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TECHNICAL BULLETIN

#182

EPROM ERASING ON PRINTED CIRCUIT BOARDS

An increasing number of UV-erasable PROM's are being erased while still mounted on the microcomputer board. As a result, there is growing concern about the effect of the high-intensity short wave ultraviolet (254nm) on the other components.

DETERIORATION CAUSED BY ULTRAVIOLET

It is known that many plastics and various natural and synthetic rubbers undergo rapid deterioration in the presence of ultraviolet. Many of these materials are present in the form of component coatings, color codes, insulation and the board itself. Usually, the result is embrittlement and subsequent cracking. Some materials have been formulated to minimize or eliminate these problems, but in any situation there may exist an unknown combination of sensitive and nonsensitive materials.

“WEATHERING” TESTS INSUFFICIENT

Many coloring materials and binders are sensitive to short wave ultraviolet, yet the usual “weathering” tests conducted by the components manufacturers may not have indicated any problem because the light source more or less resembles the spectral distribution of solar radiation to the earth's surface. However, the most damaging ultraviolet to materials is generally that of wavelengths shorter than 290nm, which is completely absent in natural or simulated sunlight. Attempts to extrapolate data obtained at wavelengths longer than 290nm can be erroneous in the majority of cases.

Synergistic environmental effects also occur at some wavelengths. The energy is often capable of disrupting chemical bonds and changing the color, physical form and reactivity of the material. Polymers suffer fragmentation and a decrease in the degree of polymerization, leading to the production of new chromophores and a consequent yellowing or browning. Newly formed reactive radical species can initiate secondary photochemical processes, sometimes leading to the evolution of gaseous species. The initial ultraviolet sensitivity is variably enhanced by the presence of impurities introduced during synthesis, processing and/or storage and any catalyst residues.

Very few investigations have been carried out on ultraviolet effects on electronic components but cosmetic effects have been noticed on some components after 24 hours of exposure to about 15,000 $\mu\text{W}/\text{cm}^2$ of 254nm radiation. These effects took the form of fading colors and the production of brown marks.

MASKING THE BOARD

Because of the multitude of component and material sources, the board should be masked to protect all possibly sensitive components while erasing the EPROM's. The mask can be constructed of cardboard or some other material that would be easy to cut out.

PROPER ERASING EQUIPMENT NECESSARY

Finally, one must consider the UV-erasing equipment capable of erasing board-mounted EPROM's. The eraser must be large enough and deep enough to accommodate the board; the UV source must have sufficient intensity to erase EPROM's quickly and completely; and the equipment must erase the EPROM's safely without exposing the operator to hazardous ultraviolet radiation. Also, the equipment should have a timer for automatic unit shut-off to minimize unnecessary exposure.

For complete information on Spectroline® EPROM erasing systems, write or call Spectronics Corporation and request the brochure entitled “High-Volume UV EPROM Erasing Cabinets.”