November 1969

Brief 69-10615

NASA TECH BRIEF

Design of Multilayer Insulation Systems

The problem:

To design a multilayer insulation system for spacecraft application which can operate at temperatures in the 300° to 700°K range.

The solution:

Develop analytical models of insulation system heat transfer to study the types of materials best suited for a near-solar environment, and confirm the models with experimental investigations.

How it's done:

Computer programs were developed to study various materials which might meet the requirements of thermally anisotropic, multilayer insulation systems. These programs were designed to include assessment of heat leaks through the insulation layers due to penetration by struts, joints, circular ports or booms. Consideration was also given to different values for conductivity in two different directions for the multilayers (anisotropic) conditions. Experimental investigations were conducted to verify the analytical models and to provide insulation thermal performance data.

Notes:

1. Results of these studies indicate the most desirable materials to be used for the 300° to 700°K range, are metallized polyimide film for the reflective shields and submicron-size glass fiber paper for the spacer.
2. The following documentation may be obtained from:

   The Clearinghouse for Federal Scientific and Technical Information
   Springfield, Virginia 22151
   Single document price $3.00
   (or microfiche $0.65)

   Reference: NASA CR-907 (N67-39508), Performances of Multilayer Insulation Systems for Temperatures to 700°K.

Patent status:

No patent action is contemplated by NASA.

Source: G. R. Cunnington, Jr. of
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under contract to
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(ARC-10166)

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