

SUBJECT: Trip Report to Receiving Tube Department, Owensboro, Kentucky and Vacuum Products Department, Schenectady, New York

Attached is an organization chart of the G. E. departments the Talaria Program will possibly have interest in in the future.

Equipment Development Operation, (E.D.O.), is managed by R. T. Pennoyer under whom the Advanced Equipment Development is managed by E. D. Finley.

This group designs and builds automated spot-welders, wire grid making machines, rotary exhaust and rotary stem and sealing machines, and automatic test equipment. Their work has been primarily for the Receiving Tube production facilities, both glass tubes and ceramic tubes.

If the Talaria gun is to be manufactured in Owensboro, this Department will do whatever equipment development the Tube Department needs. This group also supports the Vacuum Products Department. Example; If a (dry-ion) Rotary Brazing System was being made by the Vacuum Products Department, this group would design the rotary portion of the equipment. E.D.O. will do development for any other G.E. Dept. provided it is within the scope of their experience. Example; Automatic welders.

Ceramic Tube Manufacturing is supervised by E.L. Davis. This group is presently manufacturing thyratrons and planar triodes using Titanium-Nickel-Fosterite braze techniques. In reviewing the yield and shrinkage of their ceramic tubes with a Type Engineer, the average ceramic tube runs as follows:

Good tubes-----	50%
Electrical Shrinkage----	35%
Brazing defects-----	15%

These are mil-spec. tubes and this is the main reason for the 35% figure. If the tubes had commercial specs., there would be only 10% electrical shrinkage. A yield of 75%. The 15% figure is due to temperature variation in the brazing oven. The shrinkage they get is from over brazing, causing excess alloying of the titanium parts with the fosterite. This causes changes in the parts orientation and shifting of critical spacing. They do not consider their oven design as the ultimate but are forced to use what they have having no further development monies.

One problem that keeps recurring from time to time is back streaming from their oil diffusion pumps. This problem is one that they are presently encountering.

Engineering Department - Leo Bowles, Manager. This Department is presently making our ceramic parts under supervision of Ed Broderick. When our parts are made in larger quantities, there are ceramic production facilities that will make the parts at 5¢ to 10¢ apiece; depending on the configuration.

This group would do development work on the Talaria gun if it were necessary to manufacture the gun at Owensboro.

Vacuum Product Department - Schenectady, N. Y.

This Department has expanded in the past two months. Harold Grant, Equipment Design Engineer, is joining them on November 1, 1964. He is thoroughly familiar with the brazing and exhaust problems of the ceramic operation at Owensboro. Mr. Grant was formerly under E. D. Finley of E.D.O. Among his accomplishments was the designing of an Utek Vac.-ion Rotary Exhaust machine. Mr. Rod Brew of Brew Mfg. Co. has joined

Vacuum Products Department. Mr. Brew formerly operated a vacuum oven manufacturing company. These two gentlemen will be an excellent source for designing multiple brazing ovens. A meeting with both of these men is being set up in Schenectady for the week of 10/19/64.

Vacuum Products Department will quote on a 500 L./sec. Triode Ion Pump Evaporator System. Delivery will be by the end of the year.

The Vacuum Products Department is working in several areas that are of interest to the Talaria Program. One is the re-design of Triode Ion Pumps to operate primarily on the 1×10^{-5} and 1×10^{-6} scales. This vacuum is all that is needed for vacuum brazing. To operate on these scales a less expensive pump will be designed. They are presently building a double oven to braze Lucalox to Columbian at 3,000°F with extremely close tolerance, $\pm 10^\circ\text{F}$. or less. This system is completely programmed by multiple power sources to thermocouple monitored oven sections. The monitor controls are built by G.E. in Lynn, Massachusetts. The system should be in operation in two weeks. It is being made for the Lamp Division in Cleveland so we can get all the information we want.

In conclusion, most of the preliminary brazing and exhaust redesign can be done thru the Vacuum Products Department. Their operation has expanded and can take in more work than it could three months ago. In these two areas, it would also be a decided advantage to deal with a G. E. department due to the proprietary nature of the Talaria Program.

Ceramic Tube Department -

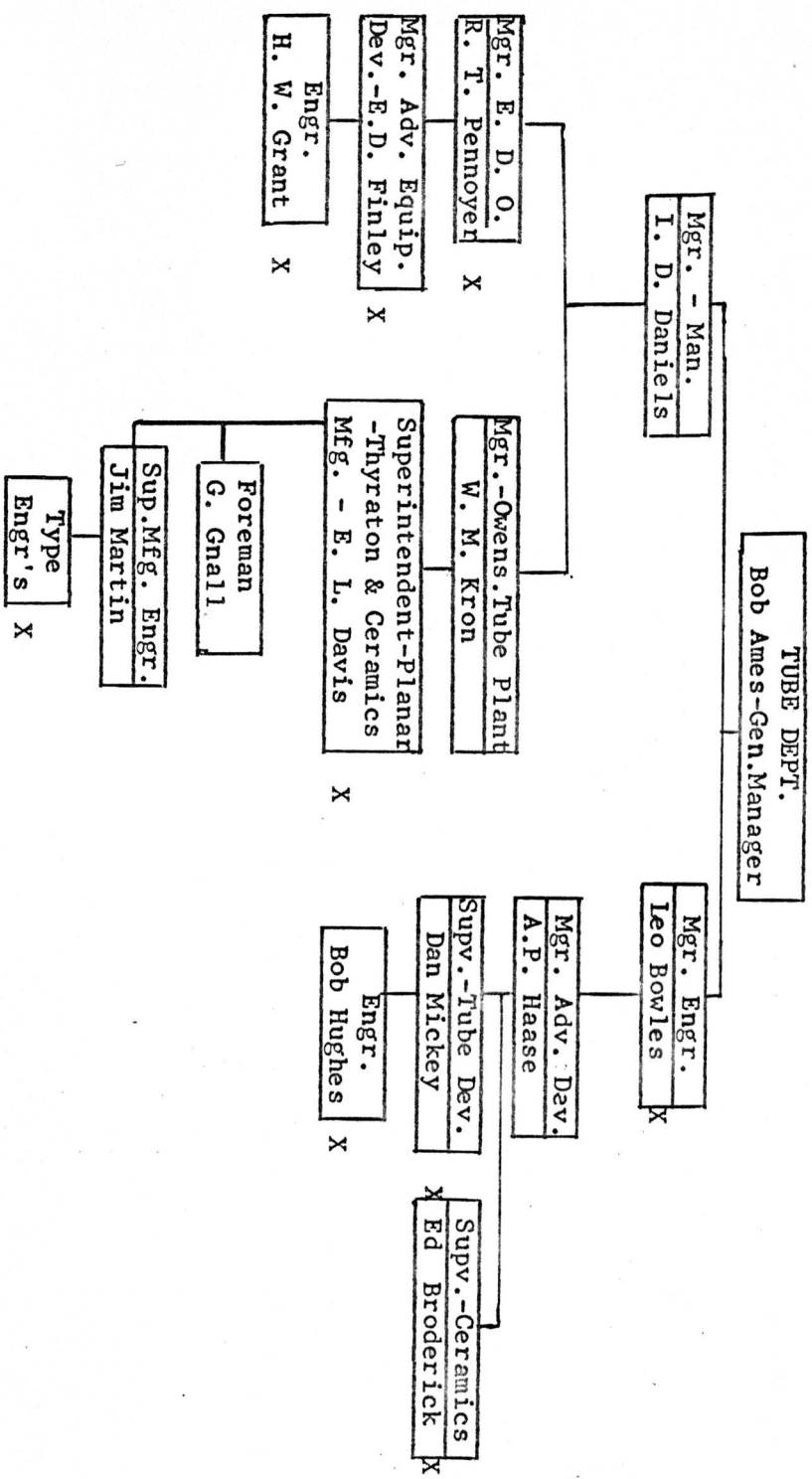
This department, at Owensboro, has the capacity to give us all the Fosterite parts we would need in production. Their ceramic tube facilities would have to be doubled to handle the volume we would need of the brazed gun assembly. Also, the techniques used, while satisfactory for their own tubes, would have to be improved. This would mostly be a matter of improved equipment. They do have the advantage of a production engineering group with much experience in ceramic-titanium brazing and a good engineering development group to back them up technically. All of these factors will be considered quite seriously in future decisions.

R. A. Taylor
Special Projects
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RAT/jr
att.

Distribution: P Capolla
G Case
M Knolls
D Monroe
F Romano
E Schilling

ELECTRONICS COMPONENTS DIVISION
TUBE DEPARTMENT ORGANIZATION CHART (PARTIAL)



VACUUM PRODUCTS DEPT.

