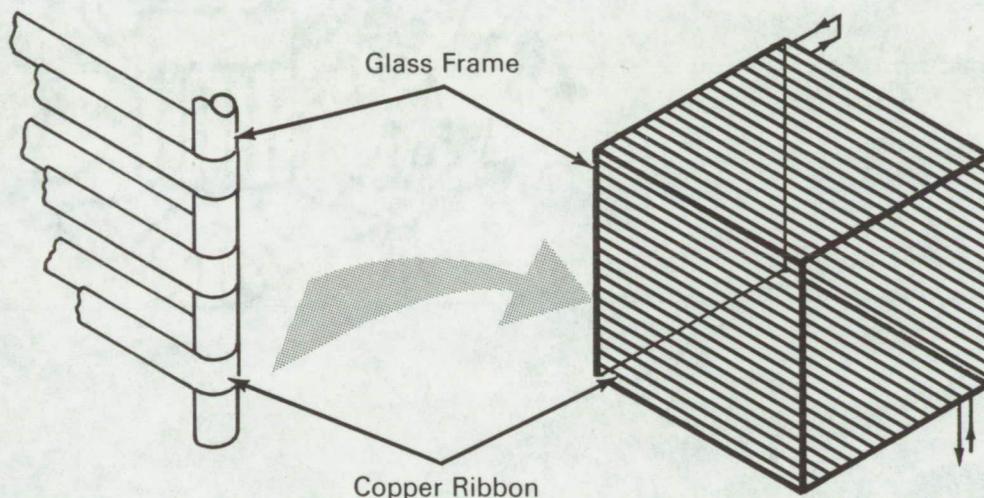


# NASA TECH BRIEF



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## Fast-Acting Calorimeter Measures Heat Output of Plasma Gun Accelerator



A calorimeter has been developed to measure the exhaust energy from a single shot of a pulsed plasma gun accelerator. It is especially suitable for use where the energy per pulse does not exceed 100 joules. The calorimeter has a fast response time, and only one measurement is required to determine the total incident energy. Calibration, including a determination of radiation losses, is simple and direct. The calorimeter consists of a long narrow ribbon of copper foil wound continuously around a glass frame to form a reentrant cavity.

The plasma heats the copper ribbon and changes its ohmic resistance as a discrete function of the total energy incident on the ribbon, independently of the local energy density. The resistance change, typically of the order of  $10^{-2}$  ohm per joule of incident energy, is measured with a Wheatstone bridge circuit. The time resolution of this type of calorimeter is determined primarily by the thickness of the ribbon, and

can be of the order of tens of microseconds. Consequently, measurements can be made before significant radiation losses can occur.

### Notes:

1. The calorimeter can be made in sections if local energy density measurements are required.
2. This type of calorimeter should be generally useful for measurement of transient, high-energy heat fluxes.
3. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer  
Lewis Research Center  
21000 Brookpark Road  
Cleveland, Ohio 44135  
Reference: B67-10192

(continued overleaf)

or to:

New Technology Representative  
General Dynamics/Convair Division  
Mail Zone 103-19  
5001 Kearny Villa Road  
San Diego, California 92112  
Reference: B67-10192

**Patent status:**

No patent action is contemplated by NASA.

Source: A. V. Larson, L. Liebing,  
and R. Dethlefsen  
of General Dynamics/Convair Division  
under contract to  
Lewis Research Center  
(Lewis-388)