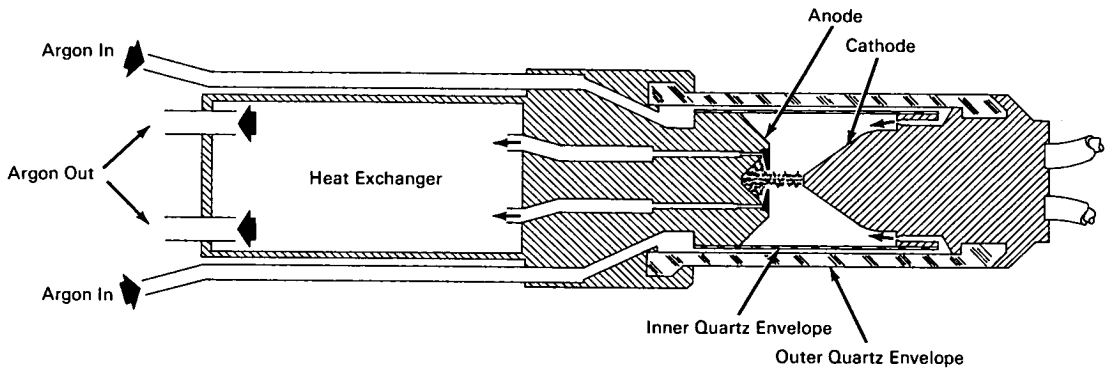
NASA TECH BRIEF

High Intensity Radiation Heat Source Is Capable of Sustained Operation



The problem:

To develop a high intensity radiation source to be used in the evaluation of ablative materials under simulated conditions of high velocity entry into planetary atmospheres. The source must be capable of cyclic operation at maximum power for an extended period of time with high reliability. Available sources were not capable of supplying the required radiant power output.

The solution:

A water cooled, high intensity radiation source rated at 125 kw, with an efficiency of 31 to 34 percent.

How it's done:

The radiation source is a direct current device in which the arc plasma is created in an atmosphere of argon gas between a copper cathode with a tungsten tip and a copper anode with a molybdenum ring diffuser. The envelope or enclosure through which the radiation is transmitted is two concentric quartz cylinders. The inner cylinder serves as a heat shield for the outer cylinder, which is the pressure container for the source.

The argon gas in which the arc operates enters at the anode end and passes from the anode electrode through the annulus between the two quartz cylinders into a gas vortex generator at the cathode end. The gas then passes through the diffuser into the anode, from which it is collected and recirculated through cooling coils back to the source. In passing through the annulus between the cylinders, the gas acts as a coolant to the outer quartz cylinder.

Notes:

1. The source can be operated using any dc power supply capable of 1500 amperes at 100 volts. It requires a high voltage rf power supply for starting.
2. The source can operate repeatedly at maximum rated power for periods of 10 to 20 minutes. At lower power inputs it has been operated continuously for periods as long as two hours.
3. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Ames Research Center
   Moffett Field, California 94035
   Reference: B66-10547

(continued overleaf)

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D. C. 20546.

Source: W. A. Geideman and K. Muller
of Textron Electronics Inc.,
under contract to
Ames Research Center
(ARC-61)