

By Tom Nousaine

# Audio's Top Urban Legend

In my last column, on audio's urban legends, I failed to mention perhaps the most persistent and seductive one: that new audio components—even cables—must be broken in, or “burned in,” before they reach their full potential.

This gives the dealer an out when a customer brings a new component home and calls back to complain that it doesn't sound as good as he had hoped: “It'll sound better once it's burned in,” the dealer will reply. And that advice may be useful for resolving unjustified cases of buyer's remorse—as long as the recommended break-in interval doesn't exceed the return period.

More to the point, do products really need breaking in? And if they do, how do they know exactly when to stop? Vinyl records have a wear cycle, but it doesn't stop; the discs simply wear out. Same with vacuum tubes, phono-cartridge suspensions, styli, CD or tape-recorder drive belts, and anything else having elastic or moving parts. These products break *down*, not *in*.

Solid-state electronic devices have no parts that break in. They either die very young (which the trade calls “infant mortality”) or go on virtually unchanged for years. So if a solid-state amplifier turns on and makes sound the first time you turn it on, it is generally good to go. And cables, completely passive transmission devices, have nothing that can break in or needs to. Audio buffs often talk about the benefits of break-in, and they have a reason (which I'll get to later)—but not the reason they think.

What about speakers? Unlike amps and cables, speakers do have

elastic elements and moving parts. If anything should need breaking in, speakers should. And manufacturers often do recommend substantial break-in intervals. One maker, for example, suggests “at least 50 hours at moderately loud levels . . . even more improvement after 100 hours of playing.” I asked a local retailer about his store's return policy. He explained that all his customers had an opportunity to listen to fully broken-in speakers on the floor and sometimes with weekend loans, but once they purchase they have 15 days to return it (and must pay a 15% restocking charge). By my reckoning, a buyer of the speaker I just cited would have to listen at a loud level for 3½ hours every day for two weeks just to break his speakers in, and would need another two weeks to get that “even more improvement.” Of course, he could also just leave them on all day for a few days—as long as there's nobody home to be bothered.

Let's think about this in engineering terms: It would appear that the drivers most likely to need breaking in would be woofers, which have compliant suspensions and relatively floppy cones. Over the years, I've conducted two in-depth studies of 12-inch woofer break-in, both at the behest of manufacturers who insisted their products *had* to be broken in for lengthy periods before being reviewed. The first time, I measured a driver before and immediately after a long break-in period, and found that its free-air resonance frequency ( $f_s$ ) had fallen by five to ten percent and compliance, or springiness ( $C_{AS}$ ) had increased by a corresponding amount.

The driver's calculated  $Q$  values changed accordingly.

However, using a computer program to model an ideal enclosure for this driver gave me the same results whether I entered the data for the driver I'd “broken in” or for a fresh one. In other words, the lowered free-air resonance counteracted the increased compliance to give me the same results. I built a pair of the enclosures the computer had recommended, and installed a fresh driver in one and the broken-in driver in the other, then made the same performance measurements for each. My results for the two speakers were not quite identical, but the differences were within the tolerances implied by the unit-to-unit variation of four samples I had measured fresh. The two speakers sounded the same, too.

I repeated this experiment for another manufacturer, who insisted his speaker required at least a 48-hour break-in. In this case I broke the driver in while it was in the manufacturer's recommended enclosure. The speaker's frequency response was the same before and after break-in. This time I also measured the resonant frequency ( $f_{SB}$ ) of the system at intervals (30 minutes, 1, 2, 3 hours, and the next day) following the break-in cycle. The  $f_{SB}$  did change but, interestingly, it slowly dropped back to its original value once the speaker had cooled down for a few hours. The woofer had warmed up but its performance hadn't changed—it hadn't really broken in. If you truly want to get whatever effects (if any) might result from breaking a speaker in, you'll have to warm it up for a couple of days before listening sessions or make sure it never cools down.

Despite all this, there *is* a break-in period for drivers. But according to a transducer engineer who used to work for a large American maker of drivers and finished speaker systems, the whole deal takes just a few seconds, and usu-

ally occurs during the final quality-control check at the end of the driver assembly line.

So do speakers break in once we get them home? Hell, no. And we should be thankful for this. I'd worry about a manufacturer who'd let a product leave his factory before he'd verified its final performance. If breaking in is truly needed, it should be done at the factory.

If a product—speaker or otherwise—sounds substandard, it won't improve with breaking in. But you might think it has, because *you* get broken in, acclimating to to the product's sound over time. Humans are remarkably adept at adapting to any stimulus. For example, a fan may

sound loud when you turn it on, but you may not even notice the noise after you've been hearing it for half an hour. Turn it off, though, and the room will sound remarkably quiet—until you get used to *that* noise level. While you shouldn't expect audio products to improve with use, you shouldn't forget that what changes may be *you*, not the product.

Finally, if you insist on breaking-in your speakers, do it carefully. Letting the speaker play overnight with a low-level test signal or music is prudent. Do not play a noise, sine wave, or other continuous signal through your speakers at high levels for an extended time. That's for the speakers' sake as well as

for your ears'. There is a technique to minimize the aural annoyance during break-in, by placing the speakers face to face but wiring one with reversed polarity, so that the sounds from the two speakers largely cancel. But this technique, which encourages driving the speakers at high levels for a long time, is fraught with danger: too much level for too long, and you'll become intimate with the smell of melting voice-coil glue. The only thing that has in common with the smell of good perfume is the expense.

**Next issue:** True or false? Every room is different. Rooms may all be different, but they are more alike in important ways than is commonly believed.