

# NASA TECH BRIEF

## NASA Pasadena Office



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### Radial Heat Flux Transformer

A radial heat flux transformer employs heat-pipe principles (evaporation-condensation cycle) to move heat radially. Previously, common practice

The concentric inner and outer cylinders and the planar screen wafers are arranged as shown in the figure.

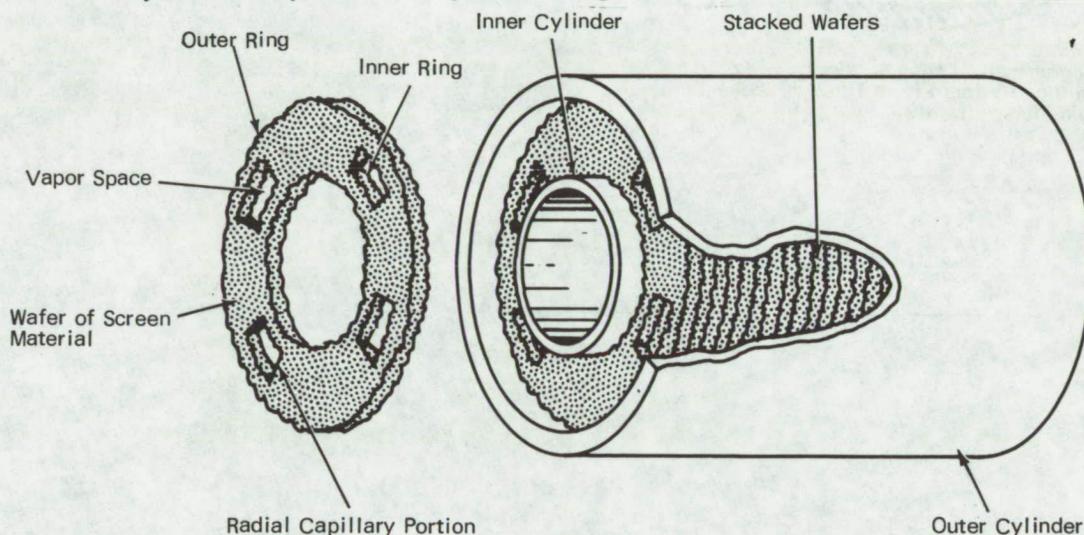


Figure 1. Radial Heat-Flux Transformer Partially Exploded

employed heat pipe principles to deliver heat by establishing a flux field extending longitudinally, with radial delivery being merely incidental to heat pipe operation.

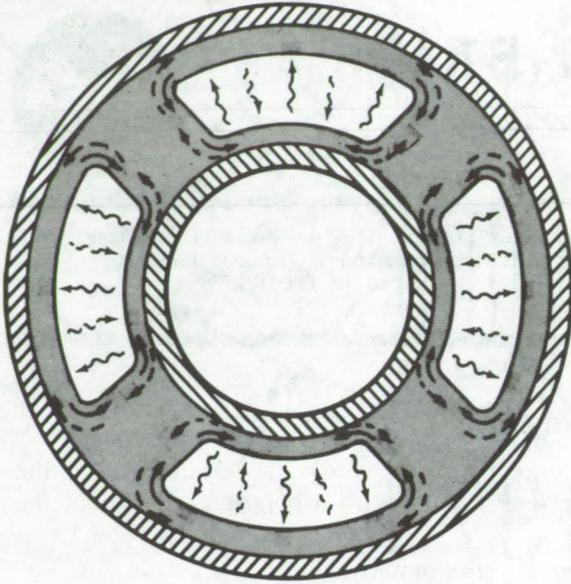
In the new unit, heat is moved radially from a small diameter shell to a larger diameter shell, or vice versa, with negligible temperature drop, making the device useful wherever heating or cooling of concentrically arranged materials, substances, and structures is desired.

The transformer employs registered wafers which act as a wick to provide radially extended bundles of capillary channels and interposed vapor spaces.

The premeasured amount of working fluid within the transformer is not too critical, but it must be sufficient to completely saturate the capillary channels. The fluid is deposited in the interstices of the wafers, and, during transformer operation, is displaced through the capillary channels from the cooled to the heated surfaces by capillary action. When the transformer is functioning as a radiator, the working fluid progresses in liquid form between the inner and outer cylinders through the capillary radial portions, and is returned in vapor form through the vapor spaces.

(continued overleaf)

Radiator Flows ← wavy line  
Flux-Concentrator Flows → dashed line



**Note:**

Requests for further information may be directed to:

Technology Utilization Officer  
NASA Pasadena Office  
4800 Oak Grove Drive  
Pasadena, California 91103  
Reference: B71-10311

**Patent status:**

This invention is owned by NASA, and a patent application has been filed. Royalty-free nonexclusive licenses for its commercial use will be granted by NASA.

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Figure 2. Diagrammatic Cross Section:  
Fluid and Vapor Flows Through Spokes and  
Voids Respectively