

Make mine melamine

Brad Thompson, Contributing Technical Editor brad@tmworld.com- December 1, 2008



Long-time readers of this column may recall that I serve as a volunteer at WinCycle.org, a nonprofit computer-recycling center. When possible, we refurbish PCs for reuse by other nonprofit organizations and to provide operating revenue. One recent arrival from a local business contained a shipment of several hundred HP Compaq d530SFF desktop PCs, some of which exhibit an interesting and spectacular failure mode.

[E-mail](#)

When the fault occurs, a soldered-in AC line fuse doesn't always open.

Applying AC power by plugging in the power cord produces a muted “pop” and a flash of light, followed by the release of a small puff of smoke—all originating from the PC's power-supply subassembly. Removing the power supply's cover reveals several severely damaged components.

In an effort to learn more about the failure mode and label codes that might reveal affected manufacturing lots, WinCycle's CTO contacted Compaq's (now Hewlett-Packard's) online technical support service. Repeated and escalated message exchanges garnered no information, except for denial that the problem exists.

The power supply's construction comprises discrete through-hole components mounted on single-sided printed-circuit boards. A sheet-metal enclosure protects the assembly, and a small fan provides cooling (and smoke) dispersal. The power supply's label bears several safety-agency approval and recognition symbols.



The power supply's Chinese manufacturer applied generous amounts of an eggshell-colored and porous sealant to stabilize components mounted on the circuit board. The sealant darkens with exposure to heat and time. It also becomes conductive, creating multiple sneak paths among components. Inserting an ohmmeter's prods in random globs of sealant shows resistances in the 1-to-10-M Ω range. That's enough to inject small amounts of AC into the primary-side switching components and cause uncontrolled circuit activity.

We've reverse-engineered portions of the power-supply circuitry and determined that Revision B (or higher) power supplies contain a white sealant that's presumably nonconductive. To date, these power supplies haven't exhibited the failure mode.

What's in the conductive sealant? Given recent news reports about contaminated Chinese medicine and milk, my guess is melamine. What's yours?

Make mine melamine, part 2

Brad Thompson, Contributing Technical Editor brad@tmworld.com- February 1, 2009

I received several replies to "[Make mine melamine](#)" ("Test Voices," December 2008/January 2009). A reader who maintains broadcast equipment offers the following comment:

"Search for conductive brown glue and see what we have been fighting for years. Whenever I fix something electronic, that glue becomes the first suspect.... Sony Broadcast VTRs used this glue under passive low-pass video filters that often malfunctioned. After replacing a few filters at \$300 each, I investigated and found the glue was conductive. Removing the glue fixed the problems. The filters were never defective. A Sony tech bulletin described it as "chloroprene glue," but who knows what else was in it."

Another reader commented, "I briefly worked at a computer case company in Taiwan near the end of 1997. At that time, case vendors—basically metal stamping operators—added value by including a power supply (PS) in each case.... Since the metal stampers had no electrical knowledge, they'd just buy any PS from one of their friends without providing specifications or performing incoming QC testing. This led to quite a few product returns to the US office, which cost a lot of money...."



A Google search for "conductive brown glue" finds more than 100,000 references, some of which mention the glue's role in various CRT display problems and its use in consumer audio equipment. Searching for "chloroprene adhesive," Google finds 56,000 references, including one from a Sony division that contains the following cautionary note: "The products...contain chloroprene rubber.... Prolonged standing in a high-temperature environment...may cause thermal dechlorination, possibly resulting in the corrosion of metal parts nearby, or in a loss of insulation resistance. Please be sure to avoid any use of these materials in electronic components that are to be energized electrically to prevent tracking or similar problems."

As the second reader suggests, given informal procurement processes, it's possible that a subcontractor used inferior glue to attach components. An archived e-mail note conjectures that "...The plain gummy petroleum glue is ok over time, but [there's] a problem with a filler/bulking agent used. I agree that it goes brown with age, [so] perhaps it's a corn flour or vegetative starch filler. I doubt a mineral [filler] like talcum or French chalk would discolor to a very dark brown or become a problem...."

So the filler might yet be melamine.