T-4

TRIP REPORT pre-trip reports

To: Philco Corporation
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The present screening practice used at Lansdale to obtain screens which they claim have covered equivalent to double applications of the old process is as follows:

1. Spray application of photosensitive film - dry
2. Exposure (3 - 4 minutes)
3. Spray application of sensitized phosphor slurry - dry
4. Exposure (3 - 4 minutes)
5. Development - dry
6. Flowcoat application of lithium hydroxide solution - dry, rinse and dry again

This procedure is used for all three colors. The lithium hydroxide is used to harden the PVA to decrease contamination from the following phosphor applications. It is also used after the red (final) application for ease of stripping of the pre-aluminizing film. To decrease fogging the phosphor slurries contain carboxymethyl-cellulose.

The phosphor patterns are laid down after the black guard bands are applied. This process is a slurry flowcoat application. The black material is a DuPont ceramic consisting of iron, sodium, potassium and chromium oxides. The material number is 7643, obtainable from DuPont at Perth Amboy, New Jersey. It costs $6.35 per lb.

After screening a methacrylate spray film is applied. This is stripped from the bulb wall close to the screen by a water jet. The entire bulb is aluminized except for the window for the photomultiplier tube. To make this window conductive an E.C. coating is applied, either by the bulb manufacturer or by the tube processer.

Back lacquer is applied by flow coating. The index pattern must be printed onto the panel skirt at one end of the bulb. The back lacquer contains an intense red dye (E.G.N. dye) to prevent reflection of the pattern onto the screen by the aluminum on the skirt. Lansdale personnal feel that the back lacquer could be eliminated if it were not for the skirt reflection.

After applying the index phosphor the bulb is put through a normal monochrome bake out. Another bake out is used after neck seal and dag application.

All of the details of processing were not readily available. Complete specifications will be written up shortly after vacation and these will be forwarded to us. A report of the many details of current problems is best deferred until these specifications are available.

The impression obtained was that Philco has stepped back to take a new look at the entire process in view of the new tube requirements and simplification. The operation is not as advanced as we had previously seen it but the ultimate outlook is very much better. The pilot section is doing most of the development work itself. It appears that this is an excellent opportunity for us to contribute a great deal to the success of this program and to attain leadership in many of its phases. The pilot operation as it exists is better equipped to develop improved techniques and equipment for factory type operations. We are probably better experienced to study and improve the fundamental processes and let their pilot operation prove these out in actual tubes.

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Gun Work

As an outcome of the photo-electric 9M.C. indexing now adopted in the Apple System, only one beam is needed. Lansdale is experimenting with various parameters in the triode gun design to meet the tentative requirements for satisfactory performance, as set by Philadelphia

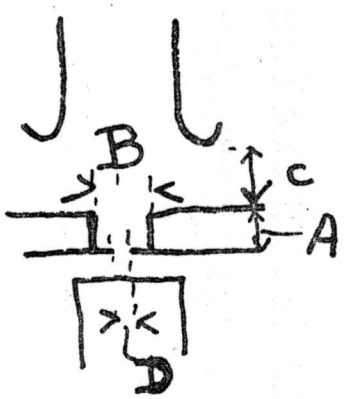
The final gun-anode voltage is now 27KV against 30KV in the two-beam system.

Essentially, meausrements are made of the unfocused spot as a function of the optimum-focused spot at 1000ua, for various configurations and parameters in the object region.

A quick idea is given by observing visually the pulsed spot with a calibrated microscope arrangement. If later the spot is measured with the Philco scanning equipment (we have this equipment available in Engineering) the half-way-down values are of course smaller then observed visually but as the scanning method is more time consuming it is only used on those samples which by visual measurement come close to the desired optimum.

An idea of the difference in the two methods can be gained by the fact that visual values of 32 - 45 mills would correspond to half way measured values of 10 - 20 mills. Note: the non-linear ratio is of course a consequence of different current distributions in the beam, caused by different configurations.

The unfocused spot dimension serves for known geometry to fix the beam angle. The structure as used is essentially a double aperture g1 structure in a triode (see figure). Only one parameter A, B, C, or D is varied at the time and an average of 5 guns is made and measured. The g1 - cathode spacing is always adjusted to obtain 150 volt cut-off.



The following values are given only to get an idea and correspond to a structure which starts to look promising:

D = 19 mill
B = 110 mill
C = 120 mill
A = 25 - 30 mill

The thickness of the first g_1 aperture is 1 - 1.5 mill.

The influence of beam angle can be seen from the following example:

Unfocused spot diameter in m.m.	Spot size in mills
40	29
30	44
25	60

Desired Values: (given by Philadelphia)

(37	32)	visual
(29	45)	observation

The best results so far are obtained by Superior 799 cap, 220 cathode and Baker 500 coating.

Assembly of the gun seems to be easy. The 1 - 1.5 mill g_1 aperture is just welded to the thicker g_1 aperture in a centering device and both are welded to the grid cap.

Alignment of the assembly with respect to the anode is straightforward monochrome technique.

The writer suggested that if satisfactory A - D dimensions have been obtained, a certain amount of shaping of the B hole wall might help to reduce cathode loading somewhat.

Life in lollipops so far, on most samples, has been satisfactory, running at 1000 ua.

The gun discussion was between the writer and Charley Gray.

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