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NASA TECH BRIEF

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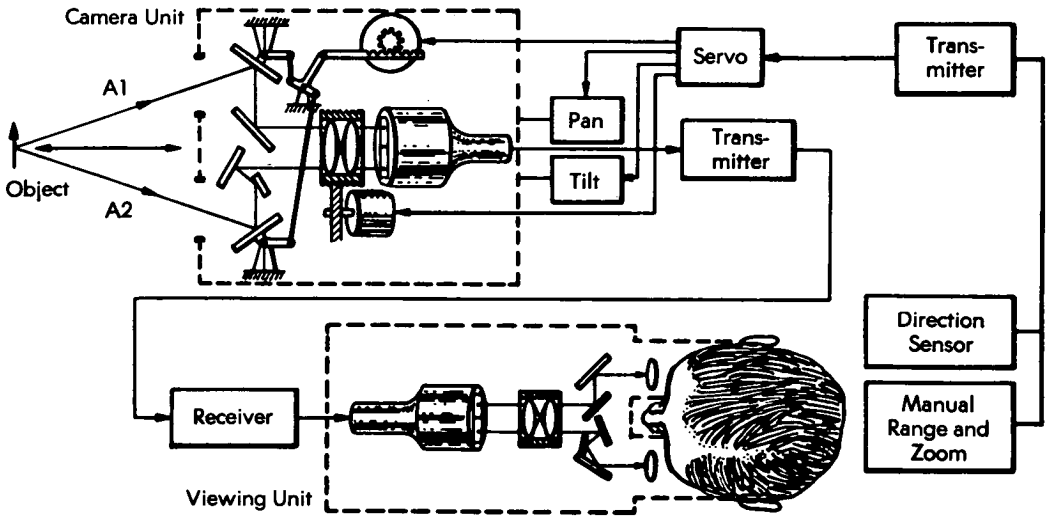
Stereoscopic Television System

The two most common methods for transmitting stereo optical information by television make use either of two TV cameras and two TV receivers for separately transmitting the left and right optical images or of a single-channel TV system in which both left and right images are displayed side-by-side on a single TV screen and separated by an optical system for viewing. The first method, however, is complicated by differences in contrast and brightness between the images produced by the separate transmission systems, as well as by various nonlinearities arising from use of components of different characteristics in the transmission and display systems. The second method is troubled by the image distortion caused primarily by the horizontal nonlinearities of the picture tube on which they are displayed.

In the stereoscopic system described below, both images pass through the same set of optical lenses and the same TV transmission and receiving systems; thus, the transmitted stereo images are of high quality because differences in the image tone and gray scales, disparities in relative focusing and magnification, and nonsimilar distortions produced by electrical and optical imperfections are minimized.



As shown in the diagram, the apparatus consists essentially of a remote camera unit and a user viewing unit. The camera unit includes a reflective light transmission system which provides a binocular set of images that are projected through the lens system onto the face of a TV camera tube. In the reflective system, a pair of rotatable mirrors (linked together so that by means of a single control they can be caused

(continued overleaf)

to rotate in opposite directions) change the range of convergence of the optical axes of the reflective system and thus increases or decreases the distance between the camera unit and the object plane. Light rays emanating from the object are reflected from the rotatable mirrors onto the reflective faces of fixed mirrors which, in turn, reflect the light into the optical system.

The two light pencils, A1 and A2, enter the lens system and are imaged onto different areas of the face of the TV camera tube. Since the images are mirror symmetrical, any circularly symmetric aberrations of the lens system will affect each of the images similarly without significant nonrelative linear distortion. The output of the TV camera tube is fed into a transmitter which is coupled to a receiver by a data link. The receiver supplies picture information to a TV receiver tube which forms a part of the viewing unit. The two images formed on the face of the tube are separated and focused individually onto the eyepieces of the viewing apparatus by a lens and reflective system.

When the stereo apparatus is to be used for selective scanning of a remote field of view, it may be desirable to mount the entire unit on the head of the user. In this instance, changes in head orientation are sensed so as to cause similar orientation or direction of the remote camera unit; the output of the direction sensor is fed into a transmitter which controls a remote servo unit that provides appropriate signals to a pan control and a tilt control. Thus, the operator can selectively inspect the field of view merely by turning his head in a normal manner. To permit selection of the range of focus or telescopic viewing of a selected object, manual range and zoom controls are provided which produce output signals that are transmitted to the servo.

Note:

No additional documentation is available. Specific questions, however, may be directed to:

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Patent status:

This invention has been patented by NASA (U.S. Patent No. 3,670,097). Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to:

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