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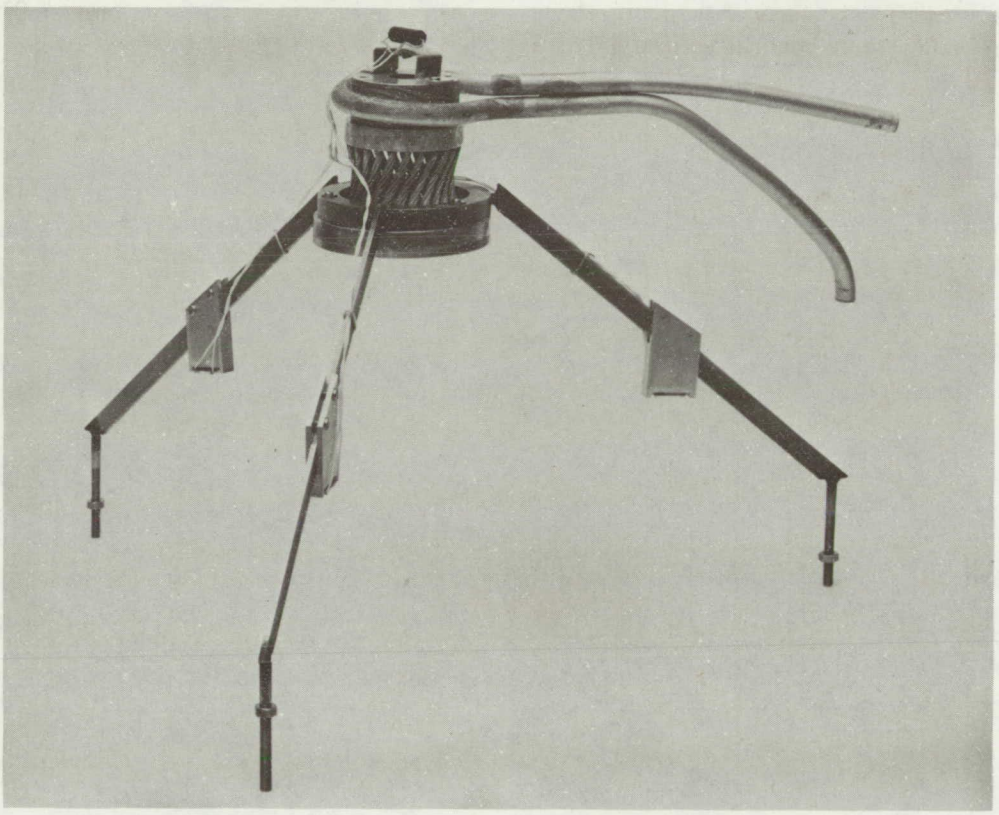
Brief 68-10399

NASA TECH BRIEF

Automatic Solar Lamp Intensity Control System



The problem:

In operating a solar simulation system within a thermal vacuum chamber, it is desirable to closely control the light sources in order to provide uniform and precise irradiation of the test volume. Previous systems used cadmium sulfide cells (one per lamp) as sensors, viewing only reflected light and, therefore, nonresponsive to changes occurring in the optical train. Also used was an a.c. bridge-null for each lamp control circuit with a common a.c. reference highly susceptible to interaction.

The solution:

A system that substitutes solar cells directly in the path of the radiation incident on the test volume and uses a d.c. bridge-null system.

How it's done:

A solar cell is affixed to a heat sink mounted on each of three arms for each solar lamp. The three cells

(continued overleaf)

are connected in parallel across a precision, low temperature coefficient, one ohm resistor mounted under the hyperbola. Each solar cell is so positioned that the typically hot and cooler areas of lamp intensity are monitored.

Output of the combined detectors for each lamp is fed through a potentiometer to the input of a control amplifier, the potentiometer being used to normalize the outputs of all detectors. An adjustable bias opposing solar cell input is also applied to the control amplifier. At the desired solar lamp radiation, this bias causes the net solar cell current to "null" the needle of a contact meter. Adjustable limits about the "null" position in the contact meter are positioned to form the desired control bandwidth. When the needle passes either high or low limit from "null", the limit contacts are energized. The contacts of the limit relay energize a control relay whose contacts actuate a lead screw drive motor to move a transformer core in the solar lamp power supply to change input power to the lamp to restore the preset radiation level. Control of the radiation from the 127 solar lamps is automatic.

Note:

Inquiries concerning this innovation may be directed to:

Technology Utilization Officer
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Reference: B68-10399

Patent status:

No patent action is contemplated by NASA.

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