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Memorandum M-2546

Page 1 of 5

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Division 6 - Lincoln Laboratory
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

SUBJECT: Group 62 Section Leaders Meeting -- November 23, 1953

To: Division 6 Group Leaders; Group 62 Staff Members

From: A. P. Kromer

Abstract: A proposal for a change in the plan for actual construction of the prototype models has been made by IBM. Circuit modifications and changes in equipment arrangement have resulted in significant reductions in the number of cathodes in the central machine and drums. Study of power equipment indicates some savings in cost can be achieved through modification of certain operational features which do not appear to affect system use or reliability significantly.

1. Equipment Construction Sequence

In view of the short time remaining between this date and the desired completion date for XD-1, IBM proposes construction of plug-in units from vendors' stock-shelf components. These units would be used in XD-1 until such time as a second set of units could be constructed using components of the types specified by the Standards Committee. The plug-in units with stock components would then be placed into XD-2 machine, and the plug-in units having components per FSQ-7 specifications would be used in the XD-1 machine. It is planned to release the control frame and perhaps other portions of the central machine on this basis.

The design change which placed all six mechanical drums in a single frame in the interest of reducing the number of tubes eliminates the previous idea of delivering various drums over a period of time. It is now proposed that all drums, plus the central machine, be delivered to Lexington simultaneously, and that this time will be between November 15 and January 15. This latter date is regarded as unacceptable if the July 1955 date to have the XD-1 system operating as well or better than Whirlwind I is to be maintained.

2. Arithmetic Element

This unit will be released from engineering to the construction organization in approximately two weeks. This time will be required to incorporate the change involving the use of a medium-power cathode-follower circuit based on the 7AK7 tube. This change will result in a saving of approximately 1100 cathodes, as compared to using the 5965 type tube in the cathode-follower circuit.

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Memorandum M-2546

Page 2 of 5

UNCLASSIFIED

3. Systems

While it has been generally agreed that production systems will consist of a duplex center (that is, two computers with a single set of input and output equipment), Taylor indicated that it appears undesirable to incorporate this change into the prototype XD-1 and XD-2 systems. The change is one which principally involves the facilities for switching from the computer to the output and display equipment. However, final decision will not be made on this point for a few days while further study of the time and its effect on release of XD-1 design is considered. This may well be change which is made between the time the prototype drawings are prepared by Project High and the time that they are released for the manufacturing organization to use to construct subsequent production systems. The manner of incorporating such engineering changes and the availability of manpower to do the work is being considered by IBM.

4. Drums

It has been decided that all rotating drum units (except perhaps the input buffer) will be housed in a single frame. Associated frames will contain the electronic equipment with the necessary electronic switching to permit time sharing of a large portion of the circuitry. This arrangement is estimated to save approximately 8000 cathodes as compared to having six completely independent drum systems, each with its associated electronics.

Depending on the amount of storage capacity for incoming data, as finally determined, a seventh drum may be added to the system. It will share electronics in the manner indicated above, however.

5. Display

Corderman indicated that work is being carried forward to prepare a tube which will have an additional set of electrostatic plates so as to try to combine the advantages of a dual deflection tube and the Charactron. It will be several weeks before much additional information regarding the value of such work will be available, however.

IBM Vestal group will construct a mockup of a console having a round 19" tube, and have this unit available for study at MIT on Monday, December 7. They had constructed a mockup of a console using a larger rectangular tube, but with consideration now narrowed down to the 19" tube, it was felt desirable to build additional mockup.

Meetings during the past week at Vestal with Corderman led to discussions concerning circuits involved with digital transmission of data, digital expansion schemes, magnetic deflection amplifiers, electrostatic amplifiers, and power supplies. More details on these discussions will be put out under Memorandum M-2534.

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6. Circuits

The development of a high power cathode follower circuit using the 5998 type tube for the central control frame will produce a saving estimated at 300 cathodes. The elimination of certain level setter circuits may result in some additional saving in numbers of tubes.

The three digit delay line adder model is now finished at High Street and will be checked out.

7. Light Cannon

A study will be made by Mayer, Morriss and vonBuelow to result in a proposal by December 1 regarding the light cannon, both its design and the manner in which it should be coupled into the system. Rudy Cypser was asked to have some IBM person associated with this study group. He volunteered to work with the group sufficiently to have a good understanding of the proposal when it is issued.

8. Output Drum

Memorandum M-2525 has been issued providing a proposal for output buffer drum specifications. In brief, this proposal provides for random access on the output side of the drum, one word slots and three fields of capacity. It is requested that comments on this proposal be returned to Jeffrey or Hopkins at MIT by December 1.

9. Outputs

A meeting is scheduled for Tuesday, November 24, at which time Rising will present a proposal for snift registers to be associated with output phone lines.

Later in the week Harrington will present a proposal covering in general the method for communicating with weapons.

10. Power Supplies

Joe Gano indicated that the matter of sequencing on one voltage at a time is being investigated as an alternative to sequencing on a group of voltages. Also, the grounding system is being further investigated so as to avoid having loops occur.

Now that cost estimates have been obtained, the total amount of money involved in power equipment, including M-G sets, D-C supplies, and all related switching, is so large that a close scrutiny of the specifications has been requested in order to attempt to reduce the cost of this part of the system. Items under consideration include: a) the use of fuses in place of circuit breakers in the end electrical modules for the various frames in the electronic equipment, b) the operation of the

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Memorandum M-2546

Page 4 of 5

UNCLASSIFIED

Power Supplies (Continued)

motor generator sets independently instead of in parallel, c) the connection of power transformers in the manner indicated in (b), and with manual switching to further reduce costs.

A visit to the manufacturer of the power transformers (Westinghouse) indicated it would be possible to have the secondary output at 480-277 volts, and that a reduction in the cost of the units would be achieved by this change. It was generally agreed that this would be desirable, and the final decision should be reached within two weeks. If taps are provided on the output winding to afford 120 volts at reduced capacity, it appears that a significant safety feature regarding operation during the initial installation period will be available at only a very slight increase in cost.

The total output of the M-G sets planned for XD-1 seems to be greater than may be necessary, and this is another element which might be increasing the overall cost of power equipment unnecessarily.

Gano pointed out that while it may be possible to make some of the above type changes in power equipment for XD-1, it will not be possible to affect the power equipment and D-C supplies for XD-2, if a delay in delivery of these units to Poughkeepsie is to be avoided. Everyone present endorsed the idea that nothing should be done which would at all delay delivery of power equipment to Poughkeepsie.

11. MTC

The drum read-out amplifiers for MTC will be packaged in the standard two tube plug-in unit used for the Whirlwind flip-flop in order to save time. It is intended to install the drum and have one track working with the MTC computer in about two weeks.

A program manual showing the planned operational code for MTC when the drum and larger memories are available will be issued shortly. Block diagrams covering this situation are now available.

Ogden requested that anyone having any circuits or other problems associated with XD-1 development which they wish to have simulated and worked out on the MTC machine should be brought to his attention immediately.

12. Memory

All of the hardware for a 64 x 64 memory to be built for MTC is available except for the driving pulse transformers. The core memory in WWI has operated 21 days without a parity alarm.

Work is continuing on the development of a sensing amplifier using the type 607 tube (non-microphonic) for the first stage in place of the 5965 tube.

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Memorandum M-2546

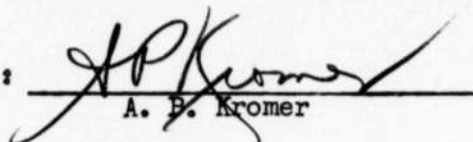
Page 5 of 5

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13. Logic

Ron Mayer stated that information had been passed to IBM that timing diagrams for the central machine except the in-out class can be considered as having reached the concurrence stage insofar as the MIT Systems Office is concerned.

Signed: _____


A. B. Kromer

APK/mmt

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

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