I began with what I consider to be the two best tools in the toolbox: shut up and listen. Other systems of the same model and vintage were working fine; gleaning no clues from them, we moved on. A quick look revealed common-mode noise everywhere. Inserting bypass capacitors in selected places didn't help a bit. I checked other capacitors and grounds. Circuit grounds and other important connections were all in order, as well. This problem was going to be a tough one, but I reminded myself that I love working on tough problems.

Taking another look, I noted that someone had replaced a switching power supply that ran the system with another vendor’s model, but replacements did not always cause problems. One of the technicians had a lot of experience working on the systems in question and had noted a twofold problem with all of them: Whenever he installed the new board-mounted switching power supply, he had to mount it off the board so that he could get the power-supply case to connect to an aluminum heat-sink block to connect the power-supply heat to the chassis. He had to mount it low enough for the power-supply pins to fit through the PCB (printed-circuit board) where it was mounted. Given what sounded like maybe a tolerance clue or just another kind of headache, we decided to take a closer look.

The OEM-provided potted power supply was in a five-sided metal case; the potted side was next to the power supply's PCB right against the traces that ran underneath the bottom of what looked like the unshielded side of the power supply. Seeing this setup gave me an idea. After quickly grabbing a couple ferrite slabs from some of our ferrite planar-transformer parts’ stock, I asked the technicians to move the power supply off the PCB but to keep it connected properly. Slipping the two ferrite slabs into the open space provided enough attenuation to the radiated B field to clean up all the common-mode noise that had been coupling into the PCB's traces from under the power supply. We had to change the aluminum heat-conduction block in one dimension to make a good power-supply-to-chassis thermal connection, but we had cracked this tough nut of a problem, without a hammer, and we were done.

With a team effort—listening first, using our technical skills second, and “egos grounded” third—we quickly made the problem history.