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Bldg #6

Subject: Trip Report of

April 6-7-8, 1955

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C. R. TUBE ENGINEERING

Some items of general interest in cathode ray tube engineering are noted below. (The trip report covered Owensboro and Tell City receiving tube operations, and several Lamp Department operations in Cleveland.) JURN LOG

A. Cathodes

1. Cathode temperatures on receiving tube types run 700-750°C, with few types up to 775°C. Temperatures when read, are taken with thermocouples, directly connected; designs are usually established by heater watts per sq. cm. of cathode surface. Actual temperature is seldom read as a control.

2. Cathode sprays are normally triple carbonates made at Owensboro and applied by spraying on Paasche machines. Cataphoretic coating is not employed because of the cathode shape, but is used for coating filament type cathodes.

3. Mica coatings are normally magnesia or magnesia silicate. On high voltage types a special suspension of sodium silicate-alumund is employed; using this coating approximately $\frac{1}{2}$ " spacing will stand 5 k.v. Mr. Millis will send the formulation.

4. Mr. Millis mentioned the use of Alclad iron for mount parts; they can achieve faster outgassing and priming rates compared to carbonized iron (approximately 100 to 1). This material costs approximately 70¢ per lb. compared to \$1.40 for nickel and \$2.20 for nickel iron.

5. A new W. B. Driver cathode alloy (melt 42195-1), developed by a series of vacuum melted lots with known additives, is under test and offers encouragement in that it apparently gives adherence and emission comparable to the active alloys with satisfactory life. Note the following analysis:

Ni 99.21%, Co 0.10%, Fe 0.11%, Mn 0.32%, Si 0.008%, Cu 0.006%,
Mg 0.027%, C 0.089%, Al* 0.000001-0.00001%, B* Neg, Ca* 0.0001-0.001%,
Cr* 0.0001-0.001%, Pb* Neg, Ti* 0.001-0.01 ppm

* = spectrographic

Attempts will be made to get sample cathode ray tube cathodes from this melt.

6. We were conducted on a general tour of the Owensboro Works by Mr. Freer. Both this plant and the Tell City Works were particularly noteworthy from a housekeeping standpoint. It was noted that one type had gone through a clean-up program with a resultant scrap reduction of 60% to 6-7%.

In connection with general housekeeping, the following points were particularly noted:

- a) The use of polished, varnished hardwood floors in many areas.
- b) Metal or bakelite tote boxes, cleaned on the line with household vacuum cleaner brushes.
- c) The use of low-velocity cleaned air in the air conditioning.*
- d) Operators mounting under enclosed work boxes (glass fronts).*
- e) Use of nylon smocks and rubber finger cots. Finger cots are changed at hourly intervals.*
- f) Use of 10-power glasses and binocular scopes to facilitate mounting and to allow close inspections for dirt and lint.*
- g) Use of air blow-off jets at several mounting stations to reduce dust, etc.*

* on 5-Star Lines

7. Pumping time on exhaust is approximately 40 sec, representing approximately 1500 per hour on 16 head machines. Trip-off pressure is approximately 0.1 micron. Pumping is practically all on Kinneys, with the last three positions using booster oil pumps.

Exhaust speed is limited by the outgassing rate of the metal gun parts. Alclad is preferred (see 4 above) although carbonized nickel is used for high dissipation plates.

8. RCA batalum is used extensively in metal tubes and is preferred by several of their people because it can be easily reflashed for tube rework; some trouble with loose particles is experienced. Investigations are under way with a new batalum-type Telefunken getter (Ba-Al-Fe titanate) and preliminary results indicate easy flashing and good cleanup with no loose particle trouble.

Kic getters are used on many types but are liable to give considerable trouble with loose particles, particularly on water-washed mounts.

Barex getters have limited application due to loose particles and where they are used the pellet is covered with a shield. Gas clean-up is not as good as with comparable Kic getters.

9. In the course of a short trip through the Chemical Products Works in Cleveland it was pointed out that they now have facilities for particle size determination, vacuum pump oil evaluations, spectrographic analyses and C.R. tube life test available for our use.

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