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Memorandum M-2911

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From: Division 6 Staff

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SECTION I - CAPE GOD SYSTEM

1.1 Group 61

1.10 General

(R. J. Horn, Jr.) (CONFIDENTIAL)

Work on the 1954 Cape Cod System is somewhat behind original schedules, but initial program testing should begin around the first of August.

The first successful raid-size test of the second series was conducted 16 July. This initial data indicates that the TPS-10D may be less sensitive than the MPS-4 for raid-size assessment. As in earlier tests, the view presented to the radar appears to be a most important variable.

Work is under way on programs for using Raydist to check accuracy in the Cape Cod System.

A ten-week indoctrination course for new staff members has begun.

(D. R. Israel)

In conjunction with Arnow and Walquist, work has begun on those sections of the rewrite of TM-20 which have been assigned to Group 61. A fairly detailed outline of the Appendices A and B has been completed, and work will start immediately on the preparation of the first draft.

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1.3 Group 651.31 Activities of Group 65

(P. Youtz) (UNCLASSIFIED)

Representatives of IBM High Street and Vestal Labs, Convair, and MIT met in Cambridge for a three-day conference on problems associated with the Charactron. The electron optics of the Charactron were thoroughly discussed, and a program for further development was formulated. Convair and MIT will continue work on this problem. Forty-five new 19-inch Charactron bulbs were received from Corning. These bulbs show a slight strain pattern around the anode button because of the thermal mismatch between the button and the glass in the funnel. Also the necks were poorly sealed to the funnels. These were experimental bulbs hurriedly produced before Corning's vacation period. Corning assured us these faults would be corrected in their production runs. Helical-dag coatings were put on these new bulbs successfully. Three tubes were processed to evaluate the post-accelerator configuration. Three bulbs with helical-dag coatings were shipped to Convair so that they can start their program.

Test specifications, test procedures, and data sheets for the 19-inch Charactron were reviewed and discussed. Convair has proposed building a packaged piece of Charactron test equipment for IBM to use for inspection, receiving, and as a maintenance tool.

The next meetings with Convair are scheduled in San Diego on 16, 17, and 18 August. Three preproduction models of the Charactron are scheduled to be ready for delivery on 15 August. These tubes will be tested and evaluated before shipment. Also test specifications, procedures, and data sheets will be reviewed again.

Three Typotron tubes were received from Hughes Aircraft. Work continued on the life tests and the evaluation program. Hughes has not yet incorporated any of the changes in the electron-optical system proposed 23 and 24 June. They agreed to send data on an alternative design by 21 July. If this data is not satisfactory, a higher priority must be assigned to formulating the optimum optical system for the Typotron. Recent checks on the leakage currents in the Typotron indicate that the handling and processing of the tube could be more carefully controlled. They have moved into their new production facilities recently. The next meeting is scheduled for 19 and 20 August at Culver City, California.

Trips have been made to Sylvania, Emporium; RCA, Lancaster; and DuMont, Passaic, in behalf of the commercial-tube improvement program. Investigations indicate the recent difficulties facing Sylvania in producing tubes of the 7AK7 family have been the development of a shift in contact potential on the suppressor grid instead of cathode poisoning. These tubes can be used as interim tubes until this problem is solved.

A trip is scheduled next week to Owensboro to discuss production of Z-2177 with General Electric.

1.31 Activities of Group 65 (Continued)

(P. Youtz) (UNCLASSIFIED) (Continued)

The tube-production facilities at Barta will be shut down this next period during the vacation period of the tube construction section.

1.33 Research and Development

(P. C. Tandy) (UNCLASSIFIED)

The d-c cathode current apparently changes very little with life test. This is not true of pulse-beam current, however. Three tubes, Cht-36, Cht-37 (both helical-dag tubes), and Cht-41, a double-band tube, were life tested. Cht-41 showed a 40-per-cent drop in pulse-beam current at zero bias as life progressed from 125 to 317 hours. After 357 hours of life the cathode image showed 70 per cent of the area with poor emission. In the last 163 hours the grid drive for 1-ma cathode current increased 4 per cent while the poor-emission area of the cathode increased from 30 per cent to 70 per cent.

After 165 hours on life test, Cht-36 had a zero-bias pulse current of 195 microamperes, while the d-c cathode current did not change appreciably. During this period the grid drive for 1-ma cathode current increased 4 per cent, and 5 per cent of the cathode area developed poor emission.

After 357 hours on life, Cht-37 showed a 10-per-cent drop in d-c cathode current in the last 214 hours. In this 214-hour period the pulse-beam current at zero bias dropped from 116 to 42 microamperes for a change of 64 per cent, while the grid drive for 1-ma cathode current increased 4.3 per cent. The poor-emission area of the cathode increased from 50 per cent to 90 per cent.

The life-test data so far indicates that the expected useful life on these tubes is not long enough. It should be noted, however, that all the above life tests were made on a d-c basis with a cathode current of 1 microampere. This extreme condition is designed to give an indication of tube life in a short period of time. In the final analysis, life-test conditions similar to operating conditions should be used on a few tubes to establish correlation.

(H. B. Frost) (UNCLASSIFIED)

Except for several staff conferences, my time during the past two weeks has been spent exclusively on writing my thesis.

1.33 Research and Development (Continued)

(L. B. Martin) (UNCLASSIFIED)

Leakage tests have been made on all Typotron tubes in Barta. A memorandum on these tests is in preparation. In addition to the tests on the Typotrons, leakage tests will be made on the experimental helical-dag tubes for comparative purposes. For further comparison the leakage tests on several randomly selected MIT storage tubes will be included in the memorandum. The storage-tube data will either be taken from storage-tube notebooks or from tests made on the tubes in storage.

While making leakage tests, a strain crack was noticed in the rim of Typotron No. 366. After photographs are taken of the crack, the tube will be returned to life test. The tube is not down to air.

Work is progressing on life-test expansion. The following revision in display plans has been made by C. L. Corderman: since the new Typotrons will have compensation plates, compensation will not be required in the deflection line-drivers. This means that the tubes with no compensation plates will be tested to failure without the character-cycling feature. The new mounts are being designed to take only the new type tubes and the old mounts modified as the old tubes fail.

The following is a list of Typotron tubes and their hours of operation on life test:

<u>Tube No.</u>	<u>Hours</u>
265	3042.6
280	2224.6
335	1407.6
366	681.8
390	705.8
392	705.8
389	681.8

(S. Twicken) (UNCLASSIFIED)

A trip was made to Sylvania with P. Youtz and A. Zacharias in regard to the low d-c plate currents of the SR-1782A. Sylvania agreed with our findings that the suppressor-grid contact potential and not poisoned cathodes was responsible for the low d-c currents; provisions were made to replace the d-c plate-current test with a pulse-current test in the interim tube only. The final tube will still have to meet both tests.

A trip was made to RCA, Lancaster, Pa., with T. F. Clough and P. Tandy to discuss the Charactron from the point of view of RCA possibly becoming a second source. The 6161 and 6146 were also discussed with a