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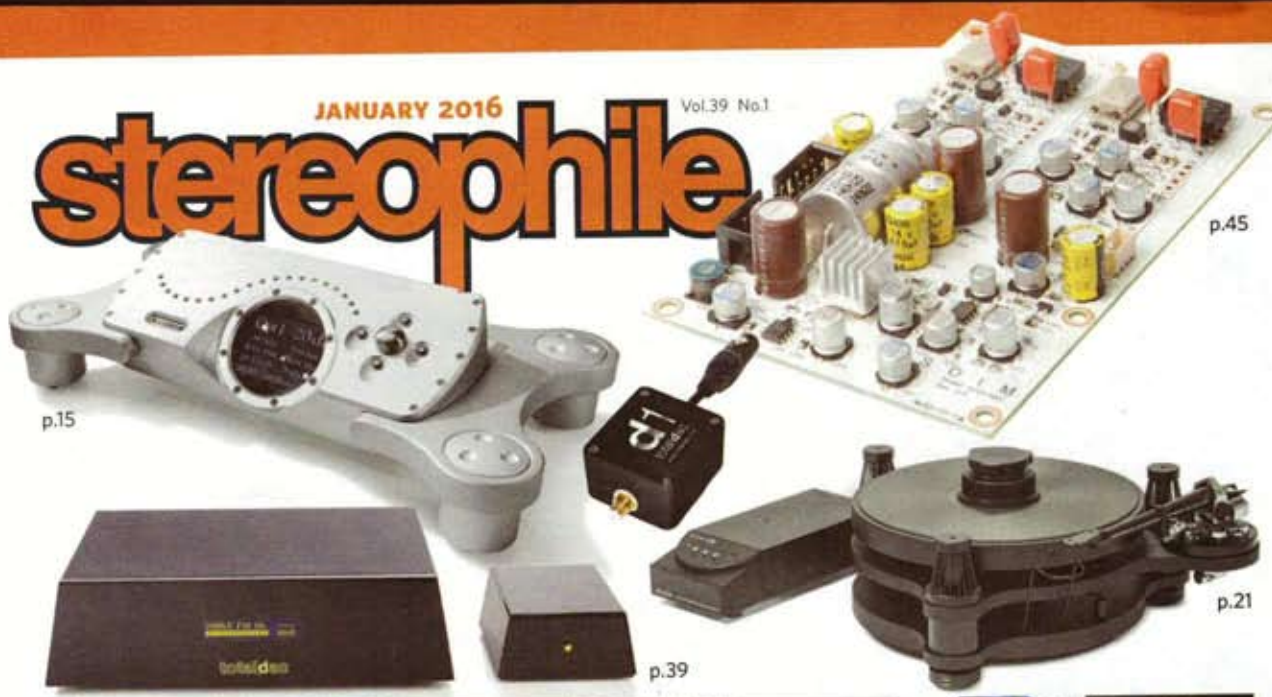

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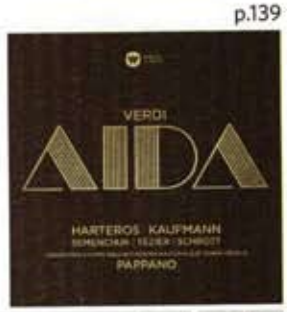

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connected devices, for any information about precisely what it does, and how. I found only two relevant statements:

> JitterBug is designed to remove unwanted noise currents and parasitic resonances from both the data (communication) and Vbus (power) lines of USB ports. . . .
>
> JitterBug's dual-circuitry measurably reduces unwanted noise currents and parasitic resonances. It also reduces jitter and packet errors (in some cases, packet errors are completely eliminated).

Well, that's admirable—but how? JA was unable to find, in his measurements, any difference in DAC output resulting from the insertion of a JitterBug. Others have reported the same—but some have seen a change in the digital signal's "eye pattern," as observed on a digital oscilloscope. An eye pattern is a way of representing the precision of the digital pulses, which ideally should be square, thus indicating that the on-off transition is perfectly defined in time. Apparently, the JitterBug applies some kind of filter so that the squarewaves' risetime is slightly *increased*—the opposite of what we want if we want to reduce jitter. However, while we assume this is not good in the digital domain, it's unclear what effect such a filter might have on the DAC's analog output. Is it possible that the JitterBug is actually doing something else, and that the apparent digital compromise is merely a side effect? As long as it's reasonably square, is the eye pattern even relevant?

When I removed the JitterBug, I missed it.

I don't know. But I, like others, can hear the JitterBug's positive effects on the analog output. I connected one 'Bug between the output of my server and the input of the miniDSP U-DAC8, and—with or without the UpTone USB Regen connected—the JitterBug did seem to sweeten the treble. And when I removed the JitterBug, I missed it. Though the JitterBug's effects were more noticeable without the USB Regen in the system, they were smaller than those of the UpTone accessory—which not only sweetened the treble but also, with multichannel recordings, tightened up the integration of elements within the soundstage.

I tried inserting a second JitterBug, as AQ recommends, in a different USB jack on the same server, but heard no difference. I also tried the JitterBug in my other system, in Manhattan, with the exaSound e28 DAC. The effect was similar: subtle but sweet.

The $49 AudioQuest JitterBug is the archetypal accessory whose audible benefits are unsupported by measurements—and, for that very reason, some consumers will reject it out of hand: two imponderables, both of which bother me. At the end of the day, I can only recommend you try it and decide for yourself.

SOtM AUDIO tX-USBhubIn USB HUB and sCLK-12.0 SuperClock DIGITAL CLOCK

I had started down a slippery slope. Having been impressed with the effect on the U-DAC8's performance made by UpTone's USB Regen, I had to wonder if the Regen, or something like it, might have a salubrious effect on the sound of my exaSound e28 DAC. The e28's designer, George Klissarov, had deterred me from adding a

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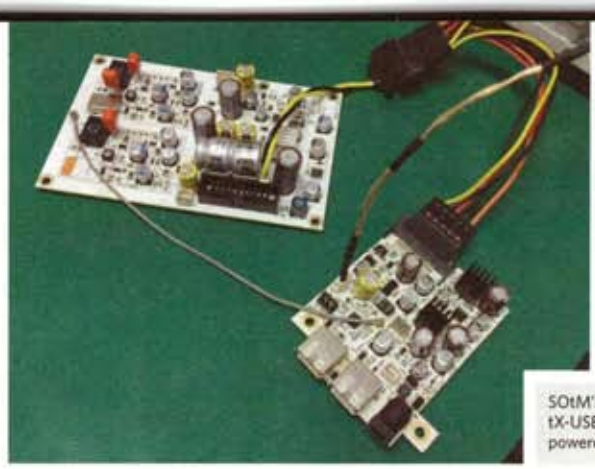
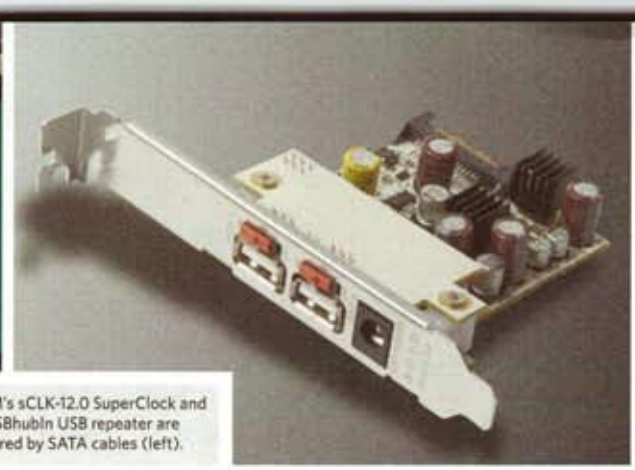


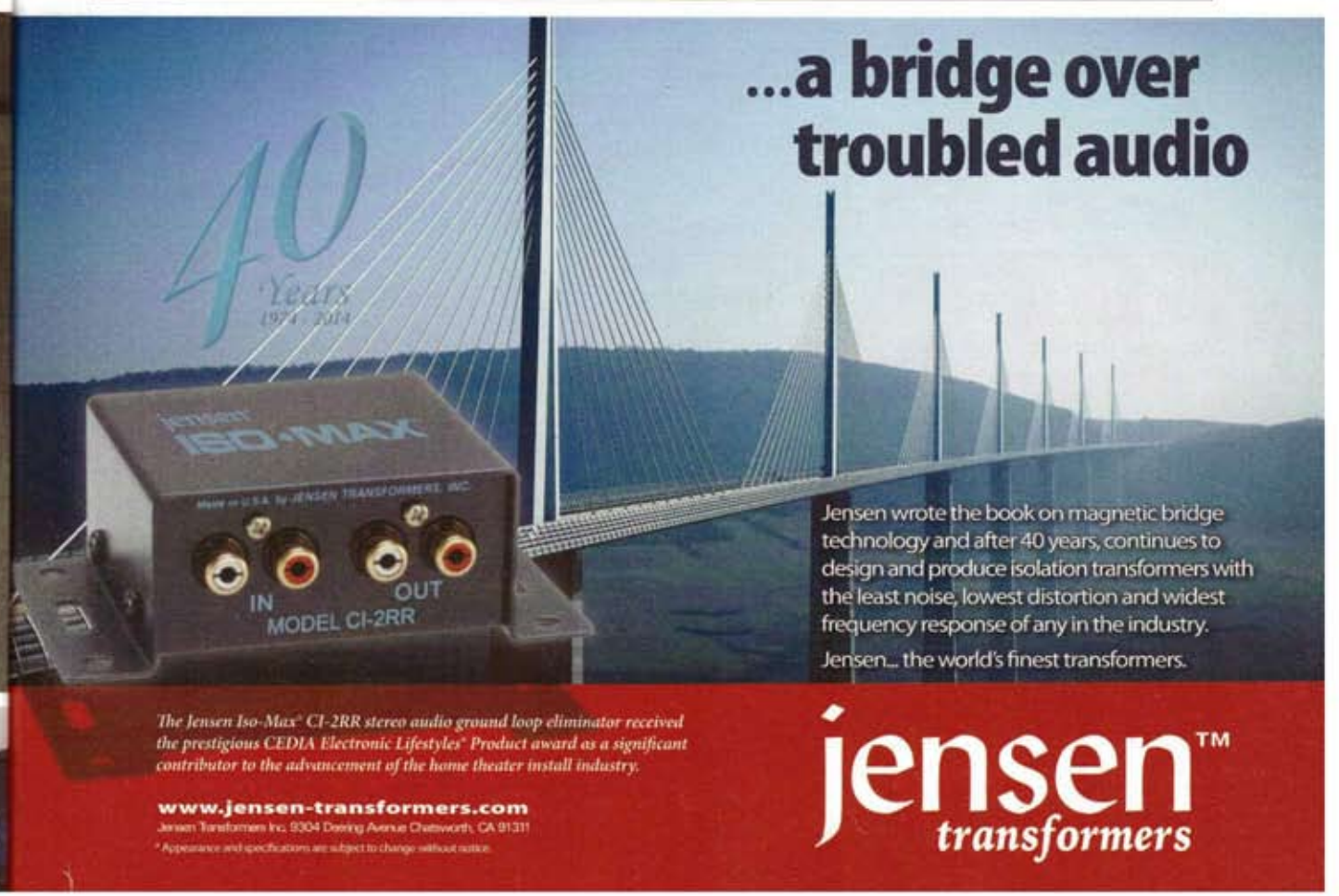


SOtM's sCLK-12.0 SuperClock and tX-USBhubIn USB repeater are powered by SATA cables (left).

PCIe-standard USB output board to my Baetis XR3 server, characterizing it as unnecessary. Conversely, the designer of the Baetis, John Mingo, recommended just such a thing, even as he has focused his efforts on S/PDIF output performance.

The apparent success of the USB Regen has been followed by the appearance of other devices incorporating a USB repeater to preserve the integrity of the signal reaching the DAC, to ensure that it is perfectly timed and shaped. But how to choose? I dislike having lots of little boxes and additional cables attached to my system; as luck would have it, SOtM Audio recently announced their tX-USBhubIn USB hub board ($350), which can be mounted in an available slot in a PC, and can run on the computer's internal power or an external supply. (For $370, SOtM offers a comparable external device, the tX-USBhubEx.) The tX-USBhubIn has two USB ports, each of which can supply +5V on USB or not. Given SOtM's success with their servers and power supplies, and with their original tX-USBexp PCIe USB Audio Card, I figured that the tX-USBhubIn would suit my needs. SOtM describes the tX-USBhubIn as an "Audio USB 2.0 Hub" with "Ultra Low Noise Regulator," "Ultra Low Jitter Clock," and "Active Noise Canceller," and makes the familiar request: "Do try and in person experience the high quality sound system produced from the new platform beyond and above the existing PC product criteria."

To my surprise, SOtM also sent their new high-precision clock, the sCLK-12.0 SuperClock ($500), to further enhance the quality of the USB output. The sCLK-12.0 SuperClock—so new that it has not yet appeared on SOtM's website as I write this—has impressive specs. SOtM's sCLK-series clocks support their dX-USB HD, iM-USB HD, tX-USBexp, tX-USBhub, and other boards. Absent any official documentation, I was sent jitter-spectrum recordings made at the AES/EBU output of a dX-USB HD by a Stanford Research Systems SR1 audio analyzer with a bandwidth of 100kHz, zoomed to focus on the audioband.

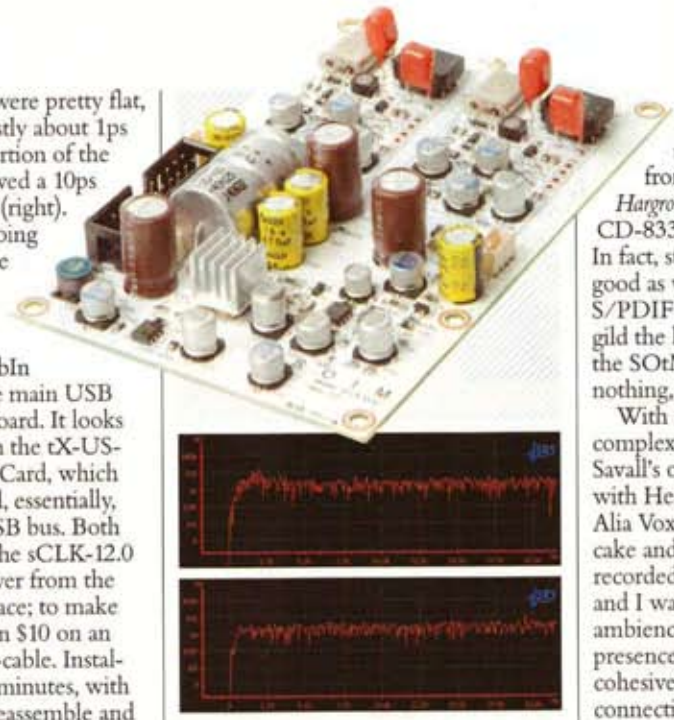


While all of the graphs were pretty flat, showing jitter levels mostly about 1ps on the log scale, the insertion of the sCLK-12.0 clearly removed a 10ps peak just below 2.5kHz (right). The clock is evidently doing something, but again, the audible impact is undetermined.

Being a USB repeater, the tX-USBhubIn is to be connected to the main USB header on the mother board. It looks smaller and simpler than the tX-USBexp PCIe USB Audio Card, which occupies a PCIe slot and, essentially, establishes a separate USB bus. Both the tX-USBhubIn and the sCLK-12.0 SuperClock require power from the computer's SATA interface; to make this easy, I spent less than $10 on an internal SATA power Y-cable. Installation took less than 15 minutes, with another 15 minutes to reassemble and reconnect the Baetis server, which then booted up just fine.

My first decision was whether to enable the 5V output on the USB port. Because the exaSound e28 is powered by its own battery, I hoped that disabling the 5V output would eliminate a potential source of noise. However, the e28 needs the 5V connection in order to be recognized by its driver. Enabled for 5V, everything functioned as before, and I was left with the music.

Switching from the XR3's stock USB connector, the SOtM hub and clock made an easily audible improvement in the sound of a system that



From top to bottom: sCLK-12.0 SuperClock; 20kHz jitter spectrum with standard clock; 20kHz jitter spectrum with SuperClock.

I'd already thought sounded entirely satisfying. Although measuring the sound levels before and after produced identical results, my immediate impression was that the music was now louder and clearer—an impression gained because I could now hear subtle distinctions in the midrange with much greater ease. The bass and treble were not obviously affected, except to the extent that some older, *splashier* recordings, such as Arthur Lyman's 1958 release *Taboo* (CD, Rykodisc 417), were less disturbing. But good modern recordings, such as "Tin Tin Deo" (1996), from *Oscar Peterson Meets Roy Hargrove and Ralph Moore* (CD, Telarc CD-83399), lost none of their detail. In fact, stereo recordings sounded as good as via the Baetis's own dedicated S/PDIF connection. To see if I might gild the lily, I inserted a JitterBug into the SOtM port, but to no avail. It did nothing, good or bad.

With multichannel recordings of complex orchestral music, such as Jordi Savall's of Biber's *Missa Salisburgensis*, with Hespèrion XXI (SACD/CD, Alia Vox AVSA9912), I could have my cake and eat it, too. The Biber was recorded in a large, reverberant space, and I was immediately immersed in its ambience—yet individual voices had presence, and the entire ensemble was cohesive. Through the standard USB connection, the distinction between direct and reflected sound was confused; switching to the SOtM connection was like having the optometrist find the *just right* corrective lens: Everything snapped into place.

All of this comes at a cost. The list price of the tX-USBhubIn is $350, and the sCLK-12.0 SuperClock costs $500.[4] You might want to start with just the SOtM tX-USBhubIn, and see if it whets your appetite for more. I swallowed both whole and found them very satisfying.

4 At the time of writing, the US distributor offered a special introductory price for the tX-USBhubIn, and promised a similar special price for the as-yet-unlisted sCLK-12.0 SuperClock.

JL AUDIO FATHOM f113v2 POWERED SUBWOOFER

Are subwoofers accessories? I think so. They're important to home-theater fans, but many audiophiles loyal to two-channel stereo refuse to consider them, even when their preferred speakers are quite limited in bass power and extension. Perhaps bass isn't all that important to them, or perhaps they're daunted by the complexity of properly setting up a sub. I lived for years without a sub in my main system, in Manhattan. My Connecticut system included subs because I sometimes use it to watch movies—but with my NYC rig including three Bowers & Wilkins 802 Diamonds and a pair of 804 Diamonds, I did not lack for bass.

Or so I thought until late 2006, when I reviewed the predecessor of JL Audio's Fathom f113v2, the Fathom f113[5] (which I'll now call the v1). The v1 didn't so much give me more bass as *better* bass. I was sort of pleased with Automatic Room Optimization (ARO), its one-band auto-equalization software, which handily dealt with a 50Hz room mode. But, over time, I came to rely on outboard EQ in the form of DSPeaker's Anti-Mode 2.0 digital room equalizer or Dirac Live. Apparently, my room needed more help than any single-band filter can supply.

Are subwoofers accessories? I think so.

Enter the Fathom f113v2 ($4500), with *Digital* Automatic Room Optimization (DARO)! Aside from its new EQ software, the f113v2 is almost identical to the v1, with some subtle changes in the I/O panel on the back and the controls across the top front. Under its hood, the v2 boasts 3000W RMS short term, compared to the v1's puny 2500W, and its single, front-firing, 13.5" driver has a modified suspension for greater linearity and lower distortion. In addition, the v1's circuitry has been reconfigured so that no audio signal is routed through the v2's control panel, and all small-signal circuits are contained in a cast-aluminum housing attached to the rigid rear-panel heatsink. Finally, because EQ is now

5 See my column in the November 2006 issue: www.stereophile.com/musicintheround/1106mitr/index.html.