October 1967

Brief 67-10388

NASA TECH BRIEF

Modified Blackbody Device Emits High-Density Radiation

The problem:

To calibrate radiometers used for spectrometric analysis of large rocket engine plumes, a high-energy-density (250 watts/cm^2) radiant source capable of precise control was required.

The solution:

A 2-inch-aperture, 100 watt/cm^2 blackbody radiation source, fabricated according to U.S. Patent 3,205,343, was modified to provide the required radiation energy level.

How it's done:

The graphite heating element was removed from the assembly and replaced with a new graphite element of substantially reduced electrical cross section. The rest of the electrical system was not disturbed. Two additional concentric radiation shields, fabricated from polished tantalum sheet, were installed inside the existing shields to accommodate the higher operating temperature of the new element. Machined copper adapter plates were added to support the smaller heating element from the cooled housing. A 1-inch-diameter viewing aperture was added to the outer adapter for optical access to the radiating volume in the heater element.

The heater element is ported to permit the radiating volume and viewing aperture to be swept with an inert gas during operation and cooldown of the heating element, as it degrades rapidly under exposure to normal atmosphere while at elevated temperature. The cooling system for the housing was left in the original configuration, as the total power level of the device remained at its original value.

Notes:

1. The modified device provides a versatile, precisely controllable source of blackbody radiation for calibration or evaluation of several types of radiometers over an extended energy-density range.
2. Inquiries concerning this device may be directed to:

   Technology Utilization Officer
   Marshall Space Flight Center
   Huntsville, Alabama 35812
   Reference: B67-10388

Patent status:

No patent action is contemplated by NASA.

Source: P. E. Schumacher
of North American Aviation, Inc.
under contract to
Marshall Space Flight Center

(MFS-12744)

Category 02