incorrect information is now eliminated. The problem of an employee transposing a digit or three in a serial number, or part number, is gone. One major headache cleared. Of course, the company *must* install and work the bugs out of a bar code reader system, but that is small potatoes for what's at risk. Just think, each $100,000 module that is not lost will amply pay for a bar code reader system.

c. Servers. On a daily basis all computer files must be updated and transferred to a company server. This is really a no brainer! Put your information in multiple locations and if one location is corrupted or destroyed, the other locations back it up! It is also a fairly easy thing for your company's IT department to do.

d. Training. Yes, an ugly subject in today's "Squeeze the penny until Lincoln screams in pain" philosophy. The person who is the SME in inventory and shipping needs to be trained. Luckily, this is relatively inexpensive. There are lots of free materials, tapes, and information modules out there.

e. Shipping materials. This is an often overlooked area or one that is ignored and cut from funding. It is also an area that has a direct bottom line impact. Let's say you have done everything correctly. All the records are complete and accessible. Your inventory SME can answer instantly as to where the package is, when it was shipped, serial numbers, part numbers, etc. But, a $100,000 part was put into a fertilizer box picked up from Wal-mart, packed with crumpled paper from the wastebasket, and held together with Scotch tape from someone's desk. (I have seen the remains of this exact example.) You must have the strong boxes, ESD envelopes, fiber tape, correct packing and cushioning material, and other shipping material to protect your module during shipment. Do you really want to replace another module because the good one you shipped arrived broken?

IF YOU DO ALL THIS, will you never lose a module or have one broken? Of course not! But the bottom line is that you will save huge amounts of dollars that are in short supply. And you will have a lot more dollars to spend in other areas of your company. You may even avoid laying off some of those valuable employees this year. Ω

Tom Stokes lives in Pleasant Hill, Missouri and has been a NARTE Senior Member since 1995. He has a Master Endorsement in Non-RF and a Master Endorsement in RF.

EMC Viewpoint

For NARTE Members Only

by Louis T. Gnecco, MSEE, NCE

Hearing Aids and Cell Phones: A Tough EMC Problem

About ten years ago the FCC decreed that, by January 1, 2000, all hearing aids were to be made completely resistant to the electromagnetic interference produced by cell phones.

The problems were substantial, partly because hearing aids are much more than just audio amplifiers.

Hearing losses are frequency dependent. The dispenser must be able to tailor the amplification to each patient's unique function of hearing loss vs. frequency. The design problem is like stuffing a stereo's graphic equalizer into a hearing aid.

Many patients also have an unusual sensitivity to sounds. They can't hear soft sounds, but normal sounds are painful. They need automatic gain control or a compression amplifier to keep things from getting too loud. So each patient needs a fancy, specially tailored amplifier. In addition, the aid must work in a small, hot, humid environment (the ear) in all kinds of weather, with little maintenance and lots of abuse. It has to be small, economical, and repairable.

Enter cell phones, which play havoc with hearing aids. They transmit at UHF, with their antennas often within an inch of the hearing aid. The hearing aid's circuits get subjected to most of the radiated power. This causes a variety of problems, and some are very subtle. It takes a trained hearing aid dispenser with normal hearing to detect them.

The problem is not limited to the "buzzing" noise sometimes heard when a cell phone is put near to a hearing aid. Circuits get saturated, and the device temporarily stops working properly. The patient misses sounds and doesn't even know it. With little or no in-house EMC capability, some hearing aid manufacturers optimistically announced that they would solve this problem with "a chip," that is, by signal processing. This never happened either. The problem was too pervasive, and the signal levels too strong.

I had the opportunity to work on this problem early on. It was tough but it was fun. I learned a lot. Working with BETTER HEARING INC., several years ago we developed the world's first (and to this day, the world's only) fully cell phone compatible hearing aids. They were demonstrated widely, patented, and FDA-approved. They worked well.

The technology for building cell phone compatible hearing aids is covered by US patents # 5.640,457 and 6,031,923 and 6,456,109. I think this will someday be a lucrative field for NARTE Certified EMC engineers. For more information, send an email. I will be happy to reply to NARTE MEMBERS ONLY.

Regards,
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Reference (a): Mark J. Sanford. "A Solution To Cell Phone Use For Non-Telecoil Equipped Hearing Aids." *THE HEARING REVIEW* May 2003. Page 54.
See: http://www.hearingreview.com/Articles.ASP?articleid=H0305F08

This column presents the author's personal views, and not NARTE policy. Comments and dissenting opinions are encouraged. This is how we learn from each other.