J. Konnekamp

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TRIP REPORT

To: Research Laboratory, Knolls, Schenectady, New York

Personnel: N. R. Whetten, A. B. Laponsky, and R. Young

Date: September 22, 1955

The purpose of the trip was to determine the extent to which Mr. Laponsky and Mr. Whetten are persuing the problem of reducing back scattered electrons in the P.A. tube, whether these efforts can be accelerated and what methods alternate to boron application are being considered.

Briefly, their method of attack is to use an aluminum film of minimum thickness consistent with good light reflectivity and substituting some material of low atomic weight for the aluminum sacrificed. Enough of this material is applied to provide adequate stopping power of the high energy back scattered electrons originating in the phosphor screen (these electrons must take a double path thru the material). The material is selected so that it gives rise to a low amount of back scattering relative to the aluminum previously used. The amount of material to be used would probably be a compromise between obtaining maximum contrast and maximum brightness.

The first application tried was a boron particle spray[1]. This showed an appreciable reduction of back scattered electrons when full coverage was obtained. However, such an application is inherently a poor choice since full area coverage can be obtained only by excessively covering a part of the area so that the brightness will fall off excessively.

The next attempt was to decompose diborane gas (B_2H_6) by heating the aluminum (and therefore phosphor and glass) to about 350 - 400°C. The diborane permated the aluminum so that boron was deposited on the glass and phosphor. This causes very low light output but the reduction of back scattering was excellent.

Evaporation of boron is being attempted at present. The boron is contained in a carbon boat which is heated conductively. The boron evaporation is difficult because of poor heat conductivity between the carbon and the boron particles. Furthermore the two components tend to react appreciably at these temperatures. They expect that a more effective evaporation can be obtained by placing the boron in a cavity in the carbon, heating the latter by R.F. so that the incandescent carbon can effectively heat the boron by radiation (black body cavity).

The boron can be prohibitively expensive if high purity is required. The high purity material they obtained cost $200. for 8 oz. An alternate which

(1) Memo Report No. EA-1 "Backscattered Electrons from Boron and Aluminized Phosphors" - N.R. Whetten and A.B. Laponsky

seemed most practical to me was to adopt the techniques used by electron microscopists. This consists of applying a smooth, continuous and tenacious film of amporphous carbon deposited from a carbon arc. This technique is supposedly subject to good control. The back scattering due to carbon should be only slightly greater than that from boron. It has another advantage that it is a conducting film and will reduce the resistance of the thin aluminum. It was decided to persue this line after making the measurements on evaporated boron.

Rodger Young has patented a scheme using Faraday cells produced in photoform glass. The feasibility of such a scheme can be evaluated when we receive a memo he will provide.

Messers. Whetten and Laponsky are interested in this problem and in order to accelerate the work it is only necessary that justification for the work be shown. That is, our interest should be indicated to the Research Laboratory.

The operating details and problems of the post-acceleration tube were discussed in order to give them better perspective of the problem.

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