NASA TECH BRIEF

A Prototype High Power Portable Lamp

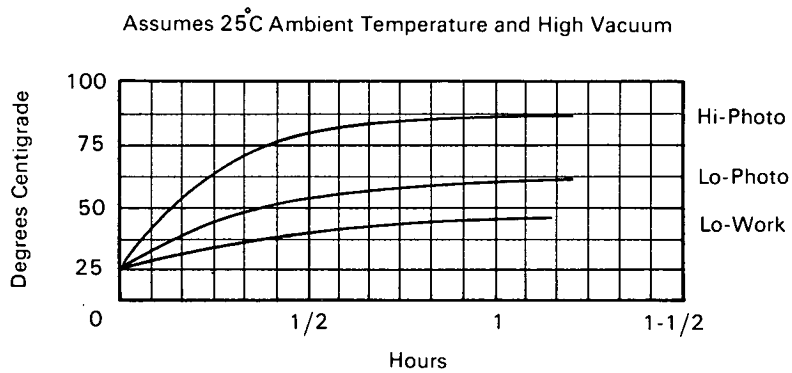

Fig. 1. Work-Photo Light Calculated Average Surface Temperature VS Time.

A portable lighting system has been constructed to serve the combined work and photographic needs of manned spacecraft efforts. While developed to meet the particular requirements of a space environment, some features of the prototype system may provide solutions to technical problems encountered in commercial systems. For example, photographers who have watched, under lights, make-up drip from the faces of their subjects will appreciate the system's "strobe" circuit. This circuit enables the lamps to be momentarily brightened while the camera shutter is opened. The momentary brightness is adequate for either black and white or color photography and yet the resulting increase in average heat load is nil.

The nine-pound prototype assembly consists of two identical light panels hinged to a central enclosure. Discrete indexing positions of the panels allow the user a choice of radiating patterns. For storage, these light panels fold, making a simple cubical package, 6½ inches high by 12½ inches long by 5½ inches deep.

Illumination is provided by six miniature fluorescent lamps each 10½ inches long. Tungsten–iodine type lamps were initially considered but were rejected because of their short life expectancy, high percentage of heat flux, and high operating temperature. Other high-pressured, high-powered lamps were rejected for similar reasons. The proposed system has switching which permits either two lamps (work mode) or six lamps (photo mode) to be energized. In either case, "Lo" and "Hi" brightness are available. Under maximum power conditions the lamps gradually increase temperature beyond 75°C (Figure 1). Operationally, however, there is little need for maximum brightness for extended periods of time.

Color film uses a red sensitive (cyne) dye, a blue sensitive (yellow) dye, and a green sensitive (magenta) dye. Most fluorescent lamps develop their energy in the yellow–green area. To compensate for the spectral inadequacies of common fluorescent lamps, a lamp having a spectral energy distribution approximating standard daylight was required. Experi-

(continued overleaf)

ments with multiphosphor "daylight" lamps disclosed photographic results identical to natural daylight. Further, the phosphors employed in these lamps have a very fast response which makes them well suited for the unit's strobe circuit.

With this proposed system, irradiation by nonluminous energy is greatly reduced. The light source, by first approximation, can be considered as a diffusing Lambert radiator for luminous flux. However, beyond this luminous range, the fixture behaves as an isotropic radiator. Thus, comparatively little heat is directed onto the subject. For equivalent power the total amount of light projected is nearly twice that of a 3200°K Planckian radiator, and nearly four times that of a 2700°K Planckian radiator. When interpreted as a photographic flux source for daylight film, the improvement is ten times that of a 3200°K radiator and 40 times that of a 2700°K radiator. Color temperature of the light was computed to be 5000° Kelvin. The light output was sufficient to make adequate color motion pictures of an object several feet distant from the assembly.

Note:

Documentation is available from:

Clearinghouse for Federal Scientific
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No patent action is contemplated by NASA.

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