BY STEVE LUBS • DEPARTMENT OF DEFENSE

The boss is always right, even when he's wrong

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In the early 1980s, I was working at a new division that built special-purpose modems. Our boxes were effective and efficient, working with well-known modulation, such as FSK (frequency-shift keying), BPSK (binary-phase-shift keying), and QPSK (quadrature-phase-shift keying). When an application required a different kind of signal, however, we ran into power and space limitations and other headaches.

My first assignment was to handle an unusual, high-data-rate signal. My boss, a 20-year analog-veteran designer, had decided to try digital processing. His protocol, however, was to use only his "tried-and-true" analog techniques in digital form—no "fancy programming" allowed. I sighed, studied previous equipment designs, and sketched several proposals. Then I hit the first of several roadblocks.

My boss and I argued about theory and my designs. When I asked questions about details in earlier boxes, he would lecture me as if I were a neophyte. After more design reviews than I can count on both hands, plus lectures, I finally had a completed system on my bench. The first test, as per my boss' protocol, was to input a square wave as data; the display output should be a single slowly rotating vector. My display output, unfortunately, included three vectors, and they weren't rotating slowly. He glanced at it and said, "Double-check your work."

So I spent the next three weeks double-checking wiring, schematics, clock signals, timing diagrams—anything that might be out of place. Finding nothing wrong, I triple-checked the schematics and replaced parts. The output remained the same. In desperation, I changed wiring and clock signals until the display showed only one vector rotating. Unfortunately, when I tried simulated data instead of a square wave, my new circuit produced only noise.

Frustrated, I begged one of my coworkers to help me. Studying the original design, he pointed out that it was working: My data-sampling clock was a noninteger multiple of the system clock, so the two clocks couldn't exactly synchronize—hence, the three rotating vectors.

My boss responded: "It doesn't work."

"Yes, it does," I countered. "It's doing what you—what we designed it to do."

His observation: "Too many errors in the output data."

"It'll work! It needs a faster sampling rate. We just multiply …"

But I was too late. He had decided that "digital" processing was a mistake and handed the project to a co-worker to do in analog form.

Two years later, Texas Instruments' first commercial DSP chip appeared. One of our new guys got to use it. He showed me how to replace several analog boards with one DSP board and some support ICs. I saw my original project and a few later ones implemented in software.

I have moved on, trying to keep an open mind. It's been difficult, with the deluge of new technology every year. Whenever I find myself slipping, I remember my old boss, spouting his tried-and-true philosophy, keeping me out of DSP and away from what is now a major part of electronic design. I hope I don't force anyone else into that scenario. EDN

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