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Memorandum M-1998

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Digital Computer Laboratory  
Massachusetts Institute of Technology  
Cambridge 39, Massachusetts

CLASSIFICATION CHANGED TO:  
Auth: DD 254  
By: R. R. Everett  
Date: 2-1-60

SUBJECT: MINUTES OF JOINT MIT - IBM CONFERENCE  
Held at Hartford, Connecticut April 21, 1953

To: All Conferees, H. Fahnstock, C. R. Wieser, D. R. Brown,  
S. H. Dodd, P. Youtz

From: A. P. Kromer

Date: April 23, 1953

ATTENDANCE:

IBM  
(Poughkeepsie)

MIT

M. M. Astrahan  
R. P. Crago  
E. H. Goldman  
P. W. Rocco  
W. E. Triest  
D. L. Crawford  
H. D. Ross  
B. L. Sarahan  
B. Housman  
W. L. Batchelor  
M. Raffensperger  
T. A. Burke  
J. Montgomery  
J. M. Coombs  
E. J. Keedy  
J. Weiland  
C. M. Balliet  
R. L. Palmer  
P. Beeby  
N. P. Edwards  
W. Rudman

J. W. Forrester  
R. R. Everett  
K. H. Olsen  
N. H. Taylor  
A. P. Kromer  
C. W. Watt  
W. H. Ayer  
R. A. Nelson  
R. L. Best  
R. C. Hopkins  
R. vonBuelow  
W. A. Clark  
W. N. Papian  
W. Ogden  
J. F. Jacobs  
R. C. Jeffrey  
R. P. Mayer

IBM  
(New York)  
G. L. Solomon

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The attached notes cover the highlights of the materials presented by each speaker. Reference is made to other reports which contain further detail where applicable.

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1. REVIEW OF PLANS FOR CAPE COD SYSTEM DEMONSTRATION -- W. A. Clark

The contemplated Cape Cod System for the September demonstration will include the use of the CPS 6B long-range radar at North Truro and 2 short-range radars located elsewhere in the New England area as a data gathering net. Data will be transmitted to Barta Building by SDV. The equipment to be installed at Barta is intended to demonstrate a mode of operation of the Computer Center (Information Direction Center - IDC) and the Sector Command Post which need not necessarily be physically adjacent to an IDC.

The general line of organization within an IDC was described. This contains two principle fields of activity:

- A. Collection of data, tracking and identification under the Combat Data Director.
- B. The assignment and control of interceptors and anti-aircraft under the Weapons Director.

The floor layout of the contemplated installation in the Barta Building was described, as well as the functions and responsibility of a tracking officer.

Work on the preparation of the program for the operation of the Cape Cod System is progressing and is covered in M-1913.

In brief, the time schedule for this activity calls for construction of equipment by 5-15, installation by 6-1, testing and debugging by 7-1, thus providing two months to develop a method of operation and to train the personnel who will be involved in the demonstration (approximately 27 people).

Memorandum M-1815 has been issued to describe the Cape Cod test. This is supplemented by other M-Notes, each of which is cross-referenced to M-1815.

2. REVIEW OF THE SERIES OF MEETINGS ON IN-OUT EQUIPMENT -- E. H. Goldman

It was pointed out that input-output equipment in the system will comprise an extremely large portion of the overall system. However, there is less knowledge regarding this phase of the problem and the equipment that will suitably handle it than almost any other portion of the system. Thus, a series of weekly meetings have been held to study the matter and plan the engineering development work in this field. Thus far the meetings have dealt with input primarily, but there have been some studies of portions of the output and display equipment. The committee action in the meetings results in the selection of the two or three most logical alternatives in connection with any phase of the problem. These are then assigned to individuals for further detailed study and a subsequent report concerning the equipment count involved in each.

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2. REVIEW OF THE SERIES OF MEETINGS ON IN-OUT EQUIPMENT (Continued)

To date these meetings have resulted in several general decisions as follows:

- A. To have an input system approximately as described in IBM Report IM-14.
- B. Not to use time sharing for the phone line terminal equipment (ultimate choice between vacuum tube counter and core shift register per IBM Report IM-23 to be made at a later date).
- C. The R-~~0~~ conversion required in connection with video mapping should not be done outside the computer. (Present thinking indicates use of rotating yoke PPI with a North pulse for automatic synchronizing.)
- D. Recording for training and post-mortems should be programmed at the computer output.

In connection with training, it was mentioned that some recording of raw video input would probably be required. Mr. Forrester indicated that Rand Corporation has been engaged on a study in connection with training for the present G.E.C. Station operations. He suggested that the results of their work be obtained and considered in connection with our project.

3. STATUS OF ARITHMETIC ELEMENT AND CONTROL DESIGN WORK -- B. L. Sarahan

The collaboration between IBM and MIT in this field has led to the following decisions to date:

- A. The arithmetic element will have a dual accumulator.
- B. The Aas type multiplication circuits will be used.
- C. Numbers will be in true form as positive and in complement form as negative.
- D. Register to register bus system will be used for transfers.

Continuation of the engineering work in this field is planned as follows:

Determination of details regarding machine checking of the arithmetic element to be concluded by 4-24.

Decision on a system of standard symbols and terminology to be established by 5-1.

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3. STATUS OF ARITHMETIC ELEMENT AND CONTROL DESIGN WORK (Continued)

Arithmetic element block diagrams to be completed 5-8.

The design of the control for the arithmetic element will follow this work and is to be completed by 5-22.

It was pointed out that present plans do not contemplate inclusion of orders which will permit addition or multiplication of 32 bit words. A standard word has been established as 16 bits.

Control circuits are being considered on the basis of a uniform time memory cycle with the fastest cycle foreseen to be 5-1/2 microseconds. The control circuits must, of course, also work at slower memory cycles.

Current thinking indicates the control will be done by numbers involving seven binary bits, three of which will indicate the basic class of order and the remaining four will provide for variations of this basic class. Actual command lanes will stem from a matrix which provides for selection of the desired combination of basic order plus variation.

Discussions regarding control of the arithmetic element have indicated that much can be gained by devoting more attention than in the past to the matter of planned maintenance programs and procedures.

4. MTC MEMORY PLANE OPERATION -- W.N. Papian

The conditions under which the first 32 x 32 MTC memory plane have been operated in the test set-up were described. It was pointed out that all data gathered to date must be considered as preliminary and is primarily a qualitative indication of performance only.

Based on measurements to date, curves were presented showing the control grid bias voltage vs. the combined XYZR & W current and the control grid bias voltage vs. strobe time.

It is expected to wire two additional planes into the memory within the next day or two and to continue testing. Based on results of these tests the remaining 14 planes will be installed with the objective of completion of testing and installation of the memory into MTC by approximately May 10.

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5. GENERAL DISCUSSIONA. Schedule for In-Out Committee Action

Mr. Astrahan reviewed the plan that had been set up for activity in the in-out meetings referred to in item 2 above. Since the prime objective of the project is to have a first prototype computer built by June, 1953, it is felt that the first piece of in-out equipment required will be the computer operator's console. The committee further feels that a period of 12 months for design and construction of various pieces of equipment is needed. Thus, decisions regarding the engineering specifications for each type of equipment must be made starting 7-1-53. To permit this to be done, the next series of in-out meetings will cover the following items:

1. Drums for display purposes.
2. Nature of in-out problems.
3. Drums and cross telling.
4. Methods of operation of the system (Group 61).
5. Outputs -- remote.
6. Drums for display.
7. Inputs -- manual (programs, card tape, etc.)
8. Printer and tote boards.
9. Input -- phone line and radar mapping.
10. Computer operator's console.
11. Computer operator's console.

B. Coordination of Basic Circuit Activity

Mr. Taylor asked that closer coordination be established to permit decisions regarding the number of basic circuits to be employed in the machine. This led to discussion of the various tube types under consideration, and the possible use of twin triodes in place of pentodes in the interest of standardization. Activity to date in connection with negotiations for the manufacturers of a "work horse" twin triode tube by General Electric and R.C.A. were briefly discussed, as well as the need to prepare a complete list of tube types to be used for all portions of the machine, including power supplies, etc.

It was agreed that the general subject of power supplies must be assigned to some individual for specific study, but this person was not named at the meeting. The MIT WWI power supply engineers are to be contacted in connection with study of this matter by whoever is assigned the task of power supply work.

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5. GENERAL DISCUSSION (Continued)

C. Standardization Activity

General discussion from the floor reviewed the standardization activity and present plans to have a central standards committee to coordinate and program the activity of task forces in each of the following six categories:

- Electronic components
- Mechanical components
- Basic circuits
- Mechanical design
- Drafting
- Materials and Processes

The discussion indicated the concensus of opinion to be that the standards committee should make studies and obtain approval from interested parties, then disseminate the information to all engineers on the project. Mr. Forrester said he felt the standards committee should also adopt the attitude of the user or customer when reaching decisions regarding the acceptance of specific components into the system.

Signed:

A. P. Kromer  
Arthur P. Kromer *mt*

APK/mtt

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