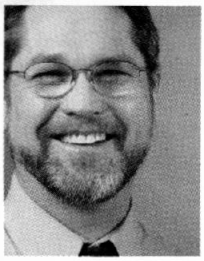

BY HOWARD JOHNSON, PhD

Aunt Judy: Beware relatives' repairs

Old Aunt Judy approaches you at a wedding reception and, with a halting voice, says, "You know about computers, right? Well, I've got this old eight-track-tape player [or black-and-white television, turntable, or whatever], and it isn't working too well any more. Can you take a look?"

Ridiculous? Yes, but try explaining to her the difference between the high-speed-digital miracles you create at work and the old, transistorized audio anachronism she wants you to fix. You can't. And you don't really want to. Aunt Judy expressed confidence in your abilities, and this is not the time to let her down. Fortunately, I am here to give you some tips. I have a lot of experience in this area. (I have a lot of relatives.)

Rule 1: Unless you have nerves of steel, do the work at home, alone, and away from the supplicant. Take your time.

Rule 2: I know it is difficult, especially with "snap-together"-style plastic cases, but try not to break the case during disassembly. Keep some superglue handy. It must be fresh. I keep mine in the refrigerator. For most plastics, I like the kind of cyanoacrylate glue—typically sold under trademarks such as Superglue and Krazy Glue—that comes with a glue activator.

Rule 3: Don't lose any parts. Sweep the floor *before* you start work. I work on a table top made of white-board material. I write a note by each little pile of screws that says where they go, and I tape the screws to the table top. Plastic bags and baby-food jars work just as well.

Rule 4: Take pictures with a digital camera. You will later thank yourself if putting the product back together becomes confusing.

Rule 5: Test one small section of the product at a time. This step usually requires a signal source to stimulate each section and a detector to observe its output. When working on audio products, for example, I use a small voice recorder as the signal source and a sensitive pair of headphones, with a preamplifier if necessary, as a detector. If you have an ac-coupled headphone, you can use it to "listen" to hum on the dc-power rails.

Rule 6: Cheat. If the product was once popular, you can probably find the schematics for it online. This rule has a subrule: Never promise a fix date. You need time to find those schematics, advice, or whatever.

Rule 7: Buy a replacement on eBay. *Do not give Aunt Judy the replacement,* because she will know that it isn't hers. The new one will have scratches in different places. Just use the replacement as a benchmark, comparing the broken set against the original in every particular. The replacement also gives you a source of spare parts. When you are done, throw it away. You are not building an economically efficient repair business here, just saving some face—and, possibly, impressing your cute cousin.

Rule 8: In older transistorized products, the problem likely involves conductive dirt, corroded connectors, or a power-supply malfunction—that is, unless someone has dropped or spilled milk into the product. So, blow out the dust with a can of compressed air, scrub the board with a cleaner from CRC Electronics (www.crcelectronics.com), polish all the connections, and check the power supplies. Those steps will fix 90% of your problems. For the other 10%, you can go on the Web to buy replacement drive belts and needles for any turntable. And plenty of people still sell old CRTs, and, yes, you can still buy eight-track tapes.

Rule 9: To solve a power-supply problem, first substitute a good external supply. If the PCB (printed-circuit board) does not indicate the correct dc-supply voltage, then set your external voltage at approximately 60 to 80% of the rating printed on the bypass capacitors in the circuit. By the way, old capacitors become highly unreliable as they age. Some people just replace them all as a precautionary step.

Rule 10: Never accept Aunt Judy's money. Doing so will lock you into a lifetime of repair work with your whole family. Instead, trade her for something she's really good at—like baking cherry pies. EDN

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