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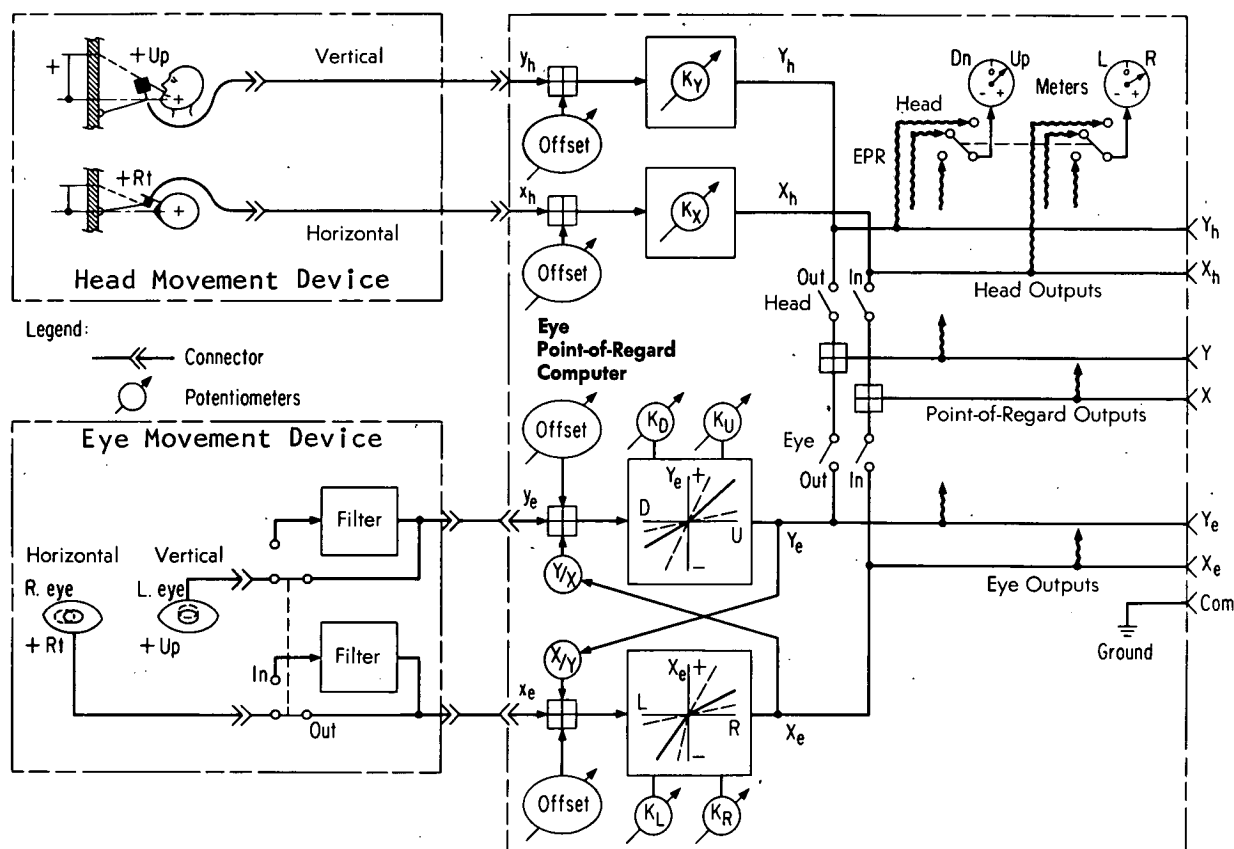
NASA TECH BRIEF

Ames Research Center



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Eye Point-of-Regard System



The problem:

To measure the intersection of the line-of-sight and a selected normal picture plane (the eye point-of-regard) for a human operator in a visual scanning system.

The solution:

Measure only two head-to-reference angles with an eye point-of-regard (EPR) system and sum them with eye-to-head angles, which are measured on a corresponding scale, to yield a dc signal proportional to

(continued overleaf)

the picture-plane coordinates. The EPR system gives convenient on-line EPR coordinates in recordable dc voltage form, thus eliminating the need for expensive camera equipment and film data reduction.

How it's done:

The EPR system includes a head-movement device (HMD), an eye-movement device (EMD), and the EPR computer which receives the signal from the HMD and EMD and provides the system output.

The HMD consists of two orthogonally mounted potentiometers connected to a reference panel by a rigid, telescoping linkage. The housing for the potentiometers provides for insertion of a disposable "pipestem" bite bar with a thermoplastic bite mold, which is clenched between the operator's molar teeth (one side) during the test. As the head moves up and down, the wiper moves around the lower pot which is fixed horizontally in the housing; the telescoping linkage allows for forward and backward head displacement accompanying the rotation. Similarly, left and right movements are picked up by the pot mounted vertically in the housing. An adjustable boresight, comprising a peep-sight about 25 cm from the eye, permits calibration and alignment checks of the HMD.

The HMD is linear in azimuth and elevation planes for motion about its center. With the head 20 cm to one side, a small change in elevation slope is present only for large azimuth angles. For the anticipated range of operation, however, an accuracy of one degree should be possible.

The EMD is a commercial model designed to measure the horizontal and vertical movement of the eye with respect to the head by a corneal-scleral boundary contrast technique. It is mounted in an eyeglass frame.

The EPR computer sums and crossfeeds the signals from the EMD and HMD to provide an output that represents the point-of-regard independent of the head movement within a range of 20° vertical and 40° horizontal. The block diagram shows the connections between the potentiometers and the summing amplifiers; the pots control HMD zero offset, gain, and cross talk with the EMD.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
Ames Research Center
Moffett Field, California 94035
Reference: TSP71-10476

Patent status:

Title to this invention has been waived under the provisions of the National Aeronautics and Space Act (42 U.S.C. 2457 (f)) to Systems Technology, Inc., 13766 S. Hawthorne Blvd., Hawthorne, California.

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