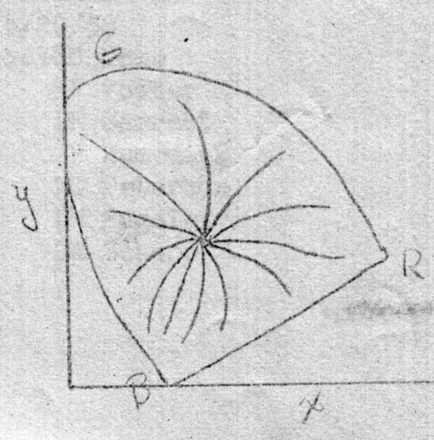
Research Laboratory Trip Report
5/16/58

W.E. Good

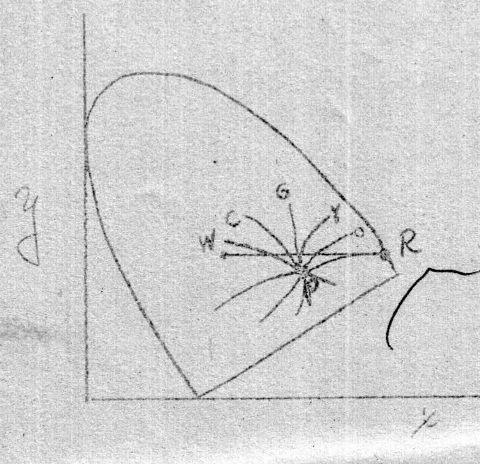
SUBJECTS DISCUSSED: Glenn's color projection scheme.
Day's window for electron beams.
Land's two-color projection.
Transparent phosphors & non-reflecting coatings for same.

Joined with W.E. Glenn, P.E. Paschler of the G.E. Research Laboratory and D. McAdam, J. Pinney of the Eastman Research Laboratory. Dr. Glenn gave a repeat of his Optical Society presentation on a technique for projecting images in color. This technique is identical to his proposal for obtaining simultaneous color from the Eidophor system by controlling the spacing of the diffraction gratings in the picture in such a way that the proper color is selected by the narrowed set of slits in the Schlieren optical system. He demonstrated his film simulations in a projector and came up with a fair color picture. A Moiré "beat" pattern is visible between the blue and green gratings when the gratings are both vertical. He reduced this difficulty by placing each grating at 45° to the vertical. The information was the same as we have learned from Dr. Glenn over the past five years but I did get a deeper appreciation for the difficulties that he had in his attempts to simulate this type of color display. He also has developed an analysis of the non-linear way in which the three gratings combine effects to give a desired color. It was both Glenn's and Pashler's feeling that all of these developments plus the work that C. Ellis (Studio Equipment) is doing, are bringing us a bit closer to a home-type Eidophor projector.

I spoke with Dr. McAdam and J. Pinney of Eastman in regards to Land's two-color experiments and in regards to our TV simulation experiments. McAdam thought that the TV experiments were definitely worth doing and made the following suggestions: He felt that the present taking characteristics were a good place to start, providing one used red and green but no blue. This was to insure that the brightness of blue objects would be low. He suggested Wratten filters #25 and 58 to start with - going to #29 and 61 if necessary. The dyes in Kodachrome film tend to help the separation. He felt that the best effect for viewing would probably be from white and deep red (#25 or #29). His explanation of seeing "off-axis" colors was based on the fact that "constant-hue" loci are curved, rather that straight as we usually assume, and that the "white point" is shifted by adaptation to a position below the red-white axis.



Constant hue loci



Shift of white point
W to P for R & W sources

The white point shifts to P by adaptation to the combination of a red and white primary system. It is apparent that various ratios of red and white will go through a gamut of pastel colors from red to cyan as indicated in Fig. 2. No blues or magentas are indicated but he said some people "see" blue anyhow. He said the eye (or mind) was good at filling in colors or at increasing the apparent saturation of known objects.

Pinney said they had made some "two color" slides for duplicating Land's work and that they were superior to the "lenticular" slides that we viewed on May 8, 1958, at Eastman.

Dr. Harold Day showed us film-like layers through which they have been shooting electron beams into the air at atmospheric pressure. These films were of glassy aluminum oxide - about 1000 Å thick. They were placed over a rectangular aperture $\frac{1}{4}$" long and 0.005" wide. The layer would stop all electrons below 3 or 4 KV in energy. For 10 KV electrons, the beam could be seen in the air due to ionization. They have been able to "write" on photographic film but as yet have not evaluated the magnitude of the scattering or defocussing upon going through this "window." A technique of this sort might eventually be applicable to TV recording.

Discussions were held with Studer, Cusano and Koller on transparent phosphors and how one might use them in the case of a display for daylight viewing of TV. They were dubious about the practical execution of a non-reflecting layer ($\frac{1}{4}$ wave-intermediate index) at each reflecting surface. Studer remarked that they have yet to solve the reflection problem for simple glass surfaces such as clock faces. They had obtained a circular-polarizing type filter, mounted in glass, with a non-reflecting coating on the front surface of the glass. It still appeared to have about 1% reflection.

Koller and Coghill are in the process of putting down a transparent phosphor (ZnF) on smooth and roughened surfaces in order to gain more knowledge about how the light gets out of a transparent phosphor.

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