VC Campbell

SUBJECT: 8" Metal Cone Tube Equipment
Development and Cathode-Ray
Tube Design Group Meeting 8/25/48

Schenectady - August 27, 1948

Mr. K. C. DeWalt
Building 269

Present:	Equipment Development	Cathode-Ray Tube Design
	Mr. Murphy	Mrs. Fehr (part time)
	Mr. Hartley	Mr. Campbell
	Mr. Newton	Mr. Jones
	Mr. Palmer	Mr. Waugh
		Mr. Callahan

The object of the meeting was to review present progress, and to make sure the equipment being designed incorporated the latest tube design and processing practice.

The design work and development of equipment has remained for the 8" metal cone small ($\frac{15}{16}$") neck button stem with copper exhaust tube. However, because it is possible the larger ($1\frac{1}{2}$") neck might be used, an effort is made in this report to determine its effect on the equipment development program. It is further assumed that if the larger neck were used, a larger button stem with larger copper exhaust tube, high frequency gun sealing and pin leadwires would be adapted to it.

I. Film Spray Machine

A machine is being designed and built for carrying on further film spraying in the laboratory. However, because this is a process that cannot be evaluated on a laboratory scale, the machine is to be built so that it can be first tried in the laboratory, then moved to the Buffalo Works for a final tryout.

Various improvements and changes have been and are being made on the present rough equipment, since Equipment Development started their design work. This is especially true of the method of cleaning the excessive film from the bulb. It was necessary to ask Equipment Development to hold up on the design work on August 10. As of today, they were asked to go full speed ahead. The problem of completely removing the excessive film is not solved, but is thought inadvisable to hold up further work on a detail that can probably be worked out later.

The equipment being designed will incorporate the items listed below. Two machines, A and B, are to be designed and built. "A" will provide the following:

1. Single head.
2. Operate in hood.
3. Machine to handle the range from 7 to 16" bulbs.
4. Screened bulb on which phosphor has been wet with distilled water by hand is placed on machine (face plate up). Machine will spin bulbs at a range of speeds from 500 - 1000, while small stream of water playing on inside of funnel is carried upward by centrifugal force for 10 - 15 seconds. Face sprayed with film by means of solenoid (variable timer) operated spray gun for about 2.8 seconds.
5. Spinning stopped for few seconds to allow water to drain out.
6. Bulb rotated again (range 500 - 1000) with water stream on, to wash out excess film for about 15 seconds.
7. Provision to be made to adjust the spray gun nozzle over a range of about 3 inches.
8. Provision to be made to shield nozzle of gun from water spray.
9. Provision to be made for low speed range of 40 to 80 rpm.
10. Door of spray enclosure should lift instead of swing, and if practical, two sides also lift.
11. Equipment to be built with safety precautions (flying glass).

Machine "B"

This machine is for brush cleaning the excess film. It is to consist of a machine for rotating the bulb at low speed (40 to 80 rpm) with the bulb axis variable from vertical to horizontal. Foot petal or other means for stopping the bulb rotation.

Status:

Equipment is at the design stage. Equipment Development to finish drawings, final check with CRT Design, then proceed with construction.

II. Stem Machine "A"

A 24 head miniature stem machine was obtained from the Buffalo Tube Works. This machine is being converted to make button stems suitable for the 8" metal cone small neck tube (pin circle and pin heads different from miniature). The machine is expected to be ready (with 4 heads) to try out aroung Sept. 1. Lead wires needed now. Shipment promised end of this week. Five hundred hand cut 50 mil. rounded end nickel leads to be furnished Equipment Development by CRT design for working on lead loader.

Five hundred stems are to be made on above machine for CRT Design Group.

CRT Design are to design and build necessary equipment for high-frequency sealing of above stems.

Stem Machine "B"

For making button stems with copper exhaust tube for the 8" small neck tube. Same machine as above. After running off the 500 button stems mentioned above (which do not have exhaust tubes) the machine is to be converted over for making a button stem similar to the above, except it is to have a copper exhaust tube.

The machine is intended for production, but only one or more heads are to be completed for tryout and for supplying CRT Design with sample stems for further work.

First stems expected late in September. Equipment Development are to make up the exhaust tube subassemblies. Work at Equipment Development being delayed for want of chrome iron sleeves. CRT Design are trying to get detailed specifications from mfg. A on processing. Nickel plating of chrome sleeve not received yet.

CRT Design are to provide the necessary equipment for high-frequency sealing the stems. Requirements for making button stem for larger neck will be determined.

III. Equipment for Face Plate and Neck Sealing

The machine is designed and being built for sealing 8" cone face plates, and also by changing the heads for sealing necks to the cone. The face plate seals are to be made with the face up. The neck seals are also to be made with the neck up. Gas fires are to be used.

The machine is being built for production, but one head for each of the two operations will be mounted for tryout and for carrying on further CRT design work.

The machine has 8 heads, 16 positions. The head circle diameter is 4 ft. (19" C to C for 8 heads).

The sequence of operations is given below.

	Face Sealing	Neck Sealing
1.	Preheat	Preheat
2.	"	"
3.	"	"
4.	"	"
5.	"	"
6.	Face Seal.	Neck Seal
7.	Anneal	Anneal
8.	"	"
9.	"	"
10.	"	"
11.	"	"
12.	"	"
13.	"	"
14.	"	"
15.	"	"
16.	Load and unload	Load and unload

The machine will have an asbestos-faced plunger for manipulating the face plate during sealing instead of using air. During face plate sealing, the small end of the cone sits, and is locked on an asbestos ring. During neck sealing, the cone face sets on a shaped asbestos turntable. Although it is planned to seal the face plate first, then the neck, it will be possible on this machine to reverse the order of sealing.

The machine is designed for 8" cone small neck sealing. It can be quite easily adapted to handle the larger neck sealing.

Status:

Machine (one head for each operation) will be ready to try out around Sept. 20.

IV. Gun Sealing:

Machine is being built for gas fire sealing button stem in 8" metal small neck tube.

It will be a 8 head, 16 position machine on the same chassis as III above. Although it is being built for small sealing, it can be fairly easily adapted to larger neck sealing.

Status:

Machine (one head) will be ready for tryout about Sept. 15.

V. Exhaust machine

A 24 head exhaust machine is being built for the 8" metal small neck. Copper exhaust tube. Spacing of heads in 13 5/8" (i.e., for larger tubes, alternate heads would have to be used). With minor changes, the 8" cone, large neck, large copper exhaust can be pumped on the machines.

Status:

Date of completion not determined yet as delivery of some materials indefinite.

Information, materials, etc., needed by Equipment Development from CRT Design Group.

I. Film Spray machine.

1. Close coordination of present development work.

II. (a). Button stems (without exhaust tubes)

1. 5000 lead wires. Promised delivery week of 8-23
2. Gauge 46A1G12 tubing 8.2 mm long. Received. To be delivered to Equipment Development.
3. Gauge 36B2G12 tubing 8.2 mm long. Received. To be delivered to Equipment Development.

II. (b) Button stems (copper exhaust tubes)

1. 5000 lead wires (same as A). Promised delivery week of 8-23.
2. Gauge 46A1G12 tubing 8.2 mm long. Received (To be delivered to
3. Gauge 31A1G12 tubing 12 mm long. Received (Equipment Development

Chrome iron sleeve, nickel sleeve and copper tube are to be procured by Equipment Development.

III. Face and neck sealing machine.

1. Drawings of new 8" metal cone with smaller end. Delivered to Equipment Development.
2. Drawings of glass funnel and neck for small neck tube.
3. Drawings of funnel and neck for larger ($1\frac{1}{2}$") neck tube.
4. Subassembly drawing of 1 and 2 and 1 and 3 above.
   40 8" cones, promised delivery - immediately
   200 small glass funnels with sealed necks. Inquiries, but not ordered. Plan to use hand converted bulbs until proper glass assemblies are received.

IV. Gun Sealing

1. Drawing of sealed-in gun for small neck tube.
2. Drawing of sealed-in gun of larger neck tube.

V. Exhaust machine

1. Preliminary exhaust schedule.
2. Drawing showing the location and type of getter.

Because of the extent and urgency of this program, close and immediate cooperation is urged between Equipment Design and CRT Design groups. Comments or criticisms of this report are most welcome.