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 ex-
ensive 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 tele-
scoping linkage allows for forward and backward
head displacement accompanying the rotation. Simi-
larly, 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 sig-
nals from the EMD and HMD to provide an out-
put 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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