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Project Whirlwind
Servomechanisms Laboratory
Massachusetts Institute of Technology
Cambridge, Massachusetts

SUBJECT: DISCUSSION OF 7AK7 PRODUCTION, EMPORIUM, PA., JUNE 15, 1948

To: H. Fahnestock

From: D. R. Brown

Date: June 18, 1948

Those present at the morning discussion were:

Mr. N. J. Reitz
Mr. V. H. Campbell
Mr. R. W. Slinkman
Mr. R. S. Fallows
Mr. T. C. Clough
Mr. D. R. Brown

Over 1,100 7AK7's were made last week; all were rejected because they did not meet the specifications for control-grid cutoff. At $E_{o1} = -11v$, I_b was between 3 and 4 ma average. The problem here is one of aligning the No. 1 and No. 2 grids.

Their 7AK7 life tests, at $E_{o1} = -7v$, shows a 15 to 20 percent decrease in I_b at 100 hours. This is much more than is normal. For example, the 7AD7, operated at $E_{o1} = 0$, $E_{o2} = 150v$, $E_{o3} = 0$, and $E_b = 300v$, showed from zero to 10 percent drop in I_b after 500 hours of life.

We have found that at rated dissipation the 7AK7 plate current decreases about 25 percent in an hour or so. If the dissipation is kept down, the plate current does not deteriorate. Also, we have used the 7AK7's as ionization gauges and found the gas current about 30 times what it is in the SR-1030, C-5245. Gas current in 7AK7's which were preburned for 100 hours is about 15 to 30 times less than the gas current in new 7AK7's.

Reitz has made some changes in going from the SR-1030, C-5245 to the 7AK7. In the first place, different machines are used to wind the grids and the tubes are assembled by different mounters. The SR-1030, C-5245, was made in the experimental shop whereas the 7AK7 is made in the production-development shop. The same machine and ageing racks are used, however, and only slight changes have been made in processing.

Changes in materials have also been made. The plate material has been changed from carbonized nickel to aluminized steel. The grid laterals

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have been changed from gold-plated, to silver-plated in the most recent 7AK7's. Reitz believes the change in plate material accounts for the increased gas pressure.

As a result of the changes made in going from the SR-1030, C-5245, to the 7AK7, Emporium has run into two difficulties. The first, a grid-alignment problem, is probably due to the use of different mounters. This may be remedied by going back to the original mounters. Reitz is now having tubes assembled by the original mounters. The second difficulty, the increase in gas pressure, is probably due to the change in materials. Reitz will revert to the materials used earlier in an effort to bring the gas pressure back to normal.

Emporium has been unable to meet the specification for transconductance of the 7AK7 and has been sending us tubes with low g_m . This may be corrected when their other difficulties are corrected. Since we are not interested in small-signal g_m , this failure to meet the specification is not important.

I told Reitz that he could temporarily relax the control-grid-outoff specification from -11v to -12v if he had to do so to send us tubes in the near future. All tubes so sent will be clearly marked. In any event, they will not send us tubes until the gas pressure is brought back to normal.

We should stop preburning 7AK7's, since those we have received so far are not suitable for application in WWI. Our present 7AK7's may be used for experimental work provided the dissipation is kept down. The tubes will probably work all right in WWI circuits if they are not preburned, but should be replaced by good tubes when we receive them.

Signed

D. R. Brown
D. R. Brown

DRB/spr

cc: J. W. Forrester
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