T-4

January 12, 1955

TRIP REPORT

E. A. Baines
D. R. Coffman
J. Gorman
L. C. Maier
J. C. Nonnekens
E. F. Schilling

Place: Pittsburgh Plate Glass Co., Pittsburgh, Pa.
Persons Present: Mr. M. Marshall, Sales Manager, Pittsburgh Plate Glass Co.
Mr. T. Uleman, Ass't. Sales Manager, Pittsburgh Plate Glass Co.
Mr. L. E. Fix, Ass't. Director of Research Laboratory, Pittsburgh Plate Glass Co.
Mr. J. Golightly, Specialist in Glass Bending, Pittsburgh Plate Glass Co.
Mr. J. Gorman, Purchasing, General Electric Co.
Mr. S. Jutila, Design Engineering, General Electric Co.

Purpose of Trip: To obtain information on glass pan construction for screen assemblies and to get some samples made.

Date: January 10, 1955

Report By: S. T. Jutila, refer to report by Mr. J. Gorman who gives purchasing, price and delivery time requirements.

INTRODUCTION:

In making glass pans for tri-color CRT screen assemblies, several expenses and distortion disadvantages are encountered if pressing and/or ordinary molding operations are used. Thus, it is worthwhile to study the possibilities of sagging and bending operations, edge forming and frit applications. To obtain a reasonable flatness of the phosphor screen an ordinary plate glass may serve as a reasonable starting point in manufacturing of glass pans. In order to obtain information for these possibilities, the above mentioned gentlemen at the Pittsburgh Plate Glass Company were contacted.

FRIT METHOD OF MAKING GLASS PANS:

The discussions with Mr. Fix, Mr. Uleman and Mr. Golightly revealed that certain, properly chosen frits may be used to make a glass pan. The edges will be bent in two parts and ground flat. The properly formed front plate is then united mechanically with the edges by using frit. This glass frit is chosen so that the temperature expansion properties are very much the same as that of the glass used for the edges and the front plate. This frit can also be chosen so that it melts

just below the softening temperature of the used glass. Thus the glass plate is not distorted in the process and ordinary tolerances are maintained. (Figure 1) After the pan is joined, the edges are again ground to the proper dimensions. We note that the frit must stand temperatures of exhaust up to 425° without a loss in mechanical strength. Such frits can be made.

We will be supplied 12 samples of the above glass pan, these are to be made by the laboratory at the Pittsburgh Plate Glass Company. We may expect these samples in one month.

According to Mr. Uleman, the above method is not necessarily the most economical one since several operations are involved.

EDGE FORMING METHOD OF MAKING GLASS PANS:

Mr. Uleman pointed out that RCA used to make small face panels for CRT tubes using edge forming techniques, the proposed possibility of such an approach for making glass pans.

The discussion with Mr. Fix, Mr. Uleman and Mr. Golightly revealed the following method (Figure 2): A forming plate made of graphite or charred apple wood is used in the lathe. A cam follower system is used for positioning flames for edges and a preheating unit is used on the front of the plate to preheat the plate up to 900°F, or below the softening temperature. The edge flames are then applied and edge formed by a skilled operator. Operations are done in a vertical position of the plate edge, flames preferably in some position below the plate to be formed. Thus the flat screen position is never heated to soft stage but the edges are worked to the proper form. Therefore, the tolerances of the inside surface are those of the original plate glass surface. After the pan is formed, the edges can be ground to proper dimensions w.r.t. the inside surface. This method may be an economical one to produce glass pans. The actual forming of edges should take some ten minutes per glass pan.

THE GENERAL APPROACH:

The general plate glass approach of making glass pans is to keep the phosphor screen surface plate of the pan below softening temperatures, thus avoiding distortions and then work or join edges to the pan. Grinding can then be applied to achieve the proper dimensions of edge height w.r.t. inside front surface of the pan.

Thus the tolerances of plate glass itself will be the limit of inside surface tolerances.

NOTES ON GLASS:

RCA has had some tubes through 1500 hour life test where 30KV electrons bombarded the screen glass. After the test, some fifteen percent drop in transmission was observed. It is observed that relatively high energy electrons are

capable of browning glass. This effect becomes noticeable in the neighborhood of 30KV.

We were shown a browned glass cube as a result of cyclotron bombardment. Some similar effect apparently occurs when 30KV electrons bombard the glass sufficiently. Such electrons also produce soft x-rays.

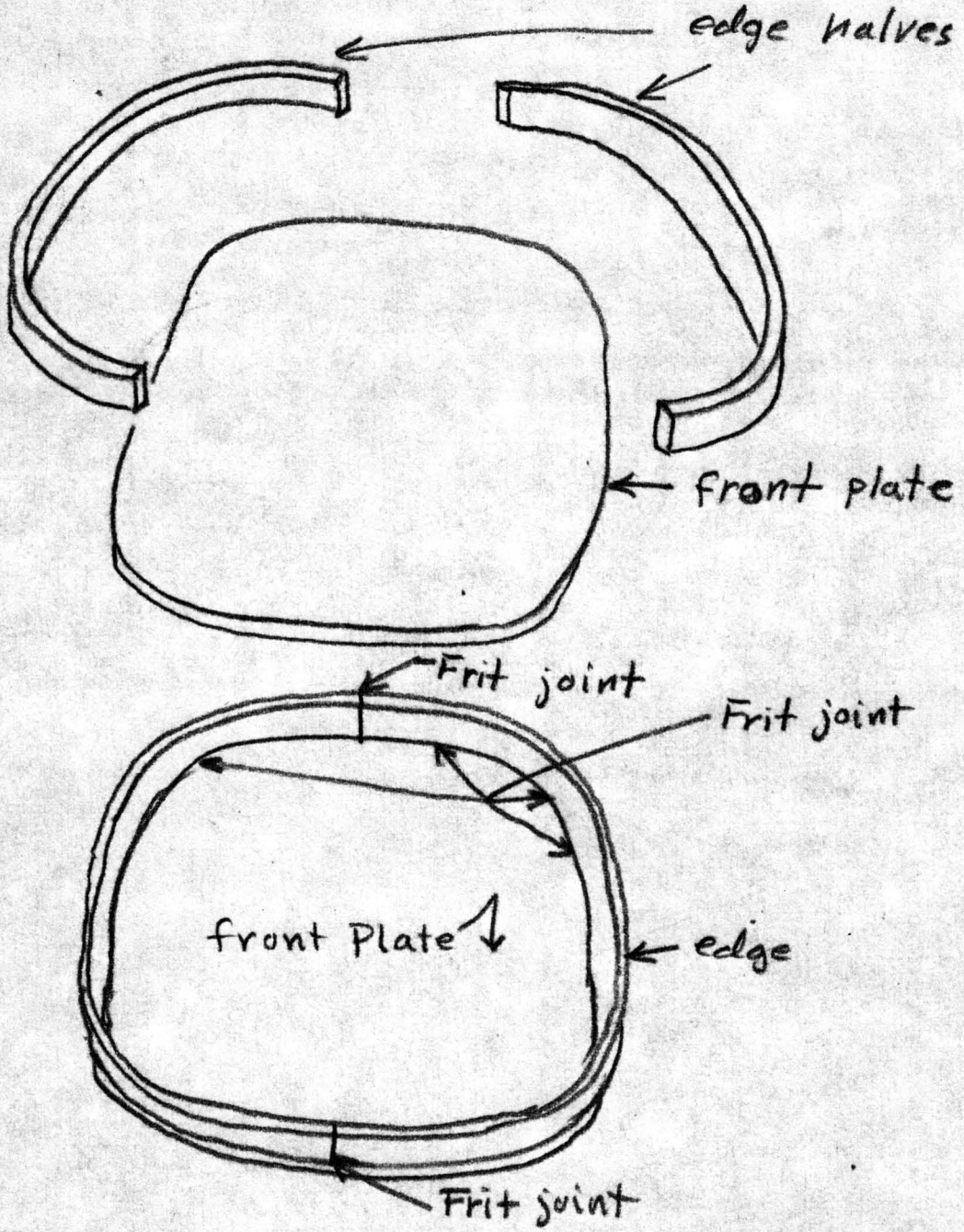
Mr. Uleman informed us that a new glass 5533, has been developed and is available in one month's time. This glass is:

1. non-browning for 30KV electrons
2. x-ray obsorbing
3. v77% transmission property
4. such that it can be sealed with chromium

The new glass thus incorporates the above improvements for television color CRT applications. We should like to use such glass for glass pans as well as for other screen applications.

S. T. Jutila
Color Design Engineering
CATHODE-RAY TUBE SUB-DEPARTMENT

/fmd



Bake Frit to joint above Frit Melting Temperature and below edge and front Plate softening Temperature

Figure 1

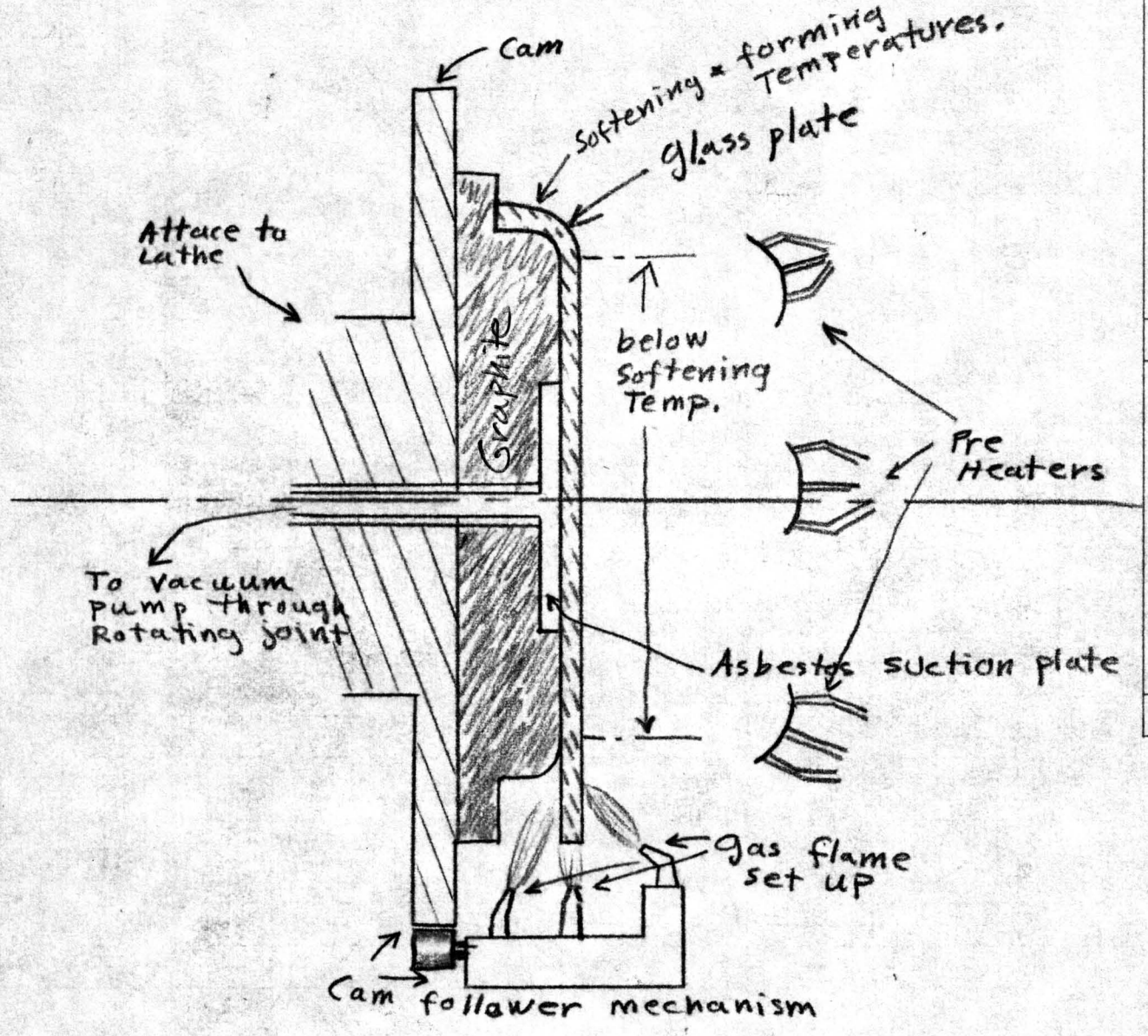

Cam
Softening & forming Temperatures.
glass plate
Attace to Lathe
Graphite
below Softening Temp.
Pre Heaters
To vacuum pump through Rotating joint
Asbestos suction plate
Gas flame set up
Cam follower mechanism

Figure 2