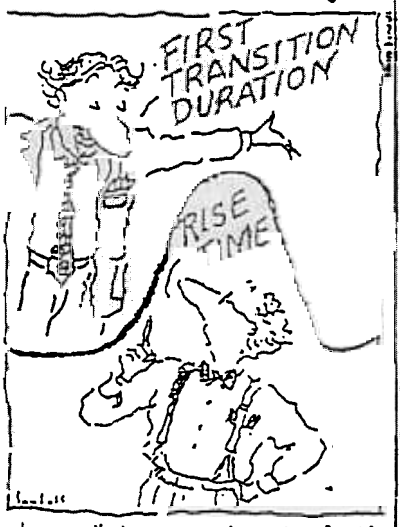
Technically speaking

Too accurate?

Sometimes the attempt to be accurate with engineering terms can fall on deaf ears. Such has been the case with *rise time* and *fall time*, terms that were purposely omitted because of this perceived lack of accuracy from the terminology for describing electrical pulses set out in 1977 in IEEE Standard 194. In their place, the standard anoints *first transition duration* and *last transition duration*, but little attention is being paid. *Rise time* and *fall time* remain in quite common use.

For example, none of the instruments made by Tektronix Inc., Beaverton, Ore., and Hewlett-Packard Co., Colorado Springs, Colo., makes use of the *transition duration* terms. The companies criticize the nomenclature as not being the way their customers talk. But recently, by a vote of the cognizant IEEE committee, the standard was amended to include the words in common use as alternatives, sort of.

Back in 1977, standards committee members concluded that *rise time* is ambiguous



when applied to a negative pulse. In this case, it could conceivably pertain to either the leading or trailing edge.

In contrast, *first transition* would clearly refer to the leading edge, and *last transition* to the trailing edge, whether the pulse were positive or negative. Furthermore, the committee reasoned that *time* in precise terms is a value at one point along a continuum, whereas the terms under consideration refer to a change in time or time interval; hence, the use of the word *duration* rather than *time*.

But even in engineering where, if anywhere, logic should prevail, the largely illogical matters of personal taste and familiarity enter in. Engineers are attached to *rise time* and *fall time* and are not about to give them up, according to informal surveys by Hewlett-Packard of its customers.

Both HP and Tektronix oscilloscopes read out pulse measurements as *rise time* whenever the transition is positive-going (even on the trailing edge of a negative pulse), and *fall time* whenever it is negative-going. It turns out the manufacturers also have logical reasons for using these terms. When automatic measurements are being taken, it may be difficult for the computer to differentiate between first transitions and last transitions.

More than unfamiliarity, the real objection to the standard terms is that they sound stilted and are awkward to say. Other terms in the standard contribute to this sentiment. *Proximal, mesial*, and *distal points* denote positions on the pulse nearest to, toward the middle, and farthest from the waveform baseline.

However, at least one of the instruments makers that prefers sticking with *rise time* and *fall time* has a product for the market that makes use of *proximal, mesial*, and *distal*. Stilted or not, this company obviously feels the terms contribute to a better understanding of what is being measured. That's not enough for one of its competitors, though, which declines to use these terms because, it says, its customers find the words too pedantic and pretentious for everyday use.

After debating the *rise time–fall time* issue—indeed, some members felt there was far too much discussion of what they regarded as a side issue and kept them from more important chores—the subcommittee on pulse techniques of the IEEE's TC-10 Waveform Measurement and Analysis Committee voted to include *rise time* and *fall time* as alternatives in the standard. However, it labeled the terms "deprecated." Translation: please don't use them.

The vote was 11 to 1, with one abstention. Said one member of the subcommittee: "We're trying to push people a little to get them to use more appropriate—and more accurate—terminology."

Another member, from an equipment maker, hoped the vote would put the issue to rest so the committee could get on to what he termed "real measurement issues." Besides, he said his company would continue to use *rise time* and *fall time*, deprecated or not, until its customer base told it otherwise.

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Can you understand this article?

Greg Cosimini, Master of Science in Electrical Engineering states, "It would take a couple of pages to translate paragraph one into everyday English to a non-Engineer. The reader would need to know:

1. What is an electrical pulse?

2. How is it normally represented or displayed?

3. How do engineers define rise time & fall time?

4. What do first transition duration and last transition duration mean to engineers?

5. That the point of the article is to compare the terms in 3 & 4.

6. That IEEE is the Institute of Electrical and Electronic Engineers and that they are the keeper of the standards.

To translate this to another language an interpreter would need to understand technical engineering terms.