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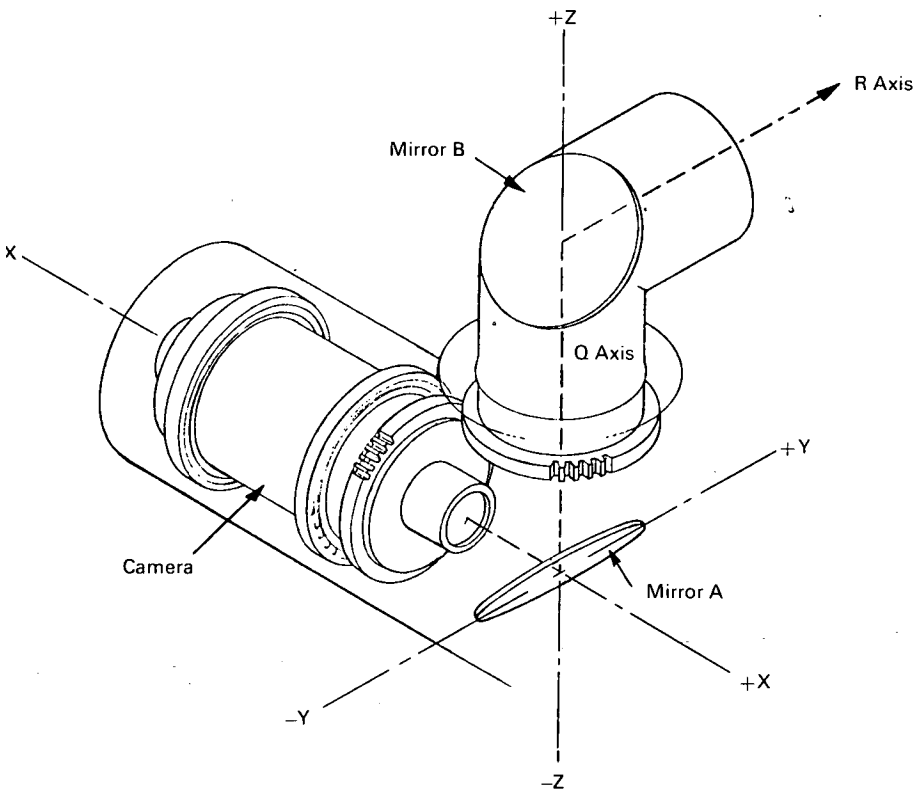
NASA TECH BRIEF

Multipurpose Binocular Scanning Apparatus



An optical gimballing apparatus has been devised which can direct narrow fields of view throughout solid angle approaching 4π steradians. It minimizes size, weight, and power when large instruments are required, and provides the basis for a binocular scanning capability. Image rotation produced by scanning is eliminated or altered as desired by gear trains directly linked to the scanning drive assembly. These rotate symetrical instruments' imaging subassemblies about an axis of least moment of inertia.

Referring to the figure, suppose that an observer looks along the $+X$ axis, and that mirror B rotates in its housing about the Q axis. When R points to $+X$ the scene seen is "right-side-up", as if mirror A were removed. As the described rotation continues, carrying the line of sight "around-the-horizon", the image rolls over such that when R points to $-X$ the scene is "upside-down." When an instrument such as a TV camera is used, it is rotated about the X axis so that the picture is "upright" in all posi-

(continued overleaf)

tions. Rotating mirrors A and B (fixed with respect to each other) about the X axis produces a different sort or image rotation. In any case, directly linked gear trains utilizing differentials can be employed to obtain the image orientation desired.

A more elaborate configuration permits binocular information to be extracted without the use of slaved gimbal systems. A minimum separation of axes maximizes the available field of view and reduces packaging volume, while extension of cross-arm carrying mirrors increases the boresight offset for a greater binocular effect. In the latter case, if an illuminator is used in one side, an increased geometric isolation from near field particle or Raleigh scattering phenomena is achieved.

Another configuration shows the use of instruments with different fields of view which eliminates parallax and utilizes only one of two possible extension arms.

By suitable modification of the basic apparatus, an instrument of minimum size and weight can be designed for use in television, laser communications, and photography.

Note:

Documentation is available from:
Clearinghouse for Federal Scientific and Technical Information
Springfield, Virginia 22151
Price $3.00
Reference: TSP-10311

Patent status:

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