CATHODE RAY TUBE
EUROPEON SURVEY

Zurich, August 17, 1957

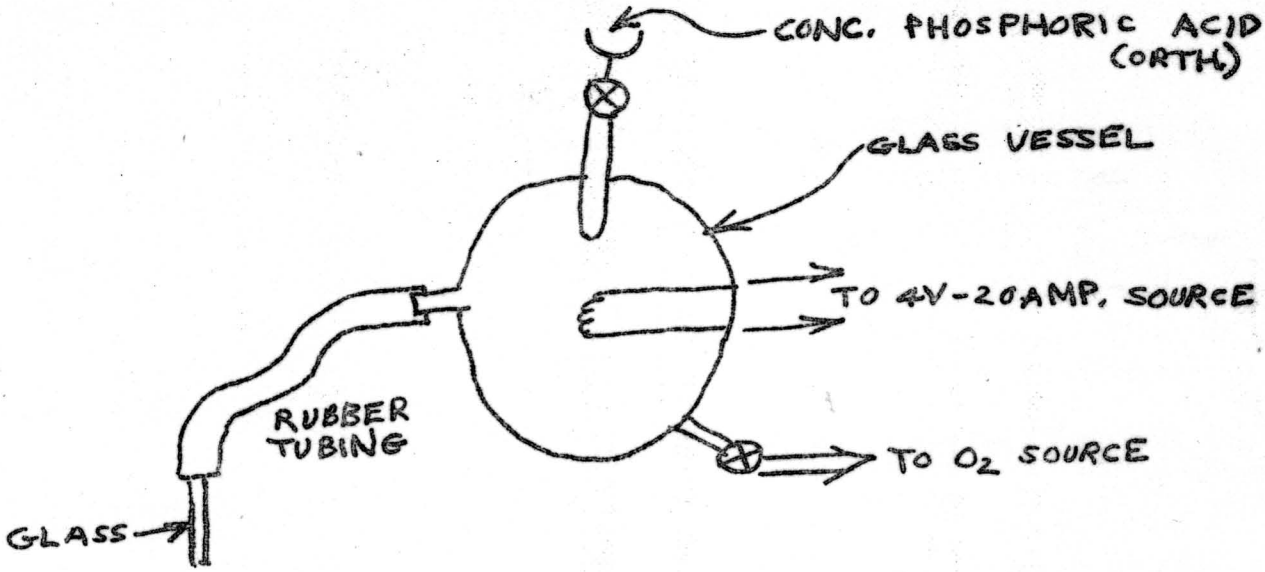
Visit to Cinema Television, London, England

I. Historical Note:

This company originally was the Bear Electronic Company who made all sorts of tubes during the war. Dr. Szago (Sp. ?) now of Rauland was the technical head. Mr. Tomes & Mr. Daniels now respectively directors of 20th Century and Cinema Tel were lab. engineers working for him. The old laboratories in the Crystal Palace in London burned, the company fell into sad days. Szago and Tomes left and the Rank motion picture combine bought out what was left and renamed it Cinema Television. The Rank chain closed out television tubes and set the group to work designing tubes for theater television. The radar and scope tubes were left in the line but were not expanded. Today they run a factory making about 700 tubes per week of the cathode ray variety, exactly similar to our "bread and butter" line, 3,5,7,10, 12 mag. tubes. They make the 3KP1 and other one gun radar types. The engineering laboratory under Mr. Freeman also makes some improved versions plus one spiral anode tube. Only a few manufacturing processes are of interest and I'll note these first:

II. Processes:

A. Screening: They use the dry phosphoric acid process for all non-aluminized types. Although we know this approach, I'll review it here, since they also do this at 20th Century in about the same way.



The acid is dropped, drop by drop onto the hot filament, causing a dense cloud of smoke. A see whiff of O2 is introduced and blows the smoke into a clean bulb through the hosing and glass tube. The bulb at this point looks as if someone had puffed cigarette smoke into it. The smoke is left stand 1 minute. A

stream of air is used to clear the smoke. An excess of phosphor is dropped into the bulb and is rudely shaken about. The bulb is upended and slapped, tapped and cuffed until the excess powder is removed. Another whiff of gas is introduced as a sealer and the bulb is screened. Even double layer screens are done this way and repeated screenings are used to build the layer to the desired thickness. The resulting screens look a lot like our electrostatically precipitated P1 screens.

They use barium nitrate and silicate and have the same poor edges on blown bulbs that we do. (This process is used only on aluminized versions). They float both nitrocellulose or methaculate depending on the mood they are in.

B. Inside Paint: They flood Atcheson Dag #660B with compressed air and then wash out the neck. A real mess.

C. Exhaust: They bought a 40 head rotary machine from Enwhistle. It's a nice job, clearly built. The only important feature is a long vertical glass tubing about 2' long between the oil pump and the compression head. This tubing is 3" diameter and supposedly works in conjunction with the pump baffel to reduce oil vapor in the tube. Silicone oil is used. Silver R.F. Oils are used and one said to outline copper 10:1.

D. Guns: There they simply copy. No attempt is made to standardize pots or anything of the sort. They use ceramic rods, mica cages (ala DuMont) or whatever. They do make a triode section of standard mica and metal parts which is all mounted in a concentric array in a large cylinder. They have rather clever glass people and make a variety of stems and pinches, simply changing molds on a simple single head hand press.

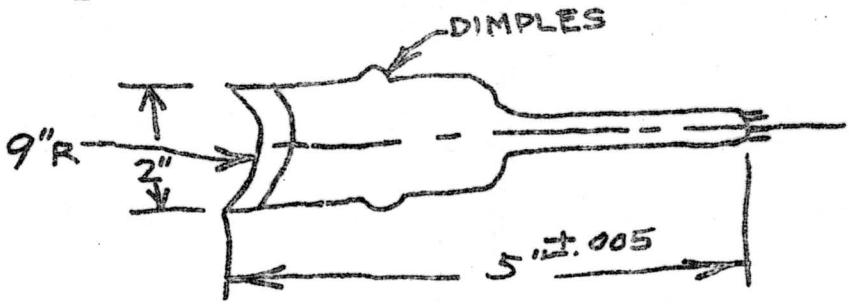
III. Research Laboratory:

Freeman bemouns the fact that they have spent about all their time designing projection tubes. They use a scaled up version of the Phillips 3NP4 gun with the spark trap. No conducting bands are painted inside the tube however. They have the usual unhappy experience with P16, P24 phosphors. No answers for more red content in P24 which they would like to see.

Spiral Anode: They also use a counter balanced piece of tubing on an engine lathe. The tip is a converted pen from a LeRoy type lettering kit. A larger reservoir has been added. Atcheson R80 Dag is thinned with ethyl silicate. The neck of the tube is raised to 50°C by little radiant heaters. The resulting spirals draw about 80 amp @25KV. If the resistance is too high, they fill in the holes between stripes of the spiral with chrome oxide + water as far along as is necessary to drop the resistance within bounds.

Spiral Tube: They make one dandy little tube. This is a high precision tube (P11) which is plugged in and out of an optical system without refocusing. The face is precision ground. It is mounted into the funnel which has been blown in a tube to put on the locating dimples after shrinking on a mandril to make it round. The neck is hypoderic tubing (ground inside). They locate on

this inside surface with an expanding mandril and grind the outside concentric + .001". The whole job is super accurate. The final spot is concentric to the dimples by ± .010".



Neck Down: They are in the habit of putting a constriction in the neck of high voltage tubes to give a convenient place to attach snubbers and reduce stray emission from the lower neck.

Adhesive: They use a solder cement for many things such as sealing faceplates to bulbs (temporary tubes) glass to metal etc:

Cerrated Pasco Mining
Corroseal #35
(50-50 Tin & Indium)

The company that is currently doing the only direct view storage work in England is English Electric (part of the Marconi Chain). We were not able to gain access to the company or work, partly because it is supposedly classified and partly because Marconi didn't care to play. Apparently the work is only a few months old.

Five working days in all were spent at EMI plus two more informal afternoons.

1. Meshes were mounted on 1" rings
2. CuF_2 was evaporated
3. Antimony Trisulfide was mounted on evaporators
4. ECR x 360 was mounted and operated etc.

I'm getting anxious to get back and try some of this stuff.

More later.

/s/ Frederick

P.S. Chan, we just got Corrodi on the phone and expect to see him tonight.