

NASA TECH BRIEF

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Field-Sequential Stereo Television

The problem:

Stereo television adds a third dimension to viewing. It allows the viewer to distinguish actual distances among the objects displayed on the screen. A number of different configurations have been used in developing this television, including dual optical systems, two camera arrangements, space division displays using two screens or split screens, time-division displays, and color discrimination. In each case, the viewer has to wear a viewing device to see in stereo. These devices interfere with normal vision. In addition, the stereo effect can be observed only from a relatively restricted area, which limits the number of people that can watch the screen at one time.

The solution:

A newly-developed stereo television system includes viewing devices that provide very low interference to normal vision. It provides a stereo display which can be observed from a much broader area.

How it's done:

As shown in the simplified block diagram (Figure 1) the system includes left and right video cameras focused on an object. Output signals from each camera are time multiplexed in a mixer into a sequence of views provided by each camera. The multiplexed signal is fed to a standard television monitor which displays the left and right images of the object.

The monitor is viewed through a special system which includes a polarizer over the face of the monitor and a set of optical elements for left and right eyes. Each eye receives the polarized light from the monitor independently, through a solid-state electro-optic element and a second polarizer (or analyzer).

The polarizer and the analyzer are linear polarizers set at 90° to each other. The electro-optic element is a hot-pressed ceramic plate made of lead, lanthanum, zirconate, and titanate (PLZT). Light transmittance through this set of optical elements is controlled by an externally applied electric field. When no field is applied, the set has low transmittance; conversely, when the field is applied, the set has high transmittance.

The electric field is applied alternately to the left and right PLZT plates by a power control unit fed by a sync separator. The separator detects right and left camera signals in the multiplexed output and triggers the power control unit to apply the electric field to the corresponding plate. As a result, the viewer's left eye sees an image from the left camera while the right eye is blocked, and the right eye sees an image from the right camera while the left eye is blocked. Triggering is done in a rapid sequence so that the viewer effectively

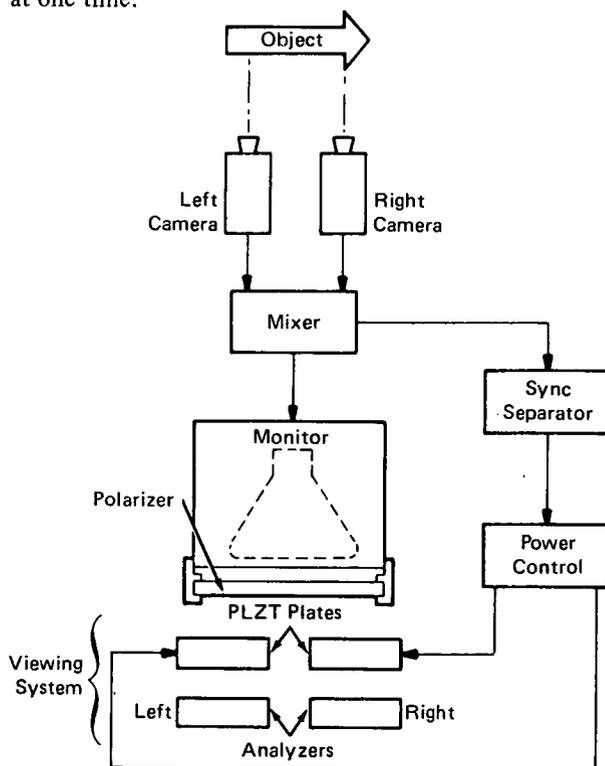


Figure 1. Field-Sequential Stereo Television System:
Twin-Camera System

(continued overleaf)

observes one continuous image with both eyes stereoscopically. The viewing system does not interfere with normal vision and allows the user to observe other areas away from the polarized screen.

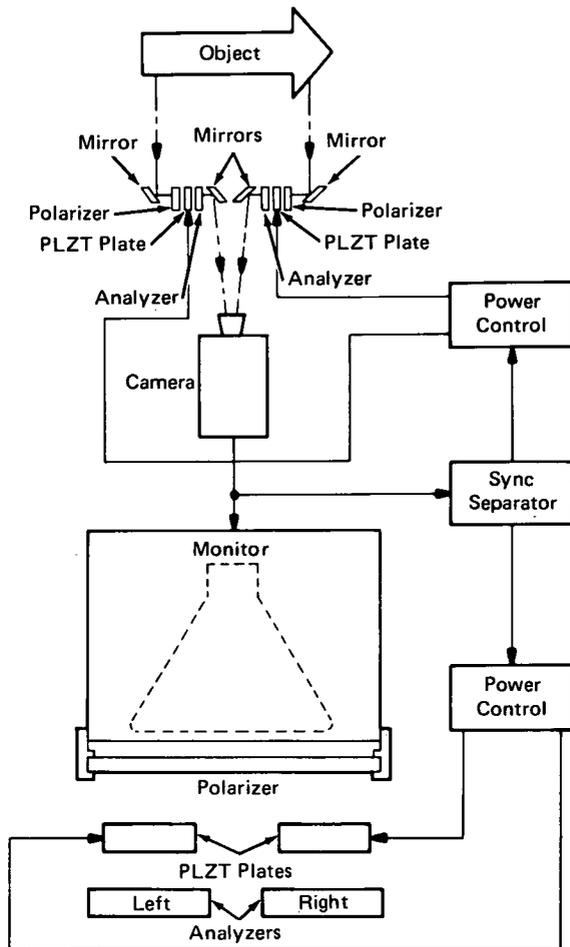


Figure 2. Single-Camera System

The same viewing arrangement can be used with a single-camera stereo system, as shown in Figure 2. The camera includes two pairs of mirrors which direct alternately the left and the right sides of the image toward the camera lens. A similar set of optical elements is included between each mirror pair, as in the viewing system. The electric field is applied alternately to the right and the left PLZT plates of the camera system by an additional power control unit. This unit is synchronized with the viewing system. When the left side of the object is viewed by the camera, the left PLZT plate of the viewing system transmits, and the right plate is blocked. The opposite situation exists when the right side of the object is viewed.

Note:

Requests for further information may be directed to:
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 Reference: TSP74-10223

Patent status:

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