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The Stunning
Soolos System...

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Sooloos

Music Server System

JON IVERSON

NETWORKED MUSIC SYSTEM

Earlier this year, in an online poll, we asked the magazine's readers if they were ready for a music server. The response was startling: 32% of you had already set one up, and 44% were ready to. Only 7% responded "probably not" or "never." In the polls we conduct online, we rarely get this kind of positive consensus about *anything* audio.

The computer industry and the Internet have already eaten the music business for lunch, and now they look ready to have consumer-electronics hardware manufacturers for dessert: For the last few years, the computer folk have led innovations in audio sources, either with iTunes, iPods, and downloading, or with homebrew software/hardware music servers lurking in geek lairs everywhere. USB DACs and media-server bridge devices have become abundant, and even some audiophile companies have stuck a toe in.

But working with a mouse or remote control and a monitor—or, especially, a couple of buttons and a small LCD screen—is like pushing sound files around with a wet noodle. I consider it design negligence to create a system that stores thousands of audio files without addressing the issue of quick and easy access to those files.

And transferring your music library to a music server can be a minefield, not to mention a lot of work. The idea looks great on paper: Instead of piles of plastic disc cases that need to be shelved and arranged, why not put everything on a hard drive the size of a small book? Instead of programming a CD changer, why not just create and save a virtual playlist? Then there are the rumors that uncompressed digital music can sound better off a hard disk than from a plastic disc.

But in practice, creating a system that can handle all the details, sound good, and protect your investment requires the temperament and time of a tinkerer. It's like working with a Swiss Army knife when what you really need is a great screwdriver.

Then I saw the Sooloos system up close, in the company's suite at The Venetian on January 8, 2007, during that year's Consumer Electronics Show. That moment changed all of my expectations of music servers. This was clearly no me-too product, but a top-to-bottom reinvention of how we relate to music.

But was Sooloos an audiophile company or a computer company? Though their proof of concept was brilliant, and appeared to leapfrog Apple's iTunes interface, and their hardware looked audiophile chic, would Sooloos find enough buyers for their +\$10,000 system, before they ran out of cash? How would it work—and sound—in the real world? Would Sooloos continue to grow, or would they be eaten? And, most important, when would Sooloos meet *Stereophile's* notorious minimum of five US dealers and thus be eligible for a review in the magazine?

It's now more than a year later, and Sooloos is still standing, delivering, and innovating. As of summer 2008, they had about 50 dealers. It was time for a closer look.

What It Is

Think of the Sooloos system as a source component like a CD player. You feed it your CDs, which it converts to lossless FLAC files, stores them on its hard drives, and organizes them visually for you on a touchscreen.

To date, all Sooloos systems include the Control:One: a 17" touchscreen with a CD slot in its base. For the past year or so, the rest of the system has included at least one Store hard-drive music-storage component, and either a Source:One or a Source:Five DAC-and-router. Beginning in June 2008, the Sooloos compo-

DESCRIPTION Hard-drive–based networked music system. Source:One: system controller with 24-bit/192kHz converters, two-channel analog and digital outputs, 4-port Ethernet switch. Store: Twinstore hard-drive, mirrored storage for contents of +2000 CDs. Control:One: 17" LCD touchscreen display/interface and CD drive.

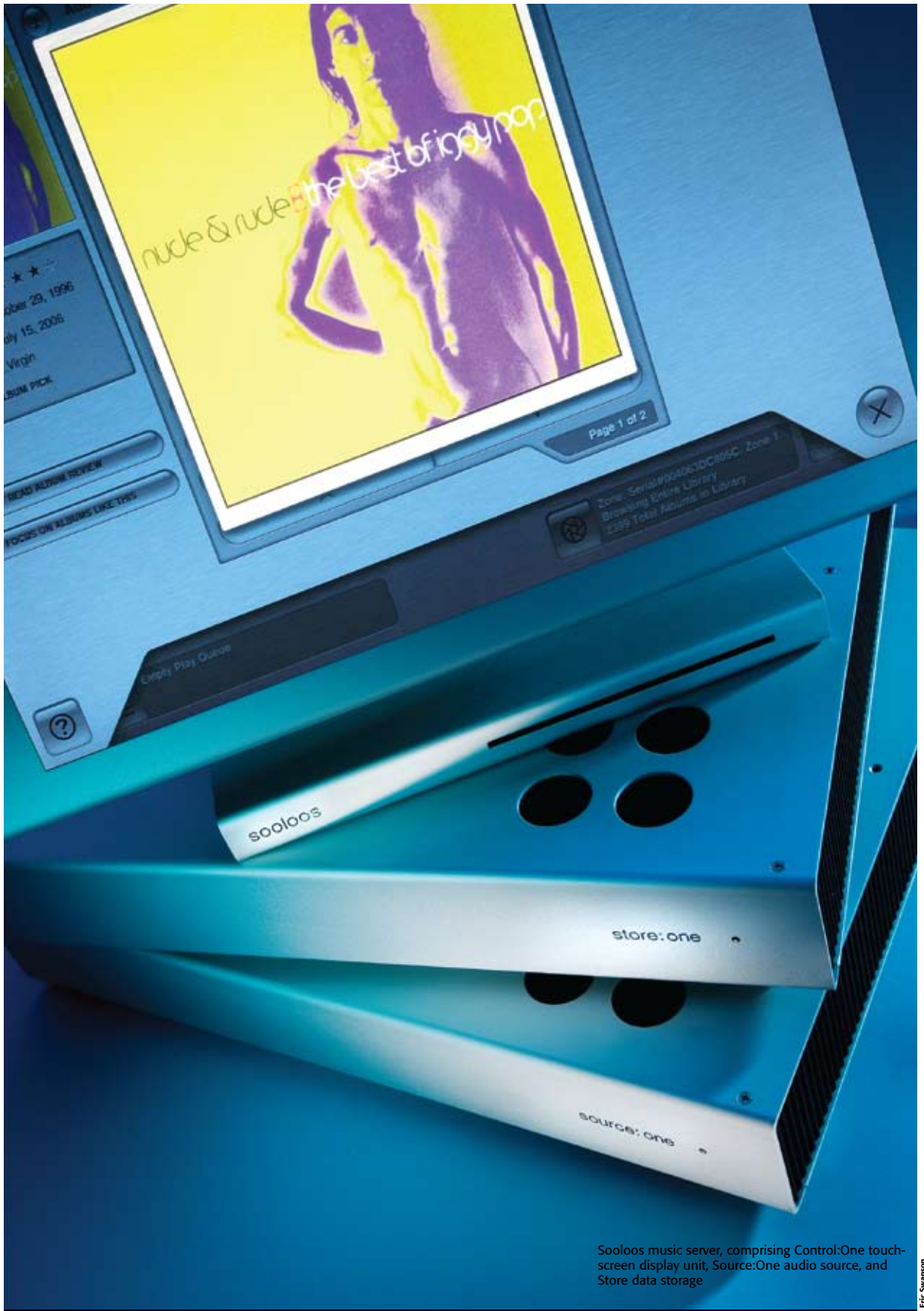
DIMENSIONS Control:One: 18" (460mm) W by 13.6" (350mm) H by 7.3" (185mm) D. Weight: 23.6 lbs (10.7kg). Source:One, Store (each): 17" (435mm) W by 2.75" (70mm) H by 14.6" (375mm) D. Weight: 12.8 lbs (5.8kg).

SERIAL NUMBERS OF UNITS

REVIEWED Not noted, JI's auditioning; Source:One, 004063DC805C; Store, 004063DC54AE; Control:One, 004063DC823F, KR's auditioning and measurements.

PRICE ca \$10,500. Approximate number of dealers: 50.

MANUFACTURER Sooloos LLC, 110 Greene Street, Suite 608, New York, NY 10012. Tel: (866) 606-0333. Web: www.sooloos.com.



Sooloos music server, comprising Control:One touch-screen display unit, Source:One audio source, and Store data storage

Eric Swanson

ment roster has been expanded by the brand-new, less expensive Ensemble, which combines the functions of a Source:One and a Store in a single box, albeit with some limitations (see sidebar, "Ensemble DAC & Hard Drive").

The Sooloos is a semiclosed system: you can't just hook up any touchscreen or hard drive to a Source:One, fiddle with third-party software widgets, or start streaming your favorite Web radio station through it. You can, however, use the Source:One's digital output with your own DAC, and use any networked device with a Web browser (such as an iPhone, an iPod Touch, or a laptop) as a remote control.

Each component in a Sooloos system is highly specialized, its sealed box containing many features. Some may find a closed music-server system antithetical to the DIY, open-system attitude prevalent in the greater server market. But, as you'll see, the Sooloos approach pays off big for the audiophile whose primary focus is the enjoyment of a music library, not tinkering with technology.

Which brings us to the *c* word. *Convenience* is usually a pejorative when used by audiophiles to describe such things as iPods and CD players, but the level of convenience offered by the Sooloos system's touchscreen and software not only make it easier to use, but can actually bring audiophiles closer to their digital music.

Setup

For this review, Sooloos sent me a Control:One, a Source:One, and a 1-terabyte Store (since replaced by the Twinstore). While the company is adding new products fast, these three are the bedrock components of a full-fledged Sooloos system, and should remain so at least through 2009.

The first thing I noticed on opening the boxes was the complete absence of instruction manuals. They've been replaced by a single, folded sheet of paper with pictures of how the components are to be connected to each other. Also included in each box is an Ethernet cable fitted with XLR jacks on each end (Sooloos uses RJ-45 or Neutrik Ethernet connectors), and, with the Store, a power supply.

To hook everything up, you network all components with the Ethernet cables, then plug them into the AC. That's it. The Source:One has a built-in Ethernet switch and multiple Ethernet jacks on the back, so you run one Ethernet cable from the Control:One



Album view, listing the songs and other albums by the same artist.

to the Source:One, and one from the Store to the Source:One. Then you run an Ethernet cable from the Source:One to your router, which should be connected to the Internet. Finally, choose between the Source:One's S/PDIF and analog outputs and connect it to your DAC or preamp.

My router is an Apple Time Capsule that's also a WiFi base station. While the Sooloos components are not wireless and require Ethernet cables to network, once you've connected them to your wireless router, other wireless devices on your network can then access the

Sooloos (more about that later). Also, I found that I didn't need to be connected to the Internet to run the Sooloos system, but I had to be online to turn it on: while booting, the Store gets a DHCP address from your router.

Once everything was plugged in, I hit the power switch on the back of each unit and waited. The Control:One blipped to life, and in a few seconds asked if I wanted to calibrate the touchscreen. It walked me through a few calibration touch tests before going on to the rest of the startup procedure. (I had to do this calibration only once, the first time I used the system.)

Depending on how many CDs you've loaded into the Sooloos, it takes two to three minutes to finish booting. The first time I set it up, however, my system hung after two minutes, displaying a message that it was looking for the Source:One. Turns out I needed to reboot my Apple router and cough up an IP address. Once I'd done this, all was well. And once everything is on, you can leave the Sooloos running 24/7.

After booting, a tidy-looking Home screen comes up, displaying four large squares labeled Music, Settings, Information, and Shutdown. You're ready to go. But before we poke the screen, let's look at the hardware.

Store/Twinstore

Whenever entering someone's home, I make a bee-line for the music collec-

ASSOCIATED EQUIPMENT

DIGITAL SOURCES Benchmark DAC1 USB, Apple Intel Mac mini running OS10.5.3 & (via Parallels) Windows XP, Apple Powerbook 17" G4 running OS10.5.3 & iTunes 7, Denon DVD-2910 universal player.

PREAMPLIFIERS Lexicon MC-12, Integra DTC-9.8.

POWER AMPLIFIERS Classé CAM 350 monoblocks.

LOUDSPEAKERS MartinLogan Prodigy.

CABLES Digital: XLO. Interconnect & Speaker: Kimber Kable. USB: Benchmark.

ACCESSORIES Dedicated 20-amp AC line for monoblocks, separate dedicated 15-amp lines for digital & analog components. —Jon Iverson

tion. It gives me a quick psychological profile or glimpse into the occupant's soul—a musical Rorschach. Very revealing. What I've seen of Wes Phillips' collection fits him like a glove, as do John Atkinson's, Robert Baird's, and Richard Lehnert's.

Stephen Mejias and I get together in person only once a year, at CES, but hearing about his musical purchases and recommendations year-round has fleshed him out in my mind in many ways. I've seen photos of the record and CD stacks in his apartment. He regularly lists recent purchases on his *Stereophile* blog. I feel I know the man. Maybe the FBI already knows about musical profiling and is studying iTunes download patterns to look for miscreants. I know I would.

I mention this because, while the system that Sooloos sent arrived mostly new in the box, the Store's hard drive was already stuffed with music. It was fascinating to see which 2400 CDs Sooloos had chosen to demo their system: everything from Bartók to Britney. Apparently, the Store's contents represented a sampling from the collections of various employees. It offered great insight into who had designed this product.

Back to minding the Store. By the time you read this, the Store will have evolved into the Twinstore (\$2500), which, as the hard-drive storage component of the Sooloos system, operates exactly as the Store does. But the Twinstore adds several advantages that bear mentioning. The original Store was sold in pairs: one box for playback, the second to keep an automated backup of the first. With the Twinstore, the primary and backup drives are in a single box, and those drives are now removable. Backup is very important with music servers. Though it happens seldom, hard drives do fail; if not backed up, the crash of a 1-terabyte (1TB) hard drive could represent the loss of over \$28,000 worth of music—not to mention the time it took to rip all those discs to the drive.

Like the Store, the Twinstore monitors its hard drives by pinging the Sooloos server every five minutes. In the event of impending failure, as disk errors and/or temperature start to increase—or an actual crash—it alerts you to find a replacement hard drive pronto. Once the new drive is in place, the Twinstore copies the contents of the backup to it and all is well.

Hard drives can be bought from Sooloos (\$175 for 500GB, \$350 for 1TB), or users can supply their own

drives, up to 1TB (until bigger drives appear). A quick search on Newegg.com for the removable SATA drives used by the Twinstore revealed prices ranging from \$189 to over \$400 each for a 1TB drive. And don't forget that you'll need *two* drives per Twinstore, which means that each terabyte of Twinstorage will

point: a distinctive, low-slung box of silver metal with black heatsinks on the sides and six rows of quarter-size circles cut out of the top, each circle covered with black metal perforated for ventilation. The front is plain brushed metal, with the Sooloos logo, the component name, and a small blue LED to indicate

MAYBE THE FBI ALREADY KNOWS ABOUT MUSICAL PROFILING AND IS STUDYING iTUNES DOWNLOAD PATTERNS TO LOOK FOR MISCREANTS. I KNOW / WOULD.

cost ±\$3200, or about \$1.30/CD. If your library is *really* huge, you can add multiple Twinstores to the system.

The Twinstore's case exactly matches those of the Source:One and Ensemble, and is understated, modern, and to the

point that it's on. Such a look may not be to everyone's taste, especially those fond of gratuitous metal fascia, but for me it was just right. On the rear of the Twinstore are the two drive bays, a power switch, and a single Ethernet jack.

ENSEMBLE DAC & HARD DRIVE

Critics of Sooloos often complain about how much the hardware costs, pointing out that similarly endowed off-the-shelf computer components retail for far less than a complete Sooloos system. Leaving aside the facts that you can get the brilliant Sooloos touchscreen interface and software only with Sooloos products, and that their gear is beautifully built and dead easy to set up, some in this age of cheaper-faster-better would rather trade refinement for a few grand in the pocket.

While I was listening to the Source:One-Store system, Sooloos shipped me an almost-final version of their new Ensemble, which should be available at Sooloos dealers by the time you read this. Essentially, an Ensemble is a Source:One and Store in a single case for a lower price (\$3500). Going the Ensemble route entails some restrictions: You're limited to a maximum of one removable hard drive, and you have to attach an external hard drive to your computer to manually back up your library via the Sooloos ControlPC software. The removable hard drive can be bought from Sooloos (\$175/500GB, \$350/1TB), or the user can supply his or her own drive. A single 1TB drive limits you to a total of about 2400

losslessly compressed CDs, but you can upgrade to a larger drive when they become available. The Ensemble's hard drive and fans make noise; if they're kept in the listening room, they must be in an enclosed space.

Another important difference is that, unlike Source:One-Twinstore rigs, Ensemble systems are incapable of Location Sync. All other software features remain the same: the Ensemble retains the full remote monitoring, support, and control options of the Source:One-Twinstore.

The Ensemble hooks up to the same 17" Control:One touchpanel, and other control devices as the Source:One (see below for information about a new, smaller panel), so it may be the way to go for those on a budget who want to get the Sooloos interface. Like the Source:One-Store, the Ensemble uses the Control:One disc slot or ControlPC application on your computer to load music into the system. It can also be remote-controlled by the ControlPC program, or any iPod Touch or iPhone.

The Ensemble can simultaneously run as many as five stereo zones: one S/PDIF and four sets of L/R RCA jacks. You can link them up, or have each play a different playlist. On the rear are: an RS-232 interface for hookup to a home-automation system; an Eth-

However, as with most hard drives of this type, cooling fans add their noise to the already irritating scratching of the disk-reading heads moving back and forth. You'll want to locate your Twin-stores in another room, or a closet with plenty of ventilation—or, as I did, in a soundproofed but cool cabinet. Because they hook up via Ethernet connectors, you can run CAT5 cable where needed.

Source:One-Twinstore systems also offer Location Sync, for those with multiple homes and Sooloos systems. Those lucky few can remotely synchronize their libraries in different locations, which adds even more hard-disk redundancy.

If Sooloos comes up with new software for your system, the Store-Twinstore automatically downloads it. First it waits for four consecutive hours of downtime, after which the Store grabs the new files and distributes them to each Sooloos device, which then automatically reboots itself. I was awake one night when this happened (we'd been watching a long movie); it was a bit unnerving to see the bright screen come alive in the dark and reboot on its own.

Source:One

For this review, I used the single-zone Source:One. The company also makes the Source:Five, a five-zone version for simultaneously playing as many as five different playlists in different locations around the house. But other than the extra zones, the different Sources are identical.

Except for the rear panel, a Source:One looks just like a Store. On the back of the Source:One is a power switch, a coaxial S/PDIF out, analog L/R RCA outs, and four Ethernet networking ports. (The rear of the Source:Five has four more sets of L/R RCA outs.)

Sooloos calls the Source:One the system "broker": it manages the communication of all of the devices. If you're having a problem, Sooloos Technical Support can remotely access your system via the Source:One-Store to diagnose the problem. I needed such support once, after Sooloos had sent an update overnight and my system could no longer find the router. While I was on the phone with HQ, someone looked at what was running and made some suggestions. A couple of specific reboots later, the system was up and I was listening again.

The Source:One also provides an important audiophile function: It houses the DAC and other sound-processing circuitry. Sooloos has not designed and built their own D/A converter, but in-

stead uses an RME Hammerfall DSP 9632 soundcard. The RME, a 192kHz-capable DAC, provides output to both the analog and S/PDIF jacks on the Source:One's rear panel. As JA notes in his "Measurements" sidebar, this DAC is not too shabby; in the "Listening" section of this review, I compare it to Benchmark's popular little DAC1.

The Control:One: Loading Music

The most striking-looking component in the system, the Control:One, houses both the bright, 17"-wide medical-grade LCD touchscreen and the CD drive. The CD slot is in the screen's heavy base, which has a footprint of 10" by 7.5". On the rear of the base are a single Ethernet port and the power-cable.

The screen is held in an adjustable brushed metal fascia that is much wider than the base—in fact, at 18", it's wider by an inch than the Source:One and Store, though it still matches the overall high-

style Sooloos look, with black metal heatsinks running down both sides. The screen itself has a slight matte finish that resists fingerprints—you don't see them at all when it's on, though smudges are visible when it's in standby mode.

The CD slot in the Control:One's base is where you add new discs to the Twin-store. There are other ways to get music into a Sooloos system: pay Sooloos to do it,¹ or import sound files from your PC's hard drive using Sooloos's ControlPC software (see below). If you have a large library and don't want to pay Sooloos to transfer it, buy an Import:One (\$800), which can rip 25 discs at a time via its CD/DVD autoloader, which attaches by USB to any PC on the Sooloos

¹ Sooloos allows customers to send in their disc collections on spindles to be ripped. The company's VP of Strategy, Rob Darling, revealed that one customer shipped them hundreds of discs of Beatles covers. Another had stacks and stacks of show tunes—and if he liked a particular show, he had every cast version, from every country in the world. Fascinating.

Ensemble DAC & hard drive, *continued*

ernet jack to connect to your router (unlike the Source:One, the Ensemble has no built-in router) to network with the Control:One, ControlPC, and Internet; and a USB jack just in case.

I used the Ensemble for a couple of weeks and found the interface to work identically to the Source:One-Store system, but I ran into some software bugs. It occasionally displayed the wrong playing times, and sometimes stalled if I was running different playlists in multiple zones. It would also, every once in a while, unlink the zones; I'm told this will all have been fixed before the Ensemble is officially launched.

Source:One DAC Upgrade:

Sooloos says that while the Source:One and Source:Five will remain current for a while, their internal DAC will likely be upgraded in the next few months. Having taken a few hits on sound quality in comparisons with onboard DACs, Sooloos is responding to audiophiles' need for better sound to go along with their innovative interface. They're talking with another high-end audio manufacturer about the DAC, and may have something to announce by the end of the year.

New Touchpanel: Sooloos says they're about to add to their product line a portable, battery-powered, 12" touchpanel with charging dock. It's

unlikely to replace the Control:One for many folks, but an additional remote control will help make the system even more sleek and easy to use. Sooloos says the custom casework is ready now; the final product will cost somewhere between \$2000 and \$2500, and we should see it before the end of 2008.

Interface and Software Updates:

As new functions are added, Sooloos plans to continue updating its software's feature set and interface "skin," or screen appearance. These updates will include making room for more music sources and streamlining some of the functions to make the skin easier to use. For example, managing multiple zone playlists and putting the system to sleep require some extra steps that will likely be eliminated. They also have plans to improve the Swim software. Let's hope they also let us sort the entire library by additional criteria, and add a Preview function to the album page.

There's More: At press time, Sooloos was unwilling to make any public statements about some of the content-streaming deals underway, but what I've heard about so far sounds exciting. They also plan to introduce some video- and photo-server products at this month's CEDIA Expo.

—Jon Iverson

network. The importing is managed through ControlPC.

Fed into the Control:One, each CD takes six to seven minutes to fully import, depending on its playing time. As soon as a CD is inserted, the Sooloos system checks that it's a valid CD, then tells you that a CD has been detected. If the hard drive is full, it will tell you that and spit the disc back out. Otherwise, Sooloos then searches the All Media/Music Guide (AMG) online database for the metadata associated with the disc (cover art, song titles, songwriting credits, etc.). The Control:One identifies which disc you've inserted by counting

the number of tracks and each track's exact timing, then searching the AMG database for a precise match. The chance of a mismatch increases the fewer tracks a disc contains. You can't hook a keyboard up to the Sooloos (there's no Bluetooth or USB port)—metadata are edited directly on the touchscreen, using a touchscreen keyboard. It's not the same as a real keyboard, but I found it easy enough to use for quick edits.

As the importing process begins, a screen appears displaying the metadata the system has found, and allows you to edit it as the ripping continues. If all looks good,

hit Continue; you'll then see a progress bar indicating how much of the job remains to be done. Rip completed, the disc is ejected and the system returns to normal mode, with your new album instantly added to the library. All CDs are imported as lossless-compressed FLAC files.

You can rip discs while music is playing, but once the ripping process is begun, you lose control of the system until it's completed. I've found that you can rip discs with the Sooloos offline, but it then leaves the metadata blank, to be later filled in manually by the user during the importing, grabbed online,

MEASUREMENTS

Of the three components that comprise the Sooloos system, it is the Source:One that outputs the audio signal. I measured the sample that had been auditioned by Kalman Rubinson; confusingly, although this identified itself to the system as a two-channel, single-zone Source:One, its front panel was labeled Source:Five, which I understand is a multizone version.

Internally, the relatively large chassis is populated with a switching power supply, an Ethernet network card, and an industrial single-board PC, into which are plugged a RAM daughterboard and a PCI soundcard. This latter, a high-performance Hammerfall HDSP 9632 from German manufacturer RME, is capable of decoding data sampled at up to 192kHz with a 24-bit word length—it will hardly break a sweat handling CD-format data in the Sooloos system. Flying leads connect the digital and single-ended analog outputs of this card to the RCA jacks on the Source:One's rear panel. Setup was straightforward, once I realized I had to connect the system to my Internet router when I turned it on for the first time.

I examined the Source:One's measured behavior using Audio Precision's top-model SYS2722 system (see www.ap.com and "As We See It" in the January 2008 issue, www.stereophile.com/asweseeit/108awsi), as well as our Audio Precision System One and the Miller Audio

Research Jitter Analyzer. (My results, of course, reflect the performance of the RME card; I understand that future production of the Source:One may well use a soundcard from a different company.) I ripped my library of CD-format test tones to the Sooloos Store using the slot in the front of the Control:One's base. Although my test signals are burned on a CD-R, when the Control:One accessed the Sooloos metadata library on the Internet, it identified the disc as a Norah Jones album; I assume the number of tracks and their timings must have been

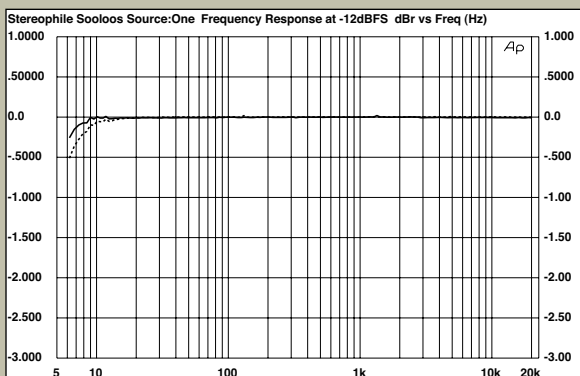


Fig. 1 Sooloos Source:One, frequency response at -12dBFS into 100k ohms, 44.1kHz data (right channel dashed, 0.5dB/vertical div.).

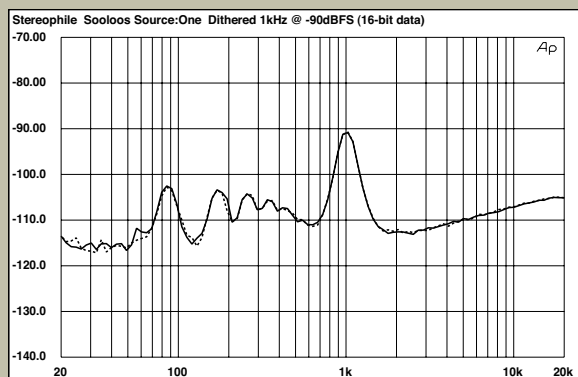


Fig. 2 Sooloos Source:One, $1/2$ -octave spectrum with noise and spuriae of dithered 1kHz tone at -90dBFS , 16-bit data (right channel dashed).

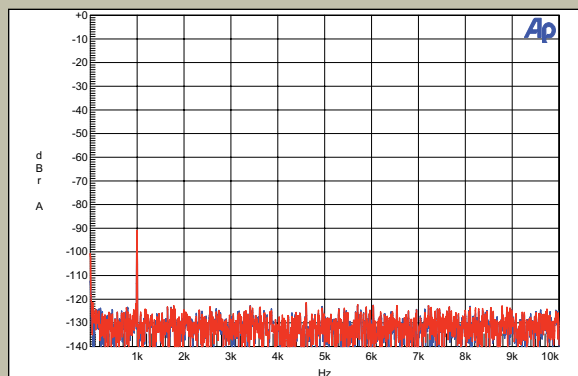


Fig. 3 Sooloos Source:One, spectrum of dithered 1kHz sinewave at -90dBFS , 16-bit data (blue left, red right; linear frequency scale).

or edited using the ControlPC program on your networked computer.

I found the entire process seamless, for the most part. Because the typical customer will receive an empty drive, I first deleted several hundred albums from my pre-stuffed review sample, to clear space for my own CDs.² I was surprised at how many obscure discs the system found detailed metadata for: Korean Beatles bootlegs, Japanese imports with extra tracks, *Mojo* magazine discs-of-the-month, limited pressings—all came up reliably.

² I deleted every one of the Britney Spears albums Sooloos had loaded.

Once in a while, when an album cover wouldn't import, I used the ControlPC app (see below) to track it down.

Sooloos says there is no limit to the number of albums you can add to the system. The system currently rips only CDs, though Sooloos hints that they might include higher-resolution formats in the future—the Source:One's RME DAC certainly seems able to handle them.

ControlPC and more control

The Sooloos is a completely self-contained system—all you need are the core components and some CDs. However,

there are other ways to control the system and manage the data on the Store or Twinstore.

The Sooloos ControlPC software is now available to download for Windows XP, and will eventually be available for Mac OSX. We run all Mac in this house, so I went ahead and added Parallels to my Intel Mac mini and installed XP. Half an hour later, after tweaking Parallels a tad, I was up and running with ControlPC talking to the Sooloos over my WiFi network.

ControlPC looks like a typical data-management application. With little

measurements, continued

similar enough to confuse the Sooloos metadata library.

The maximum output level at 1kHz was 3.35V, 4.5dB higher than the 2V CD standard, sourced from a very low output impedance of 49 ohms at low and middle frequencies. The source impedance rose to 82 ohms at 20kHz, but this is still a very low value; there won't be any compatibility problems. The frequency response was perfectly flat from 10Hz to 20kHz (fig.1), and channel separation was excellent, at 100dB L-R and 116dB R-L, at 1kHz.

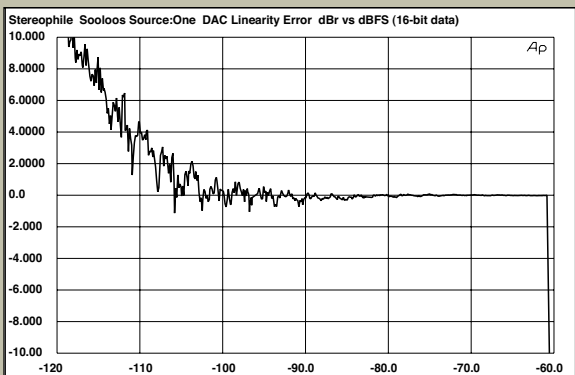


Fig.4 Sooloos Source:One, linearity error, 16-bit CD data.

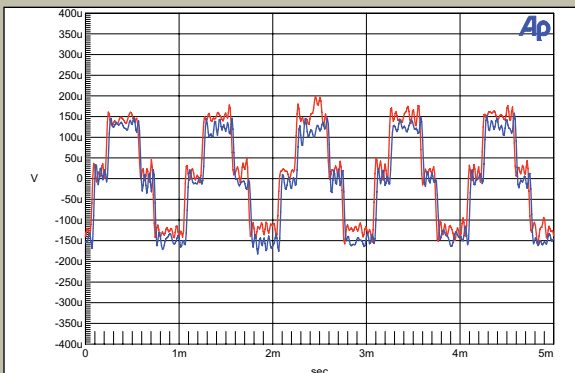


Fig.5 Sooloos Source:One, waveform of undithered 1kHz sinewave at -90.31dBFS , 16-bit data (blue left, red right).

The spectrum of the Source:One's analog output while it decoded data representing a dithered 1kHz tone at -90dBFS , using a swept $1/3$ -octave bandpass filter, indicated excellent linearity, with an absence of any harmonic spurious, but uncovered some lower-frequency artifacts at 86Hz and its odd harmonics (fig.2). It's possible these were the result of ground leakage from the switching power supply—the ground connections on the RCA jacks on the rear panel of this sample are galvanically connected to the Source:One's chassis—but, peculiarly, they are not visible in an FFT-derived spectrum of the same output signal (fig.3).

The presence of this noise resulted in a higher-than-usual amount of positive linearity error below -100dBFS (fig.4), but was low enough not to obscure the Source:One's reproduction of an undithered tone at exactly -90.31dBFS (fig.5). The three discrete DC voltage levels described by this signal are clearly visible, with good waveform symmetry.

Harmonic distortion was very low into high impedances (fig.6), with the second harmonic the highest in level at -90dB (0.003%). Some higher-order harmonics can also be seen, though these are all below -110dBFS and should therefore be inconsequential. However, even though the Source:One has a low output impedance, it is not happy driving very low impedances—into 600

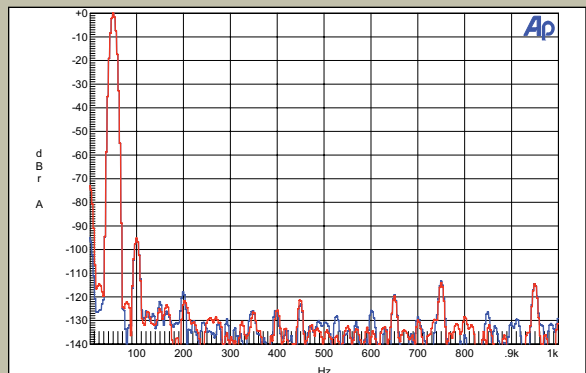


Fig.6 Sooloos Source:One, spectrum of 50Hz sinewave at 0dBFS into 100k ohms, 16-bit data (blue left, red right; linear frequency scale).

instruction, I figured out how to start editing metadata and importing new album-cover art (where needed). ControlPC lets you search for metadata in sources other than AMG (such as Amazon.com), which I discovered because of how AMG sorts compilations and multi-disc sets. For example, under “Artist,” AMG lists all of the tracks in Rhino’s series of *Nuggets* compilations as “Various”; it was helpful to re-edit those sets so they’d stick together in the interface. ControlPC made this painless; buffing up my ripped library was actually fun. (I found that Amazon and fan websites are the best sources for hi-rez cover art.)

ControlPC is not just for editing metadata; it’s also handy for exporting parts of your library to another hard

drive, an iPod, or a mix CD, as well as for controlling the Sooloos system and setting up playlists in multiple zones, if you have them. But it turns out there’s an even better way to remote control a Sooloos system, and you don’t even need Microsoft.

One drawback of the Sooloos system as delivered that struck me right away was its lack of a remote control. It has no IR or RF capability, though you *can* network Sooloos gear with home automation systems such as AMX. But adding Play, Stop, and Skip for the Sooloos to your all-in-one remote is out of the question.

Luckily, you can control the Sooloos system through a portable or desktop computer’s Web browser: Safari for the Mac, Internet Explorer for Windows.

First, go to the Sooloos information screen and find your system’s IP address. Enter that number and the zone information as a custom URL, and a control pad pops up with a small picture of the album currently playing, along with its track and time details. You can also browse your entire library and set up playlists—we’re back to mouse and screen here, but it works.

Even better, you can use an Apple iPod Touch or iPhone as a controller. The browser layout has been optimized for the smaller screens of these touch-screen devices, and it worked great. We used a Touch to control the system from all over the house. Still, a Touch or iPhone is no substitute for using the much larger Control:One for browsing

measurements, continued

ohms, a regular series of distortion harmonics appears (fig.7). Intermodulation distortion was very low (fig.8), but some spectral spreading can be seen around the 19kHz and 20kHz fundamentals in this graph.

I assessed the Source:One’s rejection of word-clock jitter by playing the Miller Audio Research test signal, developed by the late Julian Dunn, and performing narrowband FFT analysis. The result is shown in fig.9: the central peak in this graph is the 11.025kHz tone, and the spectral spikes toward the sides are data-related sidebands. These are close to the test signal’s residual level, but perhaps of more subjective significance are the lower-frequency sidebands that can be seen to either side of the central peak. These are spaced at $\pm 86\text{Hz}$ and its multiples, the same frequency as the spurious seen in fig.2. Again, this behavior may have resulted from the fact that the analog output jacks of Kal’s review sample were grounded to the chassis, which, Sooloos’s Rob Darling subsequently informed me, was due to a manufacturing error and is not typical of overall production. Even so, the calculated jitter level was still very low, at 254 picoseconds peak-peak, which makes it unlikely that this

behavior underlay KR’s preference for the Source:One’s digital output feeding his Meridian digital preamp over the sound of the Sooloos’s analog outputs.—John Atkinson

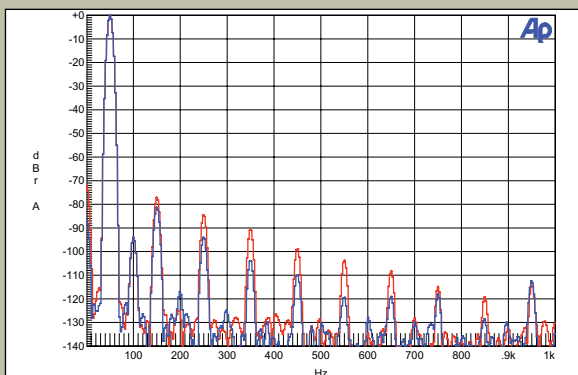


Fig.7 Sooloos Source:One, spectrum of 50Hz sinewave at 0dBFS into 60 ohms, 16-bit data (blue left, red right; linear frequency scale).

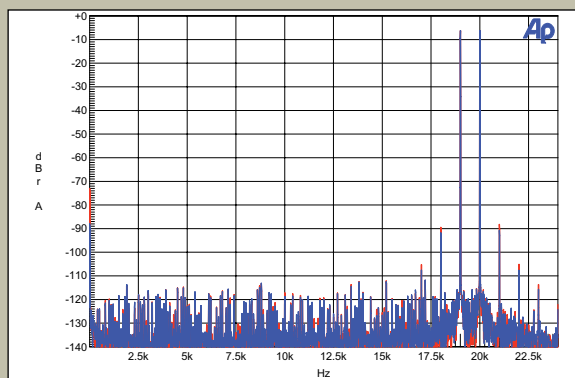


Fig.8 Sooloos Source:One, HF intermodulation spectrum, 19+20kHz at 0dBFS peak into 100k ohms, 16-bit data (blue left, red right; linear frequency scale).

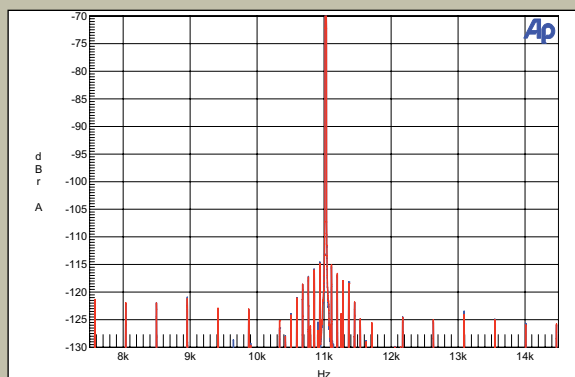


Fig.9 Sooloos Source:One, high-resolution jitter spectrum of analog output signal, 11.025kHz at -6dBFS , sampled at 44.1kHz with LSB toggled at 229Hz, 16-bit data. Center frequency of trace, 11.025kHz; frequency range, $\pm 3.5\text{kHz}$ (blue left, red right).

music. Using an iPod Touch was very comparable to using the Sonos LCD-and-scrollpad remote control we had in-house for several months last year.

Software and Using the System

I've played with quite a few music-server interfaces, including a couple of touchscreens, but nothing else comes close to the Sooloos for finding, sorting, and playing music. And it's lightning-quick.

What's brilliant about the Sooloos interface is that you can approach your primary goal of finding and playing an album or list of songs in several ways. But before you can fully appreciate this, you must grasp the underlying structure of the library.

When you tap the Music button on the Control:One after booting the system, you see a grid of 18 album covers, each 2" square, arranged in three rows, in alphabetical order by artist's *first* name (eg, Neil Young appears under *N*). This is the primary view of your library. Across the top of the screen is a row of 26 buttons, from A to Z. Under the bottom row of album covers, toward the right side of the screen, are forward- and back-arrow buttons for skipping through the library, 18 covers at a time.

Along the bottom of the screen is a row of icons comprising (from left to right): a Help button, a window displaying info about the track currently playing (title, remaining playing time of track as well as of the track queue), three buttons to control the playback (Skip Back/Forward, Play/Pause), the Focus panel, and Search and Home buttons.

If you want to play an entire album, you can skip forward or back screen by screen, tapping the arrow buttons until you find the disc you want, or go directly to the artist by using the letter buttons along the top. If you start spelling the artist's name by quickly tapping successive letters, you'll immediately land on the right page. Usually, three letters is all it takes.

You can also hit the Search button to search for artists, albums, songs, or any combination. A keyboard pops up—start typing a name, hit Enter, and a list of matches appears. When you spot the album you want, tap the album cover; the album's track list page pops up. Tap the Add Album to Play Queue button and a menu pops up with four choices: Add to Play Queue, Play Next, Play Now, and Cancel. Tap Play Now and the music starts instantly. You can also tap just one of the tracks to play it directly.

If all of this sounds complicated, it's not. Try it only a few times, and you start finding albums quickly.

There's much more you can do from the album's track list page. On the left is the cover image; below that, a button to press to read a review of the album, another to edit the album's metadata, another to have the system automatically find other albums just like it, and one to add the album to a Collection/Playlist. On the right is a column of album covers of other albums by the same artist. Pull

TAP ON ONE OF THOSE NAMES AND YOU CAN SEE EVERY OTHER ALBUM IN YOUR LIBRARY THAT THAT PERSON WORKED ON.

up any Kraftwerk album and you'll then see all the other Kraftwerk albums in your library.

At the top of the central column are some tabs: you can look at the list of Songs, see what Genres or Moods it's filed under, or a list of album Credits. Tap on Credits and you're shown a list of everyone credited with working on that album—musicians, producers, engineers, photographers, etc. Tap on one of those names and you can see every other album in your library that that person worked on. This function is called Focus, and it's one of the Sooloos system's more powerful features. You can use it at any time to select groups of albums

according to a wide variety of attributes. One of my favorite uses of Focus is to sort albums by date of importing. This way, I can quickly find the most recent additions to my library without having to remember the artists' names.

Focusing on genre is also a great way to find stuff. There are dozens of Genres and Subgenres; tapping one presents you with the usual grid of album covers, but this time only those within that genre. And you can Focus on multiple criteria: psychedelic albums, only from the 1960s, rated at least four out of five stars. Tap tap tap, and there they were: 15 albums. You can now create a custom playlist, save this group of albums as a Collection to call up later, or just pick one and hit Play. Or you can tell the Sooloos system to Swim within this Focus.

I loved the Swim feature. The Sooloos has the standard Shuffle mode for playing an album's songs in random order, but Swim takes this further, searching through a Focus or Collection grouping—or your entire library—and grabbing songs indefinitely. When I told the Sooloos to Swim its way through my whole library, it never ceased to surprise me.

If you hit Home at the bottom right of the screen, you can then tap Settings. That's where you name your zones and set such things as the crossfade time between tracks, volume levels, sleep mode, etc. If you get stumped, you can hit Help at any point; a contextual screen comes up with details about your current settings and what you might want to try.

I've only scratched the surface of how you can find and sort albums within the Sooloos system. At first, without a manual, I was a little mystified about how it all worked—but within a few days I'd



The Ensemble prototype with removable drive exposed.

created strategies to deal with the thousands of music choices, and was diving deeper and deeper into music from artists and albums I hadn't listened to in years. It was far easier to poke around in the Sooloos than through my CD shelves, and the speed of sampling one artist or another had me listening to music I usually pass right by.

A few criticisms: It would be nice to have a Preview option when browsing albums so that you could easily sample a song before committing it to the Play Queue where you'll then have to go to delete it if you don't want it. It would also be nice to sort the entire library by something other than artist name—by genre, for example, so that all jazz albums are listed together alphabetically; or by import or release date; etc. Adding access to Web radio and music-streaming services such as Pandora would eliminate my need to keep a computer in the system. And the album-cover art could be higher resolution, with a larger color palette—iTunes covers tend to look much nicer by comparison when blown up in Apple's Front Row and Cover Flow. And all of the Sooloos components run warm to hot.

Listening

I listened to the Sooloos system in four different ways: using its analog outputs (from its internal RME Hammerfall DAC); using the S/PDIF output directly into a Lexicon MC-12 preamplifier; into the new Integra DTC-9.8 preamp (reviewed by Kal Rubinson in the January 2008 *Stereophile*); and into the Benchmark DAC1 USB. I also compared the Sooloos via the Benchmark to iTunes running on my Apple portable via USB to the Benchmark—and, for a bit of nostalgia, to a Denon DVD-2910 universal disc player. Before I began my listening, Sooloos sent their sales manager over to modify the Source:One by isolating the ground on the S/PDIF connector—apparently, they'd missed a few units.

For all comparisons, I assembled a playlist that included "So What" and "Miles Runs the Voodoo Down," from producer Bob Belden's excellent new *Miles from India* (CD, Times Square TSQ-CD-1808—get this disc!); "Come Together" and "A Day in the Life," from the Beatles' *Love* (CD, Apple/Capitol 3 79810 2); and several tracks from Choying Drolma and Steve Tibbetts' beguiling *Selwa* (CD, Six Degrees 657036 1104-2).

I first wanted to determine the differences, if any, between the Sooloos

Source:One's analog and digital outputs directly into the preamps. The analog output was about 4.5dB hotter than the digital, so I calibrated the volume with an SPL meter and compensated with the volume control for all comparisons. Bottom line: The Sooloos's analog output bettered both preamps' own DACs

USING THE SOOLOOS
GOT ME MORE DEEPLY
INVOLVED WITH MY
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I BEGAN COLLECTING
MANY YEARS AGO. SIGN
ME UP.

in subtle but meaningful ways. Choying Drolma's voice sounded thinner through the preamps' own DACs than through the Sooloos DAC, and the Integra DTC-9.8's soundstage felt more constricted than those of the Lexicon or Sooloos.

Comparing the Sooloos's RME DAC via its analog outputs to the Benchmark via its S/PDIF out was another matter. I give the Benchmark the nod on this one, though not by much—after reading JA's review of the Benchmark back in January, I'd expected more. I'm splitting hairs here, but the Benchmark had a tighter midrange and transients and a more natural dynamic feel, while the Sooloos's analog output exhibited a little woolliness with voices. But the acoustic piano in "So What" was the real give-away here, with more clarity and focus. (See sidebar, "Kalman Rubinson on the Sound of Sooloos," in which KR describes the even greater differences he heard with some other DACs.)

More obvious were the differences between the analog outputs of the Denon DVD-2910 universal player and the Sooloos-Benchmark combo. The music server won this one by a slightly wider margin, which probably shouldn't have been surprising: we'd added a spinning piece of plastic to the equation. But whether it was the source of the digits or the Denon's DAC, the DVD-2910 lacked refinement, felt looser all around, and exhibited more hash in the high frequencies while not sounding actually brighter.

Finally, I connected both the Sooloos (S/PDIF) and my Mac (USB) to the Benchmark, and switched back and forth between them. I first ripped my playlist tracks to iTunes as WAV files from the same CDs I'd imported to the Sooloos, turned off all iTunes audio modifiers, and set the appropriate sampling rate in the Apple Midi Setup utility. Playing the same track via the Benchmark, the Mac and Sooloos were very, very close—but I give the nod to the Sooloos, which had a tighter, more relaxed midrange. This was especially noticeable on "A Day in the Life," as the instruments around John Lennon's voice took on a more natural spread. But the Benchmark DAC1 was a great leveler here—if it weren't for the more cumbersome iTunes interface, I could be happy with the sound of either server through the Benchmark.

If you've got access to a great outboard DAC, take a listen—you might like it better than the analog outputs of the Sooloos. Otherwise, the latter offered respectable sound, and, as I've often found with good digital, the differences that were there were only *barely* there.

Conclusions

There are already dozens of music servers on the market, as well as an infinite number of home-brew PC variations. In my mind, however, a touchscreen system running intuitively designed software is *the* way to navigate thousands of audio files. By comparison, using iTunes to organize and play a large music library I now find simply frustrating. A good interface such as that of the Sooloos (or of an iPod, for that matter) keeps the complexity hidden while offering the user a powerful tool.

The Sooloos is a hugely ambitious product that has completely changed my expectations of music servers. It will no doubt be only one of many touchscreen-based systems in the years to come, but right now, the Sooloos—aimed squarely at the music lover and audiophile—is the best I've used. You can complain about the price or quibble about the sound, but for something that raises the bar this many notches and works this well—it never crashed once in the several months I used it—it has no peer.

You'll want to find a dealer and play with a Sooloos system in person. Using the Sooloos got me more deeply involved with my music library than at any time since I began collecting many years ago. Sign me up. My disc players are history. ■