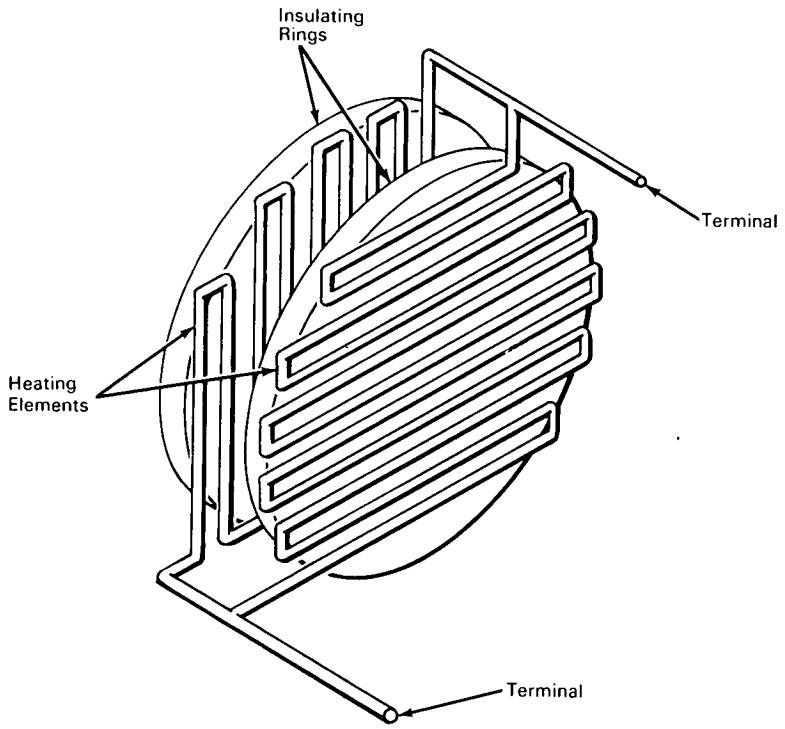
August 1965

Aso 311

Brief 65-10224

NASA TECH BRIEF

Heater Decomposes Oil Backstreaming from High-Vacuum Pumps



The problem: To prevent oil molecules from reaching the work area of a vacuum chamber by backstreaming from an oil diffusion pump. Previous methods employed cryogenic baffles that were not 100% efficient and these imposed additional load on the vacuum pump. Even a minute amount of oil in the work area can adversely affect delicate electronic or optical work.

The solution: A heater placed between the pump and the vacuum chamber breaks backstreaming oil molecules into basic constituents, that can be pumped away.

How it's done: The heater is formed by threading a continuous nichrome wire through two high-temperature insulating rings and positioning the rings so the installed wires are perpendicular to each other, effectively forming a grid pattern. The heater is placed at the intake to the pump in the air stream. A current of 10 amperes at 200 volts is applied to the heater elements bringing them to a cherry red at a temperature

(continued overleaf)

of approximately 900°C. Oil molecules coming in contact with this thermal barrier will decompose into their basic constituents and be rendered harmless. A tetraphenyltetramethyltrisiloxane oil widely used in diffusion pumping can be expected to reduce to methane, carbon oxides, water vapor, and silicons. These products can be either pumped away or allowed to remain in the vacuum chamber since they are all harmless in most vacuum experiments.

Notes:

1. This device does away with the need for cryotrapping with liquid nitrogen, previously employed at great expense.
2. This invention, interposing only a few thin wires into the air stream, leaves rated pumping speeds relatively unchanged.
3. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Goddard Space Flight Center
   Greenbelt, Maryland, 20771
   Reference: B65-10224

Patent status: NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

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