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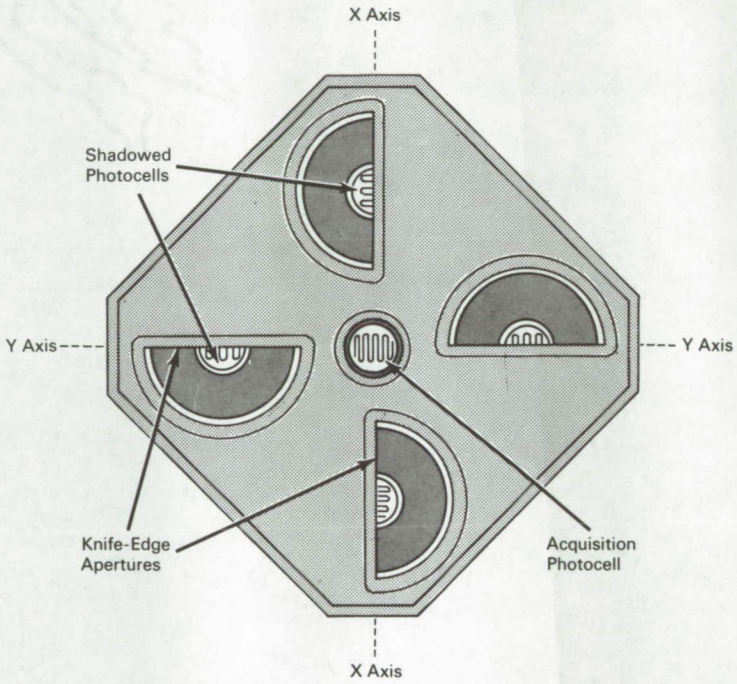
NASA TECH BRIEF

Photocell Shadowing Technique Improves Light Source Detector



The problem:

To design a light source tracking detector that exhibits minimum scale factor change with increased light source angle. The tracking detector should be simple in construction and use standard, reliable components.

The solution:

A lightweight, compact modular system that includes an acquisition photocell for seeking the light source and four shadowed photocells, two per (X and Y) axis.

How it's done:

Operation of the tracking detector involves null sensing by two sets of two cadmium sulfide photocells operating in an X-Y configuration to act on a bridge circuit. These four cells are shadowed by knife-edge apertures that cause one cell in an axis to receive more luminous flux than the other as a function of tracker angular displacement. This results in an electrical offset in the bridge circuit proportional to the degree of angular displacement. A fifth, or acquisition cell, mounted in the center of the module, operates in conjunction with a switching circuit to provide an acquire

(continued overleaf)

and intensity signal to discriminate between wanted and unwanted sources. Using two cells in each axis with opposite shadow edges, angular motion of the light source causes one cell to increase in resistance while the opposite cell resistance decreases, thus causing a positive or negative voltage output in the bridge circuit. This output signal is processed to produce a dc output error signal that operates a servo system to return the detector to a null position by removing the pointing error.

Notes:

1. The bridge circuit plus signal processing electronics are packaged in the back portion of the tracker, thus making a small, lightweight unit.
2. Photocells of various types, responsive to other portions of the spectrum, could be used to acquire and track infrared, ultraviolet, and other source fluxes.
3. Inquiries concerning this innovation may be directed to:

   Technology Utilization Officer
   Jet Propulsion Laboratory
   4800 Oak Grove Drive
   Pasadena, California 91103
   Reference: B66-10564

Patent status:

No patent action is contemplated by NASA.

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