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

SUBJECT: BIWEEKLY REPORT FOR 14 JANUARY 1955

To: Jay W. Forrester

From: Division 6 Staff

Approved: John B. Bennett

CONTENTS

Academic Courses

(J. W. Forrester) (UNCLASSIFIED)

A memo will soon be circulated listing MIT subject to be taught next term in the Lincoln buildings. Staff members are encouraged to enroll. Any subject for which there is insufficient enrollment will be cancelled.

Monthly ADES Review

(J. W. Forrester) (UNCLASSIFIED)

The regular (second Tuesday of each month) ADES review was held this week in New York. In preparation for the meeting, Western Electric posts progress schedules and prepares comments on the several parts of the SAGE System program. This prepared material is discussed at the meeting and later mailed out by Western Electric.

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1.3 Group 65

1.31 Activities of Group 65

(P. Youtz) (UNCLASSIFIED)

All construction and processing procedures for building a 19-inch Charactron tube in the Barta Building tube laboratory were reported in rough-draft form this past 2 weeks. After this information is edited and studied, it will be published. This report gives one method of making a quality Charactron tube, and it can be used as a guide for studying and evaluating any production methods of making large-display tubes.

We have been reproducing some of Convair's critical production techniques in our laboratory.

The life-test programs for the Charactron, Typotron, and sintered cathode have been progressing satisfactorily.

I attended conferences with the IBM Project High Tube Group on second sources of commercial tubes. No definite conclusions were reached. Several alternative proposals were reviewed and discussed with the IBM engineering groups.

I made a trip to the General Electric Plant in Owensboro, Kentucky, to review the production progress of the Z-2177. GE was behind schedule on the production of tubes but has agreed to add another mount team and increase production without sacrificing quality. The present mount team is doing very satisfactory work. However, tubes that meet the original objective specification are not being produced.

I visited Sylvania at Emporium, Pennsylvania, to review progress on the production of 2420 tubes and improvement of the SR-1782A tubes. Sylvania has agreed to add more mount teams to meet IBM's production needs. A review of Sylvania's data on the improvement program indicates that some tolerances on the dimensions of the grids may be incompatible with the tube's plate-current specifications. We have agreed to polycast a number of their tubes, dissect them, and check mechanical dimensions. These mechanical dimensions will be correlated with the electrical characteristics. Out of this program we expect to get sufficient data to guide the improvement program.

1.33 Research and Development

(D. C. Lynch and J. S. Palermo) (UNCLASSIFIED)

During the past 2 weeks we spent time revising two memoranda entitled "Chemical Processing Procedures" and "Construction of a 19-Inch Display Tube."

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1.33 Research and Development (Continued)

(D. C. Lynch, J. S. Palermo) (UNCLASSIFIED) (Continued)

We also investigated techniques for the electropolishing of stainless steel and the application of liquid gold and silver to a 19-inch Charactron bulb.

(T. F. Clough) (UNCLASSIFIED)

The DuMont Research Laboratory has agreed to furnish our section with a few special 5-inch flat-face CRT bulbs which are required for display-tube research.

The record section at Project High will soon complete punching in the Z-2177 tube-installation data from MTC. During the next 2 weeks some members of the Barta tube section will be trained in the technique of measuring polycast tube sections. The data so obtained will be correlated with readings of SR-1782A electrical characteristics.

(L. B. Martin) (UNCLASSIFIED)

The 16-position life test is ready to test Typotrons. Many details are being completed on this rack while we are waiting for tubes.

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

Tube	Total Hours	Condition
265	6674.8	marginal
280	5856.8	satisfactory
335	5039.8	satisfactory
366	4338.0	satisfactory
390	4338.0	satisfactory
392	4338.0	satisfactory
389	4254.2	satisfactory
394	3555.9	marginal

(S. Twicken) (UNCLASSIFIED)

I made a trip with the Project High Tube Group to the General Electric Company, Owensboro, Kentucky, to ascertain the status of Z-2177 production. The present mount line is insufficient to meet scheduled requirements and will be increased. In order to meet objective requirements, additional engineering effort must be applied by GE on the following:

1. A cathode free from interface (from the materials and processing approaches);

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1.33 Research and Development (Continued)

(S. Twicken) (UNCLASSIFIED) (Continued)

2. Cause and remedy of early-life instability;

3. Perpetual campaign for the reduction of intermittent shorts.

Detailed plans for these programs were discussed.

I made a trip with the Project High Tube Group to Sylvania, Emporium, Pennsylvania, to check on production progress and progress being made toward objective requirements. In view of the long-range machine requirements as given by IBM, plans were made to further increase production. A critical review of tube geometry, parts tolerances, and available test data indicated that further work is necessary in the program to meet SR-1782A objectives. Accordingly, a program was set up under which Sylvania will produce some special tubes with carefully chosen parts. These tubes will be polycast and cut open, leading toward a correlation of tube characteristics and dimensions.

(P. C. Tandy) (UNCLASSIFIED)

The five 19-inch Charactrons on life test, CHT-61, CHT-62-1, CHT-74, CHT-75, and CHT-80, now have operating times ranging from 651 to 2164 hours.

CHT-61, CHT-75, and CHT-80 have shown no appreciable change during the past 2 weeks. CHT-62-1, which has been operated at 500-μa d-c cathode current for the last 857 hours, has not improved. The heater voltage was raised from 6.3 volts to 7.5 volts, but there was no great change in emission during the last 180 hours. Within the last 1000 hours the ion current on this tube changed from 0.8 to 5 millimicroamperes.

CHT-74 showed little change in matrix current at zero bias, but this current changed from 27 to 11 microamperes at a bias voltage of -25 volts. After 1013 hours the ion current on this tube was 1.8 millimicroamperes.

A leakage check has been made on all the tubes. The results are listed in the following table:

Tube	Elements Showing Leakage	Change in Leakage Current	Change of Hours on Life
CHT-61	A_2 matrix	28 to 40 microamperes	1351 to 2132
CHT-62-1	A_2 matrix	43 to 48 microamperes	1214 to 2035
	SP2	0.06 to 31 microamperes	1214 to 2025
CHT-74	A_2 matrix	28 to 29 microamperes	213 to 994
CHT-75	A_2 matrix	0.16 to 30 microamperes	0 to 781
CHT-80	A_2 matrix	0.06 to 34 microamperes	0 to 620

The selection plate SP2 of CHT-62-1 is the first element other than the A_2 matrix to show leakage.