Campbell

CATHODE RAY TUBE
EUROPEON TECHNOLOGY SURVEY

F. J. Mayer
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OBJECT: This resume is intended to give a brief summary of the situation observed in the companies visited. A few recommendations for future contact follow. The comments are listed in approximately chronological order. A detailed report covering Industrial, Military, entertainment and factory areas is in preparation, but will be of more interest to personnel working directly in the specified project areas.

GENERAL: I was received with complete candor and no effort was made to be secretive about any of our areas of interest. The one thing that hampers a prolonged stay at any company is the zeal on the part of that company to be hospitable. The net result is that so many key people are occupied in the visit that the visitor wears out any reasonable welcome in a few days. This point is important, because in the future some attempt should be made in two of these companies to send G.E. personnel with a specific problem of mutual interest to G.E. and the Europeon company. This project could be worked on jointly, thus affording the visitor adequate time to observe and learn the fundamental approach being used by the company visited. The survey type visit similar to the one being reported necessarily deals more with finished projects and accomplishments. Such an approach eliminates the chance to learn "how" rather than "what" was accomplished.

COMPANY VISITS:

I. London - E.M.I. (Electrical Musical Industries)

The following people were contacted and the related field of endeavor follows the name:

Dr. L. Broadway	Director Engineering
J. A. Lodge	Storage Tubes Phototubes
R. S. Webley	Storage Tubes
Dr. H.G. Lubszynski	Camera Tubes (Vidicon)

Active work was dropped in this company on storage tubes 2 years ago. A great deal of know how is available here, however. The following products are completely engineered and could be made available for production with little trouble.

VCRX-350 - Electrical Read In-Electrical Read Out storage tube. This tube has a target similar to the Ratheon or direct view type.

VCRX-360 - Storage Orthicon - This tube uses a photo conductive target with the resulting time lag as a storage target.

Vidicon: This tube also uses photo conductivity to transduce from light to electrical energy. When the photo conductor is made thick the resulting lag may be made on the order of 20 seconds for storage work. EMI feels that its vidicon for television application is superior to RCA's. This may be accounted for by the fact that English broadcasting standards (50 field/sec.) allow a greater target capacity which in turn allows a larger target area. An increase in resolution is thus realized.

Photo-Surfaces: EMI makes a complete line of photo and photomultiplier tubes. (See "Recommendations")

CPS EMITRON: This camera tube is built in competition with the RCA image orthicon. It uses a four component photocathode originally developed by Summer (now of RCA). This cathode makes the Emitron, which has no image section, no worse than 5 times less sensitive than the image orthicon. One of the components prevents the cathode from being used in the image orthicon. The Emitron has a superior grey scale rendition and is remarkably free of shading. EMI has a studio demonstration that really strikingly displays the differences between the tubes.

Seven working days were spent at EMI where they demonstrated in the Laboratory the preparation of storage targets for the ECR 350, mesh preparations testing of storage tubes, etc. It is hard to overestimate the value of being permitted to actually witness techniques as they are being performed. Sample targets were brought to G.E. to serve as comparison standards for our work to come.

II. Cinema Television - The people contacted were:

Mr. Daniels - General Manager
Mr. Freeman - Supervisor Engineering Laboratory

This company originally was the Beard Electronic Company during the war. Part of the technical staff left af the Rank motion picture chain purchased the company and renamed it Cinema Television. The new management closed out the manufacture of television picture tubes and set the engineering group to work on projection 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 standard industrial or military cathode ray tubes per week similar to our 5, 7, 10 and 12 inch magnetically deflected tubes. They also make the 3KP1 and similar gun oscilloscope tubes. One spiral anode tube is made.

The visit to this company consisted of a factory visit and an afternoon of technical discussion with the engineering group.

III. 20th Century Electronics - The people contacted here were:

Mr. Tomes	- Director
Mr. N.B. Balaam	- Chief Engineer
Mr. T. Jennings	- Project Engineer phototubes

This is a small alert company about 10 years old. Tomes founded it after leaving Beard Electric to make Geiger counter tubes. These are still a major part of the production. The company makes:

1. Oscilloscope Tubes 1, 2, 4, 8 gun
2. Photomultiplier Tubes
3. Geiger counter tubes
4. Distillation of Boron 10 to Boron 11

Manufacture in this organization is strictly a job shop proposition. Process techniques are those of the laboratory. The engineering approach is strictly limited so far as development is concerned. Designs are chiefly copied. A goodly number of prodessing tricks were observed and the visit was fruitful.

IV. Sieman's Ediswan (Cosmo Works) - The people contacted were:

A. E. Cole	- Engineering
P. A. Deegan	- Engineering
K. Yates	- Factory Engineering

This company spends most of its time in monochrome tube production. They run a few magnetic type radar tubes similar to our 5FP and 7BP lines. A few one gun oscilloscope tubes are made. The only special cathode ray tube work has been in the field of projection tubes.

One day was spent in engineering conference and one day in a factory visit. Quite complete factory processing notes were taken and will be reported later. A special low wattage cathode was observed and has been reported at G.E. where Mr. Campbell is evaluating.

V. ULM, GERMANY - Telefunken - The people contacted were:

Dr. Schaffernicht	- Storage tubes - Monochrome Production
Dr. Gundert	- High Gun Electron Optics
Dr. Dahlke	- Cathodes Life Test
Dr. Bruek	- Director of Engineering
Mr. Otto	- Storage Tubes
Dr. Bauer	- Electron Optics

This was a most rewarding visit and is best related in chronological order. Dr. Bruek opened the sessions by introducing the people and arranging a schedule to speak to each individually. This system lasted but a short time and a more informal set of sessions followed.

Dr. Schaffernicht first discussed the Telefunken electrical read in-electrical read out storage tube. Complete mechanical drawings were furnished. I saw the tube in operation as a band width suppressor. The demonstration was most impressive.

Dr. Gundert spoke at great length of the high Gm gun program. A revised set of specifications from Dr. Nonneken's was discussed. It was decided that the next logical step was to make a fresh attempt to build a distribution modulation gun using the new voltage allowances, then to study the final lens requirements peculiar to such a gun. Dr. Gundert's earlier work on electron beams and deflection systems was discussed at length.

Dr. Dahlke discussed his work on life test and cathode activation. This is an area that should be quite fruitful for cathode ray tube application.

A short factory visit was made and a general cathode ray session was held with Drs. Schaffernicht and Gundert. Spot size measurements and much of Dr. Gundert's work on both the high Gm gun and color guns was demonstrated.

VI. PARIS, FRANCE - C.S.F. the people contacted were:

Messrs. Guenard - Technical Director
Boulet
Choffart
Charles

This firm builds a complete line of storage tubes as well as many sundry magnetron, linear accelerations and other industrial tubes. The storage tubes includes

TCM 13 - Barrier Grid Tube used for noise integration and as a moving target indicator.

TMA 403 - Double ended electrical in-electrical out scan converter similar to RCA's graphicon

MTV 100 - Barrier grid tube featuring multiple read out used for band width narrowing.

TEI 500)
TEI 1000) Direct view storage tubes 5 & 7 inch similar to RCA direct view tubes.

OG 506 Post acceleration oscilloscope tube.

The visit was made to the CSF Research facilities. Most of the visit was spent in demonstration of the finished tubes. Data and published articles were furnished covering much of the same material as was discussed. The exact geometry and nature of the storage surfaces were discussed, although the processing details were not. G.E. has no agreement with this firm, but they were very cordial and frankly stated their preference not to discuss proprietary processes.

VII. LYON, FRANCE - CFTH - The people contacted were:

Mr. Kahn
Mr. Biolley

This is a new plant building about 1000 17 and 21 inch, 90 degree deflection tubes per day. Rather complete notes were made of the critical processing details. This company is licensed by RCA and uses RCA standardizing instructions as a guide. At the time of my visit they were experiencing extreme difficulty with RCA phosphor 287A. The blue component is too long in persistance for the French scanning system.

RECOMMENDATIONS:

A. Any G.E. work on photosurfaces would be enhanced by further contact with EMI. The CPS Emitron is worthy of further evaluation.

B. Cathode Ray Tube would benefit by having an engineer work for several months with Dr. Gundert of Telefunken on a problem of mutual interest to G.E. & Telefunken. G.E. would gain the experience and technique of this outstanding man and would get an electron optical problem solved. One excellent problem would be that of building an electron gun for use in a small neck, wide deflection angle tube. The person chosen should have an excellent analytical background in mathamatics. Previous tube experience would help but should not be used as prime criteria. The program should be one of developing a working philosphy for future cathode ray tube gun work, and the engineer should be expected to continue the work as a speciality for some time after his return.

Telefunken was sounded out and seemed receptive to such a program for the second quarter of 1958.

Frederick J. Mayer, Jr.

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