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NASA TECH BRIEF

Lewis Research Center

Analysis and Design of a Flat Central Finned-Tube Radiator

An analysis of a flat, direct-condensing central finned-tube radiator rejecting heat from both sides enabled the design of space radiators to meet minimum weight and geometric requirements. Two electronic digital computer programs were developed for the analysis. The first program is based on a fixed conductance parameter and yields a minimum weight design. The second employs a variable conductance parameter and variable ratio of fin length to tube outside radius, and can be used for radiator designs that have geometric limitations. Both programs consider a Rankine thermodynamic cycle, vapor and liquid headers, pressure drop in the radiator tubes and headers, meteoroid protection for the tubes and headers, radial temperature drop in the tube wall, and fin and tube radiant interchange in the development of the descriptive equations.

Major outputs of the two programs include: tube length, number of tubes, radiator aspect ratio, radiator weight, fin length and thickness, specific-heat-rejection rate, and header geometry. These outputs are based on the choice of input variables such as tube inside diameter, temperature and power levels, fin and armor materials, prescribed pressure drops in tubes and headers, mission time, probability of no punctures by meteoroids, and radiator-header-panel configuration.

Notes:

1. This program is written in FORTRAN IV for use on the IBM 7094 computer.
2. Requests for further information may be directed to:

   COSMIC
   112 Barrow Hall
   University of Georgia
   Athens, Georgia 30601
   Reference: B71-10399

Patent status:

No patent action is contemplated by NASA.

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