

*circulate
to management
to me on 6-16-52*

*V. C. Campbell
Bldg # 6*

MEMORANDUM

Building #6, Electronics Park
Syracuse - April 28, 1952

SUBJECT: VISIT TO LANCASTER, PA. - FACTORY OF RCA
ON APRIL 17, 1952

Purpose of Visit: To discuss the life test results on tube types under consideration for purchase from RCA and to review finished tube Quality Control.

People Seen: Earl Wood - Plant Manager
George T. Thomas - Manager, Quality Control, Lancaster
Dr. Headrick - Design Engineering
Miss Betty Bell - Factory Engineer

The life test results to date on 16AP4A, 16GP4, 16GP4B and 17CP4 tubes were discussed in detail with Miss Bell, Mr. Thomas and Dr. Headrick. Since the 17CP4 tubes were not manufactured in Lancaster, Dr. Headrick agreed to make lab. test and pass tubes and data to Marion.

Summation of the data resulted in three topics for discussion:

- (1) Leakages - HK, G2
- (2) Gas
- (3) Emission

Leakages

They did not admit having any trouble with these items. Several possible reasons for leakages were discussed. They mentioned that once before they had located emission coating on the sides of the heater sleeve that caused HK leakage. They had recently changed to a substitute inner lead on the stem leads and wondered if that may be adding to the problem. They were not using bead shields on the cathode lead. In the past certain batches of heater coatings had been found to show HK leakage tendencies.

It was agreed that they would analyze our life test tubes and after taking corrective action, would submit more sample tubes for life test.

Gas

This item was discussed at great length. They use higher initial gas ratio limits at higher beam currents than we do. The exact correlation has not been determined but the overall levels are similar.

	<u>Factory</u>	<u>Customer</u>	<u>Cathode Current</u>
GE	.2	.25	200 microamperes
RCA	.4	.50	500 microamperes

An analysis of the initial gas ratio readings on samples sent us indicate they were well within our limits with the exception of one tube. This tube was outside both limits.

They do not use gas ratio increases as a reason for life test failure. They admitted that our concern over increasing gas resulting in the destruction of the cathode and reduced emission was valid. They relied upon the design of the ion trap gun to protect the cathode from damage due to increased gas.

The most serious increase in gas was on the 17CP4 tubes. These tubes were made in Marion and they freely admitted that Marion was in quite serious trouble for this reason. They said considerable work had been expended on cleaning up this problem and they hoped it would be under control soon.

Emission

This characteristic is closely akin to the gas problem.

I explained our method of judging decreases of emission with life. They felt we were 10 to 20% more severe than their method.

General Comments

They admitted our life test data was an "awakening" for them and apparently has been cause for some action already. My general impression of the discussion was that they were trying to justify their tubes without much enthusiasm.

At one point in the discussion they informed me that our life test results were very poor. They pulled out a number of sheets marked "Competitor's Life Test - G.E." for my inspection. The results were quite poor showing gas, low emission, X-burns, etc. I requested to see the actual tubes and in the melee it turned out that the tubes were of their manufacture but contained G.E. guns. One tube was actually G.E. and although the gas ratio was above our limit, the tube successfully completed life.

Quality Organization

The Quality Control Section at Lancaster is about the same as reported in my trip report of March 14, 1951 except the Finished Tube group was reorganized in February.

This function is now termed "Assurance Quality Control" and is aimed at insuring the finished product satisfied specifications and customer requirements.

The following is a flow chart showing where the various control stations are located:

Sample Mechanical Test by Tube Type

Class III AQL - .65%

Cracked Face Plate
Broken Base
Stripped Seal
Cracked Neck-Cone
Broken Bulb
Poor Etch
(All rejects combined
held to .65% AQL)

Class IV AQL - 1.0%

Silicate on Face
Scratched Face
Base Alignment
Poor Soldering
Crooked Pins
Loose Particles
Poor Getter Flash
Dimension Off
(All rejects combined
held to 1.0% AQL)

If passable, no 100% Mechanical
tests are applied to Production -
If reject rate is exceeded, 100%
Mechanical tests are applied at
Electrical test station.

AGING

FACTORY
ELECTRICAL
TEST

Sample Electrical Test by Tube Type

Class I AQL - .65%

Air
Short
Cut-Off
Emission
Beam Strikes Neck
Focus Voltage
Screen Condition
Gas Ratio
(All rejects combined
held at .65% AQL)

Class II AQL - 1.0%

Stray Emission
Leakages
Breakdown
Screen Color Temperature
Screen Color Difference
(All rejects combined
held to 1.0% AQL)

If reject rate is exceeded, notify
Test Foreman who takes corrective
action.

Sample of good tubes from above
Quality Checks are held for 3 days.

Class A - AQL .4%

Air
Shorts
Emission
Gas Ratio over 1.0
(All rejects combined
held to .4% AQL)

Class B - AQL 1.0%

Stripped Seal
Cracked Neck-Cone Seal
Broken Base
Poor Testing
Gas Ratio - .4 to 1.0
Cracked Face
(All rejects combined
held to 1.0%)

Notify Factory, Quality and
Warehouse Personnel

100%
VISUAL
CHECK

PACK

Warehouse Sampling Test

Scratched Face
Silicate
Poor Etch
Poor Solder
Base
Brand
Carton and Labels

Notify Factory, Quality and
Warehouse Personnel

SHIP

In the final test area a bulletin board is used to display the following:

1. Control charts of the range and averages of 4 tube samples taken regularly on each tube type for:
 1. Emission
 2. Cut-off
 3. Light Output and Color
2. Summary Report by tube type for each day of the current month on Class I, II, III, and IV rejects.
3. Summary Report by tube type for each day of the current month on Withholding test records for Class A and B rejects.
4. Warehouse sampling rejections by days for all tube types.

The inspection tables used in the above tests are from the MIL-STD-105A tables for normal and reduced single sampling plans. The sample size for each days sampling test are taken from the production schedule.

W. L. Jones, Jr.
Quality Control Section
Cathode Ray Tube Department

WLJ:edk

cc: RH Berg - Buffalo Tube Works
WH Buck - Office
GF Callahan - Office
VC Campbell - Bldg. #6
GL Case - Bldg. #6
KC DeWalt - Bldg. #6
HR Hemmings - Buffalo Tube Works
A. Hendry - Bldg. #6
RE Lee - Bldg. #6
PB Magee - Buffalo Tube Works
FJ Mayer - Bldg. #6
LE Record - Bldg. #6