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Inside a 1990s Circuit Board: A Practical Look at RoHS Compliance in Modern Electronics

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In these notes I wanted to share something that often goes unnoticed when restoring or examining older electronic devices: the presence of hazardous substances on circuit boards produced before RoHS existed. I recently opened a small FM receiver module from the early 1990s. At first glance, it looked perfectly normal — resin-coated PCB, tin-lead solder joints, and a simple RF front-end. But as I worked on it, I was reminded how different today's electronics are, especially because of RoHS rules.

RoHS (Restriction of Hazardous Substances) has become one of the most influential regulations in the electronics world, and restoring older equipment is a good way to appreciate its importance. Before the mid-2000s, it was normal to find lead-based solders, chromium-treated metal casings, and plastic components containing brominated flame retardants. All of this made manufacturing easy, but it also meant that disposing of these devices could release chemicals that linger in the environment for decades.

Indice

The receiver module

The module I worked on is small, with a classic green fiberglass PCB and tin-lead solder joints that are still in surprisingly good condition. The shielding box, instead of aluminium, is a thin metal sheet treated with a chromate layer — something that RoHS would immediately classify as restricted due to hexavalent chromium. The wiring insulation has yellowed over time, probably because of brominated additives in the PVC jacket.

Even the smell that comes from heating the solder with a modern iron is different. Leaded solder melts beautifully, but it also reminds you why RoHS was created: massive amounts of lead were entering landfills every year through discarded electronics.

The internal structure

The circuitry is simple: one RF transistor, a ceramic resonator, a small variable capacitor, and a handful of resistors with thick leads. While the overall structure is still sturdy, modern components are very different. Today, resistors and capacitors with similar values are manufactured with RoHS-compliant materials, avoiding cadmium-based resistive films and switching to lead-free solders.

The metal frame of the tuning knob is another pre-RoHS giveaway. It has a plating that looks like chromium, and slight green corrosion around the edges hints at chemical instability after long-term exposure to humidity.

Why RoHS changed the design of electronics

When comparing this module with even a low-cost device produced today, the differences are immediately visible. Lead-free solder has a slightly duller look. Connectors now avoid cadmium and chromium compounds. Printed circuit boards use halogen-free laminates in many cases. Even power supplies have undergone redesigns to eliminate mercury and reduce hazardous flame retardants.

These changes did not happen overnight. When RoHS first took effect in 2006, many manufacturers complained about reliability issues with lead-free solder. Cracked joints and early failures were common. Over the years, however, solder formulations improved, flux chemistry evolved, and PCB manufacturers adapted. The result is today's electronics — safer for the environment, easier to recycle, and more compliant with international norms.

Practical comparison during restoration

While working on the receiver module, I replaced a few corroded wires with modern, RoHS-compliant ones. They are more flexible, they don't release the same odor when heated, and they have far fewer additives. I also substituted one electrolytic capacitor that had leaked; modern capacitors avoid substances that were common in older chemical compositions.

When checking the solder joints under magnification, the contrast was clear — old, shiny tin-lead next to newer, slightly grainy lead-free solder. Both work, but only one aligns with today's safety requirements.

Things to check in RoHS-sensitive restorations

If you're working on similar older devices, here are observations worth noting:

- Plating on metal frames may contain chromium compounds older solders almost always contain high lead percentages plastics may include brominated flame retardants pigments in older components sometimes contain cadmium electrolytic capacitors may use outdated formulations.* These are harmless during simple restoration, but important from a waste-management perspective.

Final conclusions

Restoring old electronics always feels like stepping back into a different engineering era. Components were larger, materials were more forgiving, and regulations were minimal. But today, RoHS shapes everything — from the solder on a PCB to the pigments in a connector.

This small FM module works perfectly again, but it is also a reminder that electronics produced today leave a much cleaner footprint than the devices of previous decades. RoHS testing didn't just change manufacturing; it changed how we think about the life cycle of every circuit we build, repair, or discard.

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