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NASA TECH BRIEF

Encapsulation Technique Eliminates Thermal Stresses in Welded Electronic Modules

The problem:

High stresses occur in encapsulated electronic components and welds which are subjected to temperature extremes.

The solution:

Apply first a coating of a thinned room-temperature-vulcanizing (RTV) silicone rubber having a high coefficient of expansion and the ability to remain flexible at extremely low temperatures and then an encapsulating epoxy resin having a relatively low coefficient of expansion (compared to other epoxies) as the encapsulating material. Thus, as the temperature decreases, the faster-shrinking RTV silicone rubber tends to provide room for the slower shrinking epoxy resin as it cools, and thus prevents possible damage to the components during temperature cycling. The RTV rubber is in a thin layer (0.002 inch) so that it does not create excessive stresses in the components. This encapsulation technique will minimize embedment and thermal stresses in welded electronic modules over the temperature range of $-200°$ to $+200°$F.

Note:

A transducer for measuring embedment and thermal stresses in welded electronic modules is described in Tech Brief 67-10367. Inquiries may also be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Huntsville, Alabama 35812
Reference: B68-10307

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

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Category 01