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Division 6 - Lincoln Laboratory
Massachusetts Institute of Technology
Lexington 73, Massachusetts

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COVER SHEET

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1.3 Group 65

1.31 Activities of Group 65

(P. Youtz) (UNCLASSIFIED)

A trip to the west coast is planned for the week of 11 October 1954 to finalize some of the specifications for the display tubes.

Intense efforts were directed toward screen aluminizing and optimizing the phosphor studies. These results were necessary to complete the final specifications for the Charactron tubes. The phosphor studies were not completed. A tentative specification for the P7 screen will be adopted next week. The aluminizing studies were completed satisfactorily. The data will be presented to Convair along with the necessary processing procedure. It is hoped that a specification can be written on the aluminized screen so no further problems arise.

Some effort was directed toward finding a new type of cathode for the Charactron gun. Present life-test studies indicate that the oxide-coating cathode is not the most satisfactory cathode for the Charactron gun. Under investigation and study is the sintered-cathode work of Bell Labs and others. More intense effort will be directed to this study in the future.

Work continues on expanding the life-test positions for the Charactron and Typotron studies.

Hughes has made some Typotrons this period which meet all of the tentative specifications.

Personnel from the IBM High Street Tube Group have been working with the test group at MIT to become familiar with display-tube test circuitry and operation.

I made a 2-day trip to Poughkeepsie to discuss the SR-1782 tube program and display-tube program.

1.33 Research and Development

(S. Twicken) (UNCLASSIFIED)

Discussions with the Project High Tube Group have resulted in concurrence on the specifications of all but one of the electron tubes for AN/FSQ-7 duplex equipment which are to be purchased to MIL specs. Specs on those tubes on which improvement programs have been underway are not yet completely frozen in regard to AQL's, etc.

1.33 Research and Development (Continued)

(S. Twicken) (UNCLASSIFIED)

The 5687 tungsten-nickel cathode-alloy life test has reached 3400 hours without any major changes in plate current such as are exhibited by standard tubes under the same conditions. A considerable amount of grid emission has developed on the cutoff sections, however, indicating a possible problem in the future application of this type of cathode sleeve.

Life tests on the RCA A4688B (5965 type) have reached 2000 hours with the appearance of considerable grid-cathode leakage. A small amount of interface has also appeared in a few tubes.

The life test on the GE 5965 has reached 5400 hours. No interface is apparent. Considerable grid emission has developed on the cutoff sections, however.

(T. F. Clough) (UNCLASSIFIED)

Group 63 has experienced some difficulty with the 3C45 hydrogen thyratron tubes which they use as a high-current pulse generator to examine the switching coefficients of magnetic cores. The rise time of pulses through these tubes increases appreciably after a few hundred hours of life. This probably results from the hydrogen cleanup process which is normal for these tubes. A series of tests at Bomac confirmed this. Data on several 3C45's of more recent manufacture have been recorded. These tubes will be observed during life to determine if the designs and processing changes in the more recent tubes will minimize this increase of rise time.

Work is being done in cooperation with Groups 60 and 62 to improve tube records by speeding up the feed-back of essential tube data.

Sylvania reports that 7AK7's have just gone back into production, and they estimate that delivery of our outstanding order should start within 1 month.

Replacement of the 5965's in MTC with Z-2177's (the improved 5965) began during this period. This will provide a large-scale test of this type and enable us to test the tube record-keeping procedure which is planned for XD-1.

(P. C. Tandy) (UNCLASSIFIED)

Pulse-transfer characteristics have been taken on three Characteron tubes. The curves for Cht-62-1 show little change between 25 and 265 hours on life test. Cht-61 is a good tube after 368 hours on life test, while Convair 0074 Characteron has a very noticeable hump in the cathode-current curve, and the beam current is flat over an approximate 30-v range of grid bias after 49 hours of life test. The Convair 0074

1.33 Research and Development (Continued)

(P. C. Tandy) (UNCLASSIFIED)

cathode emission is poor in the center indicating ion bombardment of the cathode.

A gas test has been made on Cht-61 and Cht-62-1. An ion current of 0.8 to 1.1 millimicroamperes on Cht-61 and 0.4 millimicroampere on Cht-62-1 were noted when the cathode current was 100 microamperes. The A_1 and A_2 voltage is 500 volts, the deflection plates and matrix voltage, 100 volts; the heaters were operated at 6.2 volts. This gas test could not be made on the Convair tube because it did not have a separate matrix lead, and it has different basing arrangement.

(L. B. Martin) (UNCLASSIFIED)

Two of the latest Typotron tubes, 419 and 426, have been tested for leakage; both tubes exceeded tentative specifications. An anode button on tube 419 came off because of a cold soldered job. Since this trouble has not been uncommon, a detail photograph was taken of the poor connection. The picture will be shown to Hughes in an effort to get them to direct more attention to their soldering technique.

A plan has been tentatively agreed upon for the location of the 16-position Typotron life test and the 10-position Charactron life test in 026 Barta. The plan involves the use of hall space adjacent to 026 for storage and the removal of about five benches. These changes will allow the two life tests to be lined up along the outside wall. Progress is continuing on the life-test units. Multiple units will be built at Lexington after the prototype is built and debugged at Barta.

Foster Holmes from IBM was at Barta 5 October to discuss modifying the Charactron Production Tester being built for IBM by Convair to test Typotrons. It would seem that the most difficult part of the modification will be mechanical in nature.

The following is a list of Typotron tubes, their condition, and total hours on life test:

<u>Typotron Tube</u>	<u>Total Hours</u>	<u>Condition</u>
265	4790.8	marginal
280	3972.8	satisfactory
335	3155.8	satisfactory
366	2454.0	satisfactory
389	2370.2	satisfactory
390	2454.0	satisfactory
392	2454.0	satisfactory
394	1671.9	marginal

1.33 Research and Development (Continued)

(A. Zacharias) (UNCLASSIFIED)

The experiments on aluminizing were completed. It was found that after an initial bakeout of the aluminized face, no further aluminum would be lost on successive bakeouts.

Phosphor evaluation studies on 7-inch cathode-ray tubes were started. To evaluate the aluminum-screen contact to the button, a suggestion by D. V. Mach was investigated. This involved the use of a capacitance bridge to measure the capacity and power factor of the condenser formed by the aluminum screen and a piece of aluminum foil formed over the outside of the tube face. This proved to be an excellent test for the condition of the screen contact.

The 7-inch tubes are presently being tested. Very definite indications of an optimum blue layer are evident from the initial tests.