Memorandum M-2563

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

SUBJECT: SUMMARY OF MIT-IBM COLLABORATION ON DESIGN OF AN/FSQ-7 (XD-1) COMBAT INFORMATION CENTRAL--November 1 through November 30, 1953

To: J. W. Forrester, R. R. Everett, J. C. Proctor, C. K. Wieser, N. H. Taylor, D. R. Brown, S. H. Dodd, P. Youtz

From: A. P. Kromer

Date: December 7, 1953

Abstract: Principal work during this period has been concerned with the display systems development and reduction of the number of vacuum tubes in the central computer and drum systems. Specifications for power equipment, output buffer drum have been studied jointly. Cost estimates for the prototype program and general planning for subsequent production were considered. Initial construction of pluggable units for the prototypes was started at IBM Plant 2.

Engineering Visits

IBM people working on the project have spent approximately 40 mandays at Cambridge, while MIT people spent approximately 88 mandays at IBM High Street during the month.

Exchange of Publications

During this period we forwarded to IBM 34 M-Notes plus miscellaneous drawings and standards sheets.

We have received from IBM 4 IM-Notes, 13 H-Notes, 4 CRR Bulletins, 2 Biweekly Reports, 2 TR-Reports and 13 Test Reports.

General Comments

This period has been devoted principally to continued work on the drum and display systems, and also to a review of the entire design in order to reduce the total number of vacuum tubes wherever practical. MIT Reports M-2511 and M-2538 have been issued during the month covering the highlights of progress regarding design work on the equipment.

In the early part of November, in line with schedule for engineering work, demonstrations of the Charactron and spot-sequential display methods were held. As a result of analysis of these two systems and the demonstration of each, decision was made to use the Charactron tube as a basis for both

the tactical display and the DID display in the Transition System. Efforts of both the IBM and MIT groups will be concentrated on this system. Initial work on development of a concept for the physical configuration of the display console has also been started with mockups being under construction by IBM which are scheduled for completion early in the following month.

As a result of the study given to the logical arrangement and circuits of the system, it appears that a significant reduction in the number of vacuum tubes may be achieved through the combination of six drum units in a single frame with electronic read and write circuits that are time-shared between all of them. Other circuit changes, including the introduction of a medium-powered and high-powered cathode follower circuit also provide reduction in the tube count within the central machine.

Review of the initial specifications for power equipment, including transformers, M-G sets, D-C rectifiers and regulators, with associated switching gear for all of these elements reveals that through simplification of the power system, significant reductions in cost can be achieved. In view of the fact that the systems presently being contemplated are prototype units,it seems advisable to effect these savings.

The joint IBM-MIT group considering the output problem have prepared and released an initial proposal for specifications covering the output system including the output buffer drum. Considerations should lead to formalizing these specifications and releasing them officially to IBM for design early in December.

Continued work in connection with the installation of FSQ-7 (XD-1) at Lexington led to a proposal to construct an additional building at that location which will house the entire system. The idea of using the basement of Building A for part of the equipment has now been abandoned. IBM and Divisions 6 and 7 of Lincoln are collaborating on the preparation of the building design and layout of equipment in this building.

Considerable attention has been given to the problem associated with the procurement of ferrite cores for the memory units in the machine. Groups from MIT and IBM have made several visits to both RCA and General Ceramics in connection with the correlation of test measurements and the standardization of a testing procedure for these suppliers, as well as at both the IBM and MIT laboratory locations.

During the month the IBM manufacturing organization started initial construction on plug-in units which will be used for the four digit adder being constructed at IBM. A certain area at Plant 2 has been designated for the construction of FSQ-7. This area will be expanded as the volume of the work increases. It is expected that it will eventually reach a size approximating 20,000 to 25,000 square feet floor area. This includes test area for the two systems.

The cost estimates prepared by IBM for their contract - 1404 with AMC were reviewed, and agreement reached regarding the scope of work and the estimated cost for the various elements of engineering design, and equipment construction which are involved. This estimate will be submitted to the Air Force in the very near future as a basis for negotiating a definitive contract covering the two prototype units.

Meetings with the various Air Force agencies and with the Western Electric-Bell Telephone Laboratory Project ADES organization were held during the month in connection with budgeting and other planning activities associated with production of FSQ-7 equipments following the prototypes. Funding is to be accomplished by the Air Force which will permit IBM to receive a contract covering initial production quantities early in 1954.

The size of the development engineering group assigned to the project at IBM has stabilized at approximately 200 people of staff level.

Signed A. P. Kromer

A. P. Kromer

Approved N. H. Taylor

N. H. Taylor

APK: jmm