

# Home Theater Magazine

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## A Bit Is A Bit...Right?

### Can high-end digital audio cables really improve the sound of a home theater system? Let's do a Face Off and find out.

by Brent Butterworth

It's gotta be frustrating for all you casual home theater enthusiasts out there. Seems like every time you open a magazine, you read some schnook raving about a new audio tweak -- usually a seemingly ineffective new device that, at least according to said schnook, "transforms" the sound of your system. "Sounds ridiculous," you think, only to read one of the schnook's colleagues from another magazine back him up a couple of months later. So, do you buy this thing? Does it really make a difference?

Some of this stuff, admittedly, is pretty easy to ignore, like the high-end audio writer who swore up and down that placing a few quarters on the tops of his speakers improved the sound of his system. Even though a lively debate ensued -- with some audiophiles arguing for the use of dimes or nickels instead, and others insisting on a certain placement of the coins -- the average guy just knows that putting a friggin' quarter on top of his speaker isn't going to make any real difference (doesn't cost you much to try it out either).

In other cases though, the decision's a lot tougher. By my reckoning, most Home Theater readers are happy to spend a little extra to get high-quality speaker and interconnect cables for their systems, and most say they hear a significant improvement in sound quality. But what about digital cables? Used to be, you didn't have to worry about digital audio cables unless you were one of the privileged few who owned a separate digital-to-analog converter for your CD player. In these days of DVD, Dolby Digital, and DTS, though, a digital audio connection forms one of the lifelines of any quality home theater system. So now you have to buy a digital audio cable. And, as a home theater enthusiast, you have to wonder if the digital audio cable you buy makes any difference in your sound quality.

Of course, we would hope you'll only wonder about this kind of thing if you have absolutely nothing else to think about; more important and consequential issues are discussed even in an average episode of *Zoe, Duncan, Jack & Jane*. But if it's late Sunday night and there's nothing good on DirecTV pay-per-view, read on.

Digital audio cables are supposed to have a simple job. They convey a series of electric pulses: When the electricity's on, you have a "1", and when the electricity's off, you have a "0". This "on/off" scheme is engineered so that noise and interference have no effect on the transmission of audio from one point to the next. The digital-to-analog converter is your preamp/[Processor](#) or receiver just needs the 1s and 0s coming in from the cable, and as long as the voltages of the 1s and 0s fall within very broad tolerances, you get a perfect reconstruction of the original audio signal.

That's what everyone thought, anyway, until some audiophiles actually tried comparing digital cables and heard what they thought were significant sonic differences among them. Various engineers started to explore the matter and soon came to the conclusion that the differences are caused by an evil little phenomenon called jitter.

Jitter is an error in the timing of a signal. All of those 1s and 0s are supposed to arrive at precise intervals, determined by an electronic clock inside the device sending the digital audio signal. The circuitry inside your receiver or pre/pro that accepts the digital audio signal has a component called a phase-locked loop that's supposed to relock the 1s and 0s as they come off the cable, but some engineers and audiophiles claim that jitter can blow right past the PLL and get into your receiver's DVA converters, where it gives the sound of harshness that's often associated with digital audio.

Digital audio cables can cause jitter if there are reflections inside the cable that bounce photons and electrons around and throw off the timing of the signal. In a Toslink [Optical](#) cable, the light can scatter around; in a coaxial cable, impedance errors can cause reflections of the electrical signal.

OK, but do all of these reflections make a difference in the sound quality? Most engineers would probably say that, in any reasonably good cable, the reflections are low enough in amplitude that they can't cause jitter severe enough to overwhelm a PLL. Of course, some engineers and many audiophiles disagree. When we started working on this Face Off, we were still sitting on the fence. We heard some subtle differences when using different digital cables with the PCM audio signals coming from CD players, but with Dolby Digital and DTS, we really had no idea what we'd hear.

We decided to compare both Toslink and coaxial cables from a variety of brands. We scammed a bunch of 2-meter cables from the usual manufacturers, with no instructions regarding price or construction, and also threw in a generic \$14.95 Toslink and one of the cheap video cables with the plastic yellow plugs that I got free with my Replay TV box. We also took the occasion to compare Toslink versus coaxial because so many readers have asked us which is better. As usual, I served as switcher monkey, so I knew which cable was which. For our panelists, the test was blind; they had no which cables we were hearing. The panelists were assistant editor Joe Hageman and New York avant-garde/jazz saxophonist David Aaron. David has served well as an extra set of ears on many of my recording projects, so I knew his listening skills were up to this challenge.

So is a bit a bit, or does all of this jitter stuff actually have an effect on the sound quality of your system? Let's find out...

## The Contestants

Before we get to the testing, let's list the different cables we tried, with a brief description of each. All prices are for a 2-meter cable. By the way, we also received cables from Kimber and Audioquest, but too late for our tests; we'll see if we can't get an evaluation of those cables done soon.

Monster Silver Digital M1000D coaxial (\$130): With both foil and braided [Shielding](#), this cable should offer excellent rejection of interference. It has a silver center conductor, plus a nitrogen-injected [Dielectric](#) that Monster says helps maintain consistent impedance. Monster's sturdy Turbine plugs give it a very firm grip on the jack. However, we've found that the grip with these plugs is so firm that it can damage the jack on cheap audio gear when you disconnect it, so be careful. The plug has a blue stripe; we'd prefer an orange one because it'll be easy to confuse this cable with a left-channel analog audio cable.

Monster Interlink LightSpeed 100 Toslink (\$44.95): This beefy cable is about 3/16-inch thick; it has large plastic connectors at the ends. Monster says this cable's precision-polished terminations help reduce diffraction of light and therefore minimize jitter.

Synergy Video/Digital 1000 coaxial (\$29.95): Like most of Synergy's other cables, the Video/Digital 1000 is designed for easy termination in the field, either by a custom installer or by a

consumer - all you need is a wire stripping tool and the proper crimper. Video/Digital 1000 is essentially a high-quality video cable; you terminate it with crimp-on F-connectors, like the ones you find on antenna cables. Then you simply attach an F-connector-to-[RCA](#) adapter, and you're ready to roll. Our Video/Digital 1000 came with nice heat-shrink tubing over the ends, with an extra strip of yellow heatsink around the [RCAs](#) to identify this as a video/digital audio cable. TARA Labs Prism D-2 coaxial (\$155): This cable is the most expensive of the bunch; it's also the thickest. Its braided plastic fiber outer jacket covers a cable that features TARA's Aero PE insulation, which the company says helps the cable maintain consistent impedance. The Prism D-2 is terminated with hefty [RCA](#) plugs covered with heat-shrink tubing.

Tributaries SilverConnect Digital SCV-150 coaxial (\$92.50): The SCV-150 appears to be functionally identical to Tributaries' V1 video cable. It's a massive, triple-shielded cable about 3/8-inch thick. The ends are skillfully terminated with chunky [RCA](#) plugs. Inside the plug, the shield is soldered all around the center conductor to maintain full [Shielding](#) and consistent impedance. Tributaries [Optical](#) Toslink (\$55): This cable is approximately the same girth as the Monster LightSpeed 100. It's tipped with thick, silver-colored plastic ends.

XLO-VDO ER-6 coaxial (\$37.95): The ER-6 is a slender cable tipped with rather small [RCA](#) connectors. The cable says, "True 75 Ohm," but at the connectors, the shield is soldered only at one place, rather than all around the center conductor as is necessary to maintain a 75-ohm [Characteristic Impedance](#) throughout the cable. Does it matter? Maybe not. Although many electronics enthusiasts are very anal about maintaining 75-ohm impedance in their transmission-line cables, the RF, video, and digital electronics that use these cables all have a broad tolerance for impedance error (my antenna handbook lists the tolerance for RF applications at +/- 50 percent. And you think that receiver of yours really maintains precise 75-ohm impedance throughout its switcher circuitry?

XLO-VDO ER-TOS Toslink (\$59.95): If you were buying on looks, this is the Toslink you'd buy. Its 1/4-inch-thick jacket and sturdy-looking connectors give the ER-TOS the same sort of aesthetical appeal of those inch-thick speaker cables you sometimes see on high-end audio systems. The thickness is purely an aesthetic feature, though - the fiber inside is no thicker than in any other Toslink cable. XLO says that the ER-TOS's terminations are polished to minimize diffraction and jitter.

## **Musical Differences**

As soon as we switched to the second cable, our hearts sunk a little. We thought there just might be a chance that we'd hear no difference at all - that we'd be able to cruise through this test plugging in each cable, saying, "Nope, I don't hear anything," moving quickly on to the next, and promptly freeing up a delightful sunny afternoon. No such luck, though. The first cable sounded a lot different from the second - even David, who's not an audiophile, noticed the differences right away. We knew that we had many hours of serious listening ahead of us. What'd we here? Mainly a difference in clarity in the midrange and treble. Some cables made one range or the other (or both) sound clearer, while others made either the mids or the highs (or both) sound more harshy or distorted. You hear the difference most easily on voices; in particular, Joe found that Juvenile's quickly delivered, hard-to-understand line "He ain't got no more money than me," sounded completely different on many of the cables. After he pointed it out (I have to confess, I wasn't listening too closely on that track), David and I had to agree.

These differences subjectively affected tonal balance - when the treble sounds more distorted, for example, the sound seems brighter and more fatiguing. Changes in the sound of the treble also tend to affect soundstaging, and we heard differences there, too; some cables tended to broaden and deepen the soundstage, while others seemed to make it collapse.

As is usually the case, we didn't completely agree on which cable was best and which was worst, although we did seem to agree on a few. First, let's start out by saying that it does seem to pay to

spend a little more for a decent cable. Our generic Toslink and coaxial cables placed in the middle of the pack at best, and in many cases, ran last or second-to-last.

Compared with the other cables, the Prism D-2 sounded more refined, but also exhibited a softer tonal balance with a mellow treble. Joe loved its tonal balance, and thought it produced the airiest, most spacious sound. On the more strident material, such as the Lisa Germano and Juvenile tracks, I thought the Prism D-2 lent the sound a smooooother, more pleasant quality than the other cables, but on other tracks, I preferred the other cables' more lively sounds. Reserve your judgement on this cable until we come to the Dolby Digital tests, though... Our results with the other coaxial cables were really too random for us to produce rankings. For every cable one of us liked, there was another guy who didn't, and still another guy who thought it sounded about average. They all seemed to work fine, though, and all three of us felt the differences among these cables were subtle enough - and so much a matter of taste - that we'd be perfectly happy with any of them. And of course, in a different system, you might prefer different cables.

It's interesting to note, though, that the two cables that sounded the best and the most distinctive to us were the most expensive. That came as a big surprise to us.

In general, the Toslink cables did, indeed, sound inferior to the coaxials - the panelists commented that the [Opticals](#) seemed to sound a little hashier and harsher in the mids and highs than the coaxials did. However, while all of us would choose coaxial over Toslink if given the choice, none of us would be particularly concerned about buying a digital audio device that offered only a Toslink output.

### **Movie Sound Mystery**

If we heard subtle but clear differences among many of the cables with PCM audio from CDs, why, oh why, didn't we hear any differences with Dolby Digital soundtracks? It could be that, while PCM audio goes through little or no number-crunching on its way from the CD player to your ears, a Dolby Digital bitstream is converted from a single stream into several streams of 1s and 0s that are completely different from those going in.

See, once PCM audio leaves the CD player, it goes through an input receiver and a digital filter, then straight into the DVA converter. (In some receivers and pre/pros, it also goes through a DSP chip for bass management and other processing.) The fundamental 1s and 0s remain unchanged. But with Dolby Digital (and DTS), the bitstream is compressed - it must go through a DSP chip to be uncompressed and packaged into bitstreams for the six channels of analog output that these formats provide. Our speculation is that when there's so much processing going on, the effects of jitter become insignificant.

With cable after cable, we heard only the most subtle differences, changes so tiny that we couldn't describe them accurately. We never felt a preference for one cable over any other - not even for a coaxial over a Toslink. Strangely enough, though, that pattern did not hold true for the TARA Labs Prism D-2. Please don't ask us why, but Joe and I both agreed that this cable sounded smoother and more natural than the others when we were playing Dolby Digital soundtracks. We double-checked our results by switching the cables back and forth several times, and we got the same effect every time. You might be tempted to conclude that the Prism D-2 did something wrong, but it sure didn't sound that way.

Wire We Doing This?

So is there any reason to care about digital cables? Our panelists respond with an unanimous, resounding "maybe." According to David, "There are definitely differences - many subtle, many not. Some brought out the horns, still others brought out the drums, others brought out the 'live' character of the sound." But as you'll read in his "What Do You Think?" write-up, he won't lose

any sleep worrying about this stuff. Joe largely agreed: "It's not the difference you hear with speakers or amps, where you have a clear preference for one product or the other."

If your primary interest is DVD playback, we'd recommend you buy an inexpensive, good-quality coaxial cable like the Synergy Video/Digital 1000 or the XLO ER-6. (Any good [Composite](#) video cable will work fine, too.) And if you're stuck using Toslink, any generic product you can pick up for \$10 to \$20 should work fine. For those who are bound and determined to get the absolute best possible, we might recommend playing around with the TARA Labs Prism D-2. If your main interest is CD playback and you demand true high-end sound quality, try out the Monster Silver digital M1000D or the TARA Labs Prism D-2. ...

I guess you could say that we've changed our minds about digital cables, but you could also say that we haven't. Yeah, they can make a difference, but at the end of our Sunday night, we're probably more concerned about whether or not Zoe and Jane find themselves a couple of nice boyfriends.