Vault under “music sources,” select it, and you’re done. With Logitech’s Transporter you have to go through a few more steps, but the Transporter’s built-in expert system leads you quickly through the process. If you have a Sonos system you can also access the Music Vault. It will appear in the Sonos’ list of available music libraries. Select “MusicVault,” and the Sonos is connected.

The Music Vault has its own CD drive, so you can add new music directly rather than sending music files by way of an Ethernet connection. Sound Science can configure the Music Vault’s internal ripper for either iTunes or Windows Media Server. Windows Media Server encodes files in MP3, WMA, or WMA lossless. This last format is not compatible with iTunes, so files ripped in WMA lossless can’t be shared by iTunes. Also, if you rip your music in WMA lossless format, Sonos players will not be able to play these files since they don’t currently

support WMA lossless files. Therefore if you use Sonos or iTunes, I recommend using iTunes and Apple Lossless format for your Music Vault ripping chores.

With the Windows Media Server, the ripping process takes about five minutes per disc and you must have an Internet connection to obtain a CD’s meta-data. The default meta-data database is very good for most popular music, but does have problems finding info on classical music, especially older or specialist labels. This is a universal problem with the Gracenote database and not a shortcoming specific to Music Vault.

When and if you need or want to add more storage to the Music Vault, you can easily add a USB drive. You can also hook up a USB drive to back up your music files. The Music Vault’s instruction book supplies detailed instructions, and Sound Science customer support is only an e-mail or phone call away.

SOUND OFF

I spent close to a month listening to and comparing music files from the Music Vault with the exact same files coming directly from my computer. My verdict: The Music Vault doesn’t introduce any audible effects. I also compared music files coming from the Music Vault via SqueezeCenter with the same files played by iTunes connected to a Logitech Transporter via the Mac Pro’s optical digital connection. Once more the differences between these two connections were so slight that I could not reliably tell any differences. With a different computer, such as an entry-level Mac Portable, Mac Mini, or Windows portable, the machines’ own digital conversion abilities may introduce

some sonic degradations (I see complaints from owners of entry-level portables regularly on Internet forums), but the Mac Pro appears to be the Music Vault’s sonic equal in its ability to not audibly degrade digital music files.

As with most digital-music-file storage systems, the primary fidelity-limiting factor will probably not be the Music Vault itself, but your D/A’s ability to receive and accurately decode digital music files. The Music Vault uses a built-in, proprietary, closed wireless network to connect with Logitech Squeezeboxes. So if your home is populated by teens playing Xbox Live or streaming

SPECS & PRICING

Sound Science Music Vault II

Capacity: MusicVault 500, 1600 CDs; MusicVault 1000, 3200 CDs (or 1600 with backup); MusicVault 1500, 4800 CDs (or 2400 with backup); MusicVault 2000, 6400 CDs (or 3200 with backup)

Warranty: One year parts and labor

U.S.

Price:

MusicVault 500, \$1485;
MusicVault 1000, \$1585;
MusicVault 1500, \$1685;
MusicVault 2000, \$1785

U.K.

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SOUND SCIENCE

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EQUIPMENT REVIEW - Sound Science Music Vault II

U-Tube videos, the Music Vault's separate wireless network should ensure that your music won't develop a terminal case of the stutters during moments of heavy traffic. Music Vault's robust dedicated wireless connection should also substantially reduce other causes of transmission errors such as distance from transmitter to receiver, but if you want to make sure that a wireless connection won't degrade your music, you can bypass it by using an Ethernet hardwired connection between the Music Vault and your Squeezebox or Sonos devices. Of course, if you do hardwire connections they will no longer be wireless devices.

Regardless of what format your music files are stored in—WAV, AIFF, Apple Lossless, or MP3—SqueezeCenter either sends them directly to a Squeezebox or, in the case of the unprotected ACC and Apple Lossless formats, decodes them into FLAC files before it sends them out to a Logitech unit. Sonos units work differently; they access music files directly from the Music Vault, bypassing the SqueezeCenter program. The native format of your music files is directly transmitted to the Sonos. Neither system is inherently superior to the other, merely different. The Music Vault is designed to work seamlessly with either one.

VALUE ON

If you peruse the Internet you will discover that NAS hard drives can be had for as little as \$100 for a 500GB unit. If you buy the right one (which may well cost substantially more than \$100) and have the skills, you can conceivably cobble together a device that has nearly all the

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Micromega WM-10 WiFi Music Streamer

A Music Library At Your Fingertips

Tom Martin

We recently received and hooked up the Micromega WM-10, an unassuming black box that seems to be exactly what a lot of people are looking for, even if they don't know it yet. You see, the WM-10, launched at CES 2010, has the ability to play high-quality audio streams remotely using the WiFi (802.11n) wireless system.

WHAT EXACTLY DOES IT DO?

Some people find the parts and pieces of computer audio a bit confusing. So, before we get into the WM-10 specifically, let's review the general idea on offer here.

Products like the WM-10 assume that the customer has (or is willing to buy) a music server. A music server is a device for:

- Downloading music files via an Internet connection
- Ripping music files from CDs
- Storing music files (on a hard disk or other mass-storage device)
- Organizing the library of music files that you've stored
- Streaming the music files (creating a bitstream usable by a D/A converter)

Since a music server can be configured using an existing PC or Mac, almost everyone is in the situation of having a music server. Audiophiles may wish to have a dedicated music server, of course,

to avoid competition for resources between computing activities and music activities.

A music server could be hard-wired to a D/A converter and from there plugged into an amplifier and speakers or headphones. As an alternative, one could purchase a music client (also known as a networked music player or music streamer). Here we use the term music client because it fits the server-client metaphor borrowed from computing (where the server is the base for massive central data storage and organization and the clients are remote devices for viewing and lightly manipulating data). The music client receives music data streams from the music server over some kind of network connection and then performs D/A conversion for input to an existing audio system.

So, in summary, the WM-10 is a music client. It is designed to work with a music server (e.g. a Mac with iTunes and WiFi). The WM-10 receives WiFi music streams from the server and does D/A



conversion. You plug the WM-10 into your preamp or receiver via a stereo analog connection. You control the songs that are being streamed from the server using an iPod Touch or iPhone.

WM-10 DESIGN

With the above in mind, the concepts behind the WM-10 are pretty simple and easy to grasp. The first idea is that audiophiles probably want their PC and their audio systems in different rooms. This isn't some whole-house audio-lifestyle BS, it is desirable because PC components tend to be noisy and the easiest way to deal with this is to relegate PCs to another room. It can also be a practical matter. Audio equipment is often located in a more relaxed living space in the home than computer gear, which is assigned to a functional workspace. The WM-10 is therefore conceived as a remote client.

The second idea behind the WM-10 is that such remote clients should be wireless. Many homes are not fully wired with Ethernet connections in all the right places, so wireless is simply easier. One could use AC power-line networking, but some designers are concerned about how well this works.

The third notion behind the WM-10 is that audiophiles will want a high-quality music client, if they want one at all. While the WM-10 starts life as a humble Apple Airport Express, Micromega has redesigned it in two critical areas. It has installed a higher-quality power supply and redesigned the clock circuitry for better D/A performance. Finally, instead of a TosLink digital output, they've used a coaxial S/PDIF output for easier and better interfacing to external DACs (should you not want to use the internal DAC of the WM-10).

While on the subject of quality, I would add that Micromega chose the Airport Express because it uses an excellent chipset, which is capable of decoding 24-bit/176kHz and 24-bit/192kHz high-resolution files. As a practical matter, this is more a future-proofing capability than something you can use right now. The Flamjaset protocol embedded in WiFi doesn't yet allow these high-resolution data rates.

To install the WM-10, you simply plug it into your preamp/amp/receiver via RCA stereo outputs on the back of the WM-10. Next, you set your music server's wireless interface to connect to "Airstream." The WM-10 then is directly

EQUIPMENT REVIEW - Micromega WM-10 WiFi Music Streamer

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connected to your music server; it doesn't go through your network, with the result that, if your music server is also your PC, you can't use the Internet over WiFi while streaming songs. Using an Apple iPod Touch or iPhone, you download a free application called "Remote" from the App Store. The iPod then sees your iTunes library on your PC and allows you to select albums, artists, and songs just as you do with the locally stored songs on the iPod itself. The iPod relays your commands via WiFi to the server and the server obeys. Volume can be controlled via the iPod or via your preamp.

HOW WELL DOES IT WORK?

I was impressed with the ease of installation. Computer setup often involves the strategic application of profanity and a search of forums for the secret to making two components designed to a "standard" talk to each other. But in this case, setup took about 15 minutes and everything worked the first time.

I only encountered two problems. The first involves "sleep mode." When you start a listening session, it simply takes a while for everything to wake up and connect with the WiFi systems (direct from the WM-10 for music streams and via your WiFi network for remote commands). Related to this, you have to remember to set the iPod Touch to "Auto-Lock: Never," so that it won't go into sleep mode. If it does go into sleep mode, it takes a while when it wakes up to find the WiFi signal, which makes it a very slow remote. Neither of these are WM-10 issues; they are byproducts of using ancillary systems that have a sleep mode.

The second problem is more obscure, but some

of you will want to know about it. My server has the Amarra player installed and integrated with iTunes. For whatever reason, the volume control on iTunes and the volume control on Amarra fight with each other when you change songs using the iPod Touch. There may be a way around this, but I haven't found it.

HOW DOES IT SOUND?

I compared the sound of the WM-10 to that of my reference EMM Labs CDSA player, as usual evaluating differences in the context of the absolute sound. This might seem unfair, given that the EMM Labs player cost \$10,000 in its (very recent) day. My goal, I can assure you, was not to set an impossible task for the WM-10. Rather, I wanted to know, as readers will, how closely the WM-10 came to DACs that are roughly state-of-the-art.

The good news is that the WM-10 offers a smooth and relaxed sound that avoids some of the cheap and nasty distortions that can mar digital playback. Too many DACs in my experience have some additive distortion in the treble range that distracts from the sense of the music being real. The WM-10 isn't like that; the player mostly gets out of the way and doesn't impose its flavor aggressively.

I would also characterize the WM-10's flavor as being slightly warm, not because it emphasizes bass, but because the mid-treble range comes across in a somewhat reticent fashion. If you have a system that leans toward an edgy or cold sound, the WM-10 might balance things out nicely.

Bass response and definition also are quite good. For example, on the Alison Krauss disc

Forget About It [Rounder], the title track has a kick drum that is very well defined on the WM-10. However, I wouldn't swear that this is due to something special in the WM-10's reproduction of low frequencies; it may simply be that the more laid-back treble presentation makes it easier to focus on the bass quality.

The WM-10's treble sonics also deliver a good sense of depth. I came to qualify this observation after listening to many discs. I think the WM-10 should be described as offering a more distant perspective. With the WM-10, you simply feel as if you are sitting farther from the band or as if the band is pushed farther behind the plane of the speakers. I find this perspective helps create a sense of virtual reality, because the sound is less locked onto the speakers.

When we get to the actual presentation of micro-dynamic detail we find the place where I think the WM-10 can be bettered by very good DACs directly connected to your preamp. For example, on Eva Cassidy's Live At Blues Alley [Blix Street Records], the opening track has the announcer introducing Eva. With the EMM Labs DAC you really get the sense of the club venue as you hear the decay of the PA reverberating. The WM-10 delivers less of this ambient information. Eva snaps her fingers on Irving Berlin's "Cheek to Cheek," and the EMM makes the echo of the snaps more realistic sounding.

The differences I'm talking about are subtle. Experienced listeners would note that the Micromega doesn't dig into the music quite as far as some of the very best DACs, but this isn't a hit-you-over-the-head kind of difference; it is more of the latent sense of a very fine veil over the performance. At \$1595, looking for an EMM

level of transparency probably isn't a realistic expectation.

Mostly, if you heard the WM-10 without comparison, I think you'd say it sounds really good. I don't think you'd immediately comment on its transparency, but you'd probably comment on its smoothness and sense of low distortion. Given the convenience of playing music from a PC or Mac, with your complete music library at your fingertips, this sound will be more than adequate to make you forget about silver discs in trays. **tas**

SPECS & PRICING

Micromega WM-10 WiFi Music Streamer

Inputs: WiFi (802.11n)

Outputs: One single-ended stereo analog output (RCA connectors), one coaxial S/PDIF digital output

Formats: 16 bit/44.1kHz (AAC, AIFF, Apple Lossless, MP3, WMA, WAV)

Dimensions: 16.9" x 2.75" x 9.8"

Weight: 8.8 lbs.

U.S.

Price: \$1595

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