

Sound Views

Opinion and comment on the changing audio scene by Robert Long

The High Price of Progress

EVERY TIME I HEAR the statistician's term "standard deviation" it strikes me afresh that there's something vaguely absurd about it. If deviation is a departure from some sort of standard course or condition, how can a deviation be standard? A sophistry, perhaps, but disturbingly similar to the situation in which the cassette medium finds itself, where some standards are honored more in the deviation than in the adherence and others suffer from a multiplicity of references, each deviating from the other.

We have, for example, received a few letters citing what the writers called the "nonstandardness" of Nakamichi decks and pointing to the International Electrotechnical Commission standards and to playback-response test tapes based on those standards to "prove" their point. And if you measure an old Nakamichi deck with an old test tape, you may well find that the response curve turns upward at the extreme high end. Why? Because Nakamichi followed the IEC standard, that's why.

How can this be, you ask. Well, the IEC wrote its primary specification in terms of flux density on the tape and playback-equalization time-constants. So far so good. But because there was no way of measuring flux densities directly (and still isn't for practical purposes), the IEC specified elsewhere what heads would be considered standard for playing back (and thus measuring indirectly) recorded flux densities. And in order to be "standard," test tapes were devised to give flat results with the existing heads. Meanwhile, however, Nakamichi had calculated head behavior for the standard flux densities and time-constants and was producing decks whose performance was flat on that basis. Because the calculations took head-gap losses into account and the progression by which the test tapes were arrived at didn't, there was a discrepancy between the end results. Yet each was "standard!"

There's actually a lot more to it than this résumé suggests. Addenda to the original IEC documents tend to confound any attempt to derive a clear picture of what the standards say, and time has made nonsense

of some of their specifics. (In fact, a tape-test standard is largely complete.) The IEC's standard heads, in particular, have become obsolete, and so have the tapes based on them. If you measure a current Nakamichi deck with a current test tape, you'll probably find a perfectly flat high end. That's because today's narrow-gap playback heads (including Nakamichi's) display little if any high-frequency loss within the audio band, so neither the deck's electronics nor the test tape need compensate substantially for such losses; both used to compensate for the *same* loss and thus turned it into a gain—which explains the

Improvement and standardization of the cassette medium are necessary but inhibit each other.

rising high end in the measured response of early Nakamichi decks.

One more example of how standards can trip us up, and then I'll get down to my real point. If you look at a lot of our cassette-deck playback-response curves, you've surely noticed many that turn down instead of up at the high-frequency end. The reason usually is a "disagreement" over cassette head azimuth. In fact, if the response begins to sag at frequencies below 8 or 10 kHz in any deck that is above the budget-price level, you can be fairly certain that its azimuth does not match that of the test tape; if the record/play response curves all stand up well to higher frequencies, the point can be considered proven.

Azimuth is the effective perpendicularity of the head gap to the tape path. If the playback head is rotated out of perpendicularity, one edge of the gap will read the recorded signal a little ahead of the other; as recorded frequency rises—and recorded wavelength consequently shrinks—some frequency eventually will be reached where the trough of the waveform is being read at one edge of the track while the peak is being read at the other, cancelling each other and reducing output. It sounds as though the cure is simple: Just make sure that all head gaps are perfectly perpendicular to the tape path. But it's not that easy. Depending on the drive mechanics, the tape doesn't nec-

essarily pass the heads in a perfectly straight line between tape guides, and its "bending" can introduce azimuth skew. Nor is the magnetic azimuth of a tape head necessarily dead straight along the centerline of the gap. So achieving perpendicularity is rather like trying to draw a square box with no aids except a rubber T-square and a French curve.

HIGH FIDELITY used to measure playback response—and, indirectly, azimuth—with Philips test tapes. We found them (like all brands, to some extent) a little inconsistent from sample to sample. But when we changed to the TDK test tape to get its greater reach into the high-frequency range and its modern bass equalization (the Philips tapes follow an older standard and hence represent yet another example of "standard deviation"), we found still larger inconsistencies between results with the two brands than we had with our various samples of the Philips tapes. And other tests suggested that neither brand would match the results with a Teac test tape. Of course, we might have come to different conclusions with different samples of these same test-tape brands, but the point remains that there is no unanimity of azimuth among quality brands and hence no standard—de jure or de facto—for azimuth adjustment!

All of which may sound like an elaborate way of introducing a plea for comprehensive, comprehensible, cast-iron standards for the cassette medium. Well, yes and no. In the scant decade that has passed since the cassette became a serious contender for grace in the high fidelity firmament, there have been many calls for more (or more useful) standards. There have also been complaints that the restrictions Philips incorporated into its licensing agreement were barriers to progress in the cassette format. Would the immense changes that have taken place in the last ten years have been possible with more comprehensive standards? I tend to think not—not entirely, at least. Yet obviously standards are needed and, in some areas, even overdue.

This dichotomy between the radical and the conservative is a fascinating paradox. Extremism in either direction exacts a heavy toll; improvement and standardization inhibit each other, yet each is a necessity to a healthy and viable cassette medium. The industry must continue to try to write "perfect" standards, but while one hand is codifying the past the other must always be reaching for the future. **HF**