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Memorandum M-2470

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Division 6 - Lincoln Laboratory
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SUBJECT: Group 62 Section Leaders Meeting--
AN/FSQ-7 Equipment Design Program

To: Division 6 Group Leaders, Group 62 Staff Members

From: R. P. Mayer

Date: October 13, 1953

ABSTRACT: Two situations urgently need attention at the present time. The vacuum tube count for a central has become rather large, and every effort should be made to see what can be done to reduce the count. The space required for XD-1 exceeds the space available in the basement of building A, and several alternate arrangements are being investigated. Progress in other fields is fairly satisfactory.

1. Tube Reduction Studies

The vacuum tube count for XD-1, as expressed in the number of cathodes present, has become excessive. Several suggestions for reducing the count were made and should be fully investigated. Mr. Forrester estimated that the cost of a single tube in XD-1 should be treated as \$10,000. This is based on a figure of \$200 per circuit and 50 production models of the central.

Taylor suggested that tubes could be saved in some cases by using non-standard plug-in units. This may be especially helpful in the A Register, Adder, Accumulator circuits. Olsen wondered if most circuits are as reliable as the plugs, and if a construction similar to that of MTC should be investigated.

Mr. Forrester suggested that a study be made of circuits for large (double diameter) drums, and that it might be desirable to put large drums in XD-1 after initial testing with the present drums. Large drums should result in a substantial saving of tubes.

Mayer reported that G. Hallgren, of IBM, has suggested that it should be possible to combine the four AM-TD drum frames into a single frame. This frame would be a little longer than the present drum frames, would have four separate drum assemblies arranged around it, and should result in a substantial saving of tubes.

Jacobs reported that Papien has estimated that a saving of 500 tubes would result from unifying the control of the two magnetic-core memory banks.

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2. Installation of XD-1

Dodd reported that three plans are being worked on for providing space for XD-1: A new building solely for XD-1, an extra floor on building A, a shed outside the basement of Building A. The problem of providing space is complicated by the fact that the operating personnel require more space than previous plans allowed for and the fact that the central machine has become too packed for efficient servicing and future expansion. Mr. Forrester pointed out that a separate building could not be built soon enough, but that a 30-foot shed running the length of building A was likely.

3. XD-1 Maintenance

Daggett pointed out that a complement test for unbalanced flip-flops is quite desirable. Set-and-clear pulses are less desirable than complement pulses because they themselves can become unbalanced. The primary purpose of the test is to locate FF's which tend to flop back to a favored position sometime after being pulsed to the opposite position. Consequently the test should be performed at a low frequency just above that which exhibits and objectionable flicker. (Bursts of 3 two-megacycle pulses repeated at the low rate seem desirable.)

4. MTC

Hosier reported that the drum circuits for MTC are nearly ready and waiting for the drums. It is important to plan adequate marginal, and other, checks on the system.

The charactron tests on MTC are being set up and should be ready for demonstrations the first week of November. Toggle-switch and plug-board storage will provide for 22 arbitrary characters at a time at arbitrary positions on the screen, with dim-bright control and with delay counters.

5. Display System for XD-1

Corderman pointed out that a decision will soon be needed concerning the use of square vs. round tubes for track display. He pointed out that the pattern from the charactron matrix becomes rotated on its way to the screen and that the use of a round tube would greatly simplify the problem of alignment of tube, display, and console.

Dick Best reports that an investigation is being made of a proposal, by Olsen, which would allow the use of 5998 type tubes for deflection drivers instead of the bigger tubes previously proposed.

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6. Mappers

Jacobs reported that Ed Rich has presented a mapper test to Raffensperger, who will design the mapper to work with the test. Rich is also working on a test for the demodulators.

7. Model Arithmetic Element

The model that was built at IBM has not worked satisfactorily (largely because the electronic circuits used were not the finally accepted ones) and so has been abandoned. It has been proposed that the Left Arithmetic Element for XD-2 be built now so that marginal checks can be run. Mr. Forrester pointed out that tests on the arithmetic element should really be started without further delay, and that frequency margins are as important as voltage margins.

8. Schedules

Mr. Forrester pointed out that we should have schedules showing what we think should be accomplished by certain dates in order to help us evaluate more detailed schedules. He also mentioned that detailed schedules are unrealistic if they must be revised whenever a necessary change in the design is initiated. It is not sufficient to design and deliver a machine on schedule if this machine is unsatisfactory. The reliable operation of a machine by a given date is our goal, not simply the existence of a piece of equipment by that date. Radical changes in the design, in order to reduce the tube count, may be necessary in order to reach that goal.

9. Visits to IBM

Ken Olsen will be living in Poughkeepsie semi-permanently for a while.

Signed: R. P. Mayer
R. P. Mayer

RPM/rb

CC: J. W. Forrester, R. R. Everett

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