STRICTLY PRIVATE

SUBJECT: Trip Report - CBS-Hytron, Danvers and Newburyport, Massachusetts

DATE: March 15, 1954

PURPOSE: Discuss possible color tube purchases

PERSONS MAKING TRIP: V. C. Campbell
J. D. Walter
J. N. Phillips
B. A. Kafka

PERSONS CONTACTED: C. F. Stromeyer-Exec. V.P.
J. A. Adams-V.P., Sales
F. E. Garcelon-Asst. to V.P.,Sal
E. Schaeffer-Dir. of Researc
A. Harcher-Mgr., Newburyport

The main purpose of the visit was to discuss possibilities of purchasing all or some portion of R&TV Department's requirements for 15" and 19" color tubes. The report follows:

15" Tube

1. A small pilot operation has been in operation at Newburyport since about February 1st.

2. Initial factory production is scheduled within a week. Most equipment is in position and some tubes have been processed through all stages. Hytron's total production of 15" up to this point probably is between 100-200 tubes.

3. Some problems they have run into are:

   A. High convergence voltage. This caused a cessation of shipments for a two to three week period. They believe it has been corrected by tilting guns 1½° away from center.

   B. Streaked pictures - Due to irregularities in the aperture mask material, probably caused in rolling. Recent shipments better. Have assigned a metallurgist full time at Buckbee Mears to mutually attack problem.

   C. Loose aperture masks - Due to fairly high exhaust temperatures springs used to clip masks to faceplate nubs lost their temper and would not hold sufficiently to permit drop test acceptance. Some modifications have been made and a material change is under way.

4. Hytron is very concerned about future of 15" and realizes that 19" will not be sufficiently along to sustain production program. Mr. Stromeyer stated, "We are going to continue making enough 15" to maintain know-how, etc., if I have to personally break every one up".

5. Factory production will initially utilize two screening conveyors having two rows each. Three rows will apparently be used for screening and the fourth for filming.

7. Screening conveyors are equipped with automatic dispensers.

8. We got a rather hurried look at a distance of what appeared to be a rotary type equipment for applying photo resist material.

9. Matching of faceplates to aperture mask is facilitated by use of three part pressure sensitive stickers. Faceplates are screened with the initial color and then exposed with an aperture mask which is then replaced in a numbered container. Applicable numbered three part sticker (with each section a different color) is applied to the faceplate. When faceplate again comes from the screening and sensitizing equipment it is correctly matched up and exposed through the same aperture mask and the proper section of the numbered sticker is removed. This identifying process is repeated through the balance of the screening steps. Equipment installed can screen about 80-90 per hour. Yield is expected to be about 58%.

10. A belt conveyor carries face plates past three exposing stations, one for each color. We were not given any information on exposure times or solutions. Exposure time was approximately 9 minutes. Due to slight suds in washing liquid Mr. Campbell feels that All, Bab-o, BonAmi or equivalent was being used. Yellowish tinge possibly pumice or talc which might provide helpful abrasive action. Sensitizer quite possibly dichromate.

11. Aperture masks were baked, following blackening, to relieve stresses.

12. Factory has a three hour exhaust schedule on 15" tubes and hopes to quickly get to two hours. Anticipate no longer rate on the 19".

13. Screen bakeout is currently three hours in pilot shop and two hours in factory. Bakeout is at approximately 450°.

14. Ultimate matching of masks and faceplates is done in a small room fitted with shelves and two doors. Faceplates and aperture masks are matched and funnels having flange diameters equal to faceplate flanges within 1/16" are matched. Selection of flange diameters is, of course, necessitated by material lost in reworking bulbs. Three recuts of the weld is considered maximum possible.

15. After sealing in the gun the funnel is placed in an alignment jig and positioned so that sights line up with the blue gun. When this alignment is accomplished a cutting tool places a small registering cut on the flange. In sealing, this cut is aligned with a specific point on the faceplate flange which has a known relationship to the orientation of the aperture mask.

<u>19" Tube</u>

1. We were shown a working demonstration of the Hytron 19" tri-color tube which they prefer to call the 205, rather than the 19", capitalizing on the obvious advantage that their construction provides 205 square inches of viewing area as opposed to 165 in the R.C.A. 19". One is immediately impressed with the fact that this is a very satisfactory and probably marketable size, only a few square inches less than a grid-plate 24" type.

2. Tube uses exact copy of R.C.A. magnetic convergence gun. Hytron said that earlier attempts to use 15" guns in longer bulbs had been unsuccessful.

3. Tube witnessed was reputed to be the second tube made and employed an aperture mask curved on wooden blocks, production tools not being completed. We were asked to make allowances for rough construction. Hytron felt that yoke used could be improved and they were awaiting arrival of what they felt would be more satisfactory ones from Rolla.

4. Aperture mask has same diameter holes overall. These are .0105 diameter. Phosphor dots are .017-.018. Hytron believes that R.C.A. move to variable size holes was dictated as much by the problems caused by hot blocking and holding alignment in an aperture mask with large holes overall as for any announced reasons.

5. Mr. Phillips agreed with Mr. Stromeyer that pin cushioning which was apparent on R.C.A. 19" at initial showing was practically non-existent on Hytron type.

6. Hytron stated that light output of highlights on small spots was 35 foot lamberts and 25 foot lamberts on large areas. Washout of colors was startling when a relatively small amount of artificial light was introduced in the viewing room. The tube not being in a cabinet, ambient light was partly responsible, although there is no question that ultimate home owner would view set in semi-darkness.

7. Particular tube shown used clear glass faceplate. Hytron recognizes that tube should have grey glass to reduce halo effect and produce crisper picture. It is possible that early 19" production will have to be in clear glass, however, due to the fact that quantities will be insufficient to utilize production tanks at Corning for grey glass. It is expected that light transmission would be further reduced with grey glass.

8. Tube operates at 25KV.

9. Hytron expects to produce samples in April and start production in June.

10. Mr. Phillips told Mr. Stromeyer that, although it was difficult to make direct comparison due to possible differences in stages of development of the two tubes, the R.C.A. 19" shown at their symposium had better overall picture quality than the Hytron tube shown. He was particularly concerned with what appeared to be poor convergence. He admitted, however, that it might not necessarily be in the tube and could, as Hytron claimed, be caused by poor set adjustments or components.

11. Price is stated as "probably no higher than R.C.A. 15"."

Availability

1. Mr. Walter stated we were potentially interested in procuring 10,000 tri-color tubes, the majority being 19", with any final split dependent on timetable for 19" availability. (This figure was different than any of the three figures on requirements supplied by Mr. Hunt on March 12th.)

2. Hytron's comments were that they would like to do business with the General Electric Company and did not feel that quantities were completely out of the question. Their general comments included the following:

   A. We must recognize that loading their receiving tube and black-and-white facilities make it necessary that they allocate tri-color to other tube manufacturers only after set accounts who can provide needed orders for receiving and black-and-white tubes are satisfied.

   B. Three other companies, including R.C.A., were scheduled to visit them this week. Anticipate no public showing.

   C. They would still like to see us with them on this tube and feel that we could be in production by September. Do not believe there are any differences of opinion on licensing which could not be cleared up by a meeting of properly constituted General Electric and Hytron management.

   D. Uncertainty of color makes accurate forecasting of capacities indefinite and they could not be held to any agreement which specified liabilities for definite quantities. If they promised a certain unit figure, however, which came to perhaps 20% of their planned output, for example, we could be assured of allocation of any reduced output to the same percentage.

   E. So far they have been unable to put promise dates on samples other than that some will be shipped in April, but would accept sample orders at this time.

   F. Some set companies have started design without waiting for tube samples on the basis of what they have seen, recognizing that circuitry will be fairly involved.

   G. In early production clear glass must be allowed

   H. They strongly recommend that any outfit intending to use their 19" take at least 100 15" tubes for use in sets, thereby establishing engineering contact which they feel is of the utmost importance in standardizing on quality and performance requirements. (This is partly motivated by desire to have some interim 15" production but makes a lot of sense).

   I. Could not make any immediate proposition. Agreed to consider subject and submit proposal to B. A. Kafka during week of March 29th. It is possible that if we are in a position to talk fairly firm quantities early, some portion or all of the aforementioned 10,000 could be supplied by Hytron, since they are still talking of reaching production of 10,000 a month this fall. (Unknown factors are their other commitments, ability to produce, and quality of the product.)

3. One is very impressed by the confident attitude of the Hytron organization. They do not attempt to cover up the fact that they have had many problems thus far and anticipate more. They have implicit faith in their ability to solve them, however. Since many of our problems in color were caused by faceplate-mask problems and because production was stopped before photo resist printing could be adopted, it is a little hard to estimate Hytron's potential production capacities in 1954 without knowing the extent to which their construction simplifies some of the problems. Unless their tube is very much simpler than the R.C.A. type it is hard to see, on the basis of apparent progress to date, how they could approach a 10,000 a month rate in 1954. Since the approximate 2,000 a month required by R&TV Department is 20% of Hytron's maximum output contemplated, we will be most fortunate to get that amount.

General

1. Hytron's Kalamazoo plant is about ready to start. This will be set up so entire output can be aluminized. It appears that 17" and larger will be made in that plant. Hytron is not currently aluminizing 17" or smaller, although they have been approached on 17".

2. Although Hytron's plans are to first convert Newburyport to color and then Kalamazoo, there was still more black-and-white production at Newburyport than the writer, at least, anticipated. Our tour was concentrated more on the color tube areas but the black-and-white capacity could still be between 1500-2000 per day.

3. Mr. Stromeyer said that the CBS board had just authorized expenditures when required to permit an addition which would feed processed color tube parts into the Kalamazoo black-and-white lines.

4. Mr. Adams referred to a General Electric announcement in the Chicago area of a tube utilizing a standard bulb which would require no mask or grid. Mr. Stromeyer said that he had heard of such a tube and doubted if it was a 1954 product. He further stated that some of the tubes he had heard proposed had questionable cathode life. This led him to believe that more should be known about cathode loading and Hytron had begun investigations.

5. Hytron has found that two part color bulbs can be glass to glass sealed without flanges without damage to some phosphors and apparently has some long range developments on this. They recognize that the economies of rework would have an important part in evaluating advantages of this.

6. We found everyone at Hytron to be extremely courteous and friendly and it is very possible that mutually satisfactory procurement of their tubes will be forthcoming.

BAK:JH

B. A. KAFKA

cc: V. C. Campbell, P. C. Fages, D. S. Hunt, L. C. Kunz, J. M. Lang, R. E. Lee, R. A. Norman, J. N. Phillips, L. E. Record, G. L. Roark, J. D. Walter