

Memorandum M-2322

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SUBJECT: BIWEEKLY PROGRESS REPORT FOR AN/FSQ-7 (XD-1)

To: AN/FSQ-7 Planning Group

From: P. Kromer, P. J. Gray

Date: July 14, 1953

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Introduction

This note is the first of a series of progress reports which will be published on a biweekly basis by the Group 62 Scheduling Office as outlined in M-2301. The purpose of the reports is primarily to furnish pertinent information in concise form as an aid to the personnel working on the AN/FSQ-7 equipment. It is not intended to be a duplication of the regular Division 6 Biweekly Report.

The reporting in this note is somewhat general, and is an attempt to summarize all progress to date. As schedules are written and progress reports are secured on a more systematic basis, it is hoped that reporting will become more clear-cut. Any comments or suggestions will be welcomed by the Scheduling Office.

Preparation of Building A at Lexington

Floor Layout

A floor plan (Drawing No. R-55425) for the basement of Building A at Lexington has been completed, and approved by Forrester. This is not a final plan, but is sufficiently firm to determine material requirements for partitioning. Specific room sizes and wall locations are still flexible. Any comments or requests for changes should be directed to A. P. Kromer or H. K. Smead.

Primary Power Load Center

The general specifications for the load center for the computer and other central equipment have been prepared and have been turned over to Division 7. The center will consist of two power transformer banks, each having a capacity of 500 kva which will change the 3 phase incoming line voltage from 4,160 volts to 120--208 volts. Procurement specifications are currently being prepared by Division 7 and will probably be completed on schedule (August 1).

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Associated Equipment Group

Equipment Power Supplies & Alternator

MIT and IBM have agreed on the desired size of the motor-generator sets and the d.c. supplies. An attempt will be made to secure two motor-generator sets of 125 kw capacity at a power factor of 0.8. If these are not available other ratings have been selected as alternatives. Further details on this equipment will be published in a report at IBM after their vacation.

IBM is currently investigating sources of supply for this equipment. It is hoped that the bulk of the power supplies can be purchased in order to reduce the engineering load on the design groups in the project.

A study is underway to determine types of relays which should be used for power distribution.

Cooling Equipment

Preliminary investigations have been carried out at MIT and it has been tentatively decided that the cooling system will consist of central refrigeration and water systems with air handling units located wherever needed. Further action is awaiting selection of a consultant by IBM. For further information contact W. H. Ayer.

Central Computer Group

Arithmetic Element and Control

All active work on the arithmetic and control elements is now being carried on at IBM. A substantial portion of the block schematics have been completed. A breadboard, four-digit arithmetic element has been constructed and is now being checked out. A breadboard shifting register is also at the testing stage. Present estimates indicate that chances are good that design work will be completed according to schedule. An up-to-date file of block schematics of the entire machine will be available in A. P. Kromer's or J. F. Jacob's office.

Maintenance and Operation Console

One console used for maintenance and program debugging will be provided for XD-1. There will be two lights per digit for every register in the machine. Provision will be made for covering one of these and for photographing the lights.

The kinds of control buttons and switches have been determined. This is outlined in the Project Grind minutes (M-2284, p. 4).

Central Computer Group (Continued)

Maintenance and Operation Console (Continued)

A display scope connected to the In-Out register will be provided. A standard display console operating from the display drum will be placed near the console. A card reader will also be located in the console area.

Test storage will consist of one live and sixteen dead registers.

Further information can be obtained from H. D. Ross of IBM.

Internal Memory

The feasibility of a coincident current magnetic core memory has been well demonstrated by the successful operation of the Memory Test Computer memory during the past few months.

Plans are underway for the construction of an additional memory which will be Model II of the MTC memory, the design of which will be somewhere between that of the MTC and XD-1 memories. The major differences between Models I and II of the MTC memory are as follows:

1. The array will be 64 x 64 x 17, plus spare planes.
2. The XD-1 core will be used.
3. "Selection" planes will be driven from pulse transformers rather than directly from vacuum tubes.
4. The design of the digit plane drivers and sensing amplifiers will be changed.
5. Digit planes may each have two sense windings and hence, two sensing amplifiers.

Schedules as laid down call for the unit to be constructed and ready for power by November 1, so considerable effort will be required for this accelerated program. When completed, this effort will produce a memory which will probably be very similar to that contemplated for XD-1.

Work is continuing on magnetic core switches and drivers and on better sensing techniques. At IBM, major effort is currently concentrated on a memory test setup for testing 64 x 64 planes and arrays and automatic and semi-automatic core testers. A 64 x 64 plane has been constructed of reject MTC cores and is being used for impedance measurements and a study of construction techniques.

Further details are available from W. N. Papien

Central Computer Group (Continued)

Internal Memory (Continued)

Memory Cores

Specifications have been written (E-563) for the AN/FSQ-7 memory cores and were transmitted to IBM on July 1.

On July 10, IBM contacted General Ceramics, Steatite Corporation and the RCA Victor Division of Radio Corporation of America for quotations on 250,000 cores. A quotation is expected from General Ceramics within a week. RCA feels unable to quote on the basis outlined in E-563, but will produce 50,000 untested cores at 12-1/2¢ per core with a guaranteed yield of 25% or greater.

Delivery of sufficient cores to yield 75,000 usable cores is expected by September 15, enough to yield 75,000 additional cores is expected by November 15 and enough for another 100,000 cores by December 15.

Cores for the Model II MTC memory are expected during August. General Ceramics Company is now quoting on 100,000 good cores for that purpose. They have already commenced work on the cores.

Computer Terminal Equipment

To date, it has been tentatively decided that no paper tape readers will be included and that IBM card equipment will be used for program and similar inputs. No decision has been reached concerning magnetic tape.

Input Equipment Group

Input Buffer Drum

It is expected that specifications for the drum will be completed by publication time of this note. The input drum will consist of five fields -- two for radar inputs, one for manual inputs, and two for crosstelling inputs. Facility will be provided for reading off drums to the internal computer by identity and/or status. Under emergency conditions, crosstold data will be displayed from the input buffer drum. "Emergency conditions" have not been completely described, but failure of the central computer would be one example.

Work has started at IBM on the circuitry for all drums, under the direction of M. M. Astrahan.

Input Equipment Group (Continued)Radar Inputs

Specifications for the input system have been settled and the block diagram is well along. (See Project Grind Minutes M-2266.) It is planned to have a breadboard model of an input system including magnetic counters and video mapper constructed by September in order that testing may be completed during November. Work on demodulators is being handled by Division 2.

Work on radar mappers is at an advanced stage at IBM. A prototype frame for the unit has been constructed, and it is felt that the units for the system will be very similar to this unit. Much circuitry has been checked with a 5" scope, but tests with a large tube are awaiting delivery of a high sensitivity deflection yoke.

Crosstelling Input-Output

Although crosstelling is a low priority item for XD-1, considerable effort is needed to determine the method, so that other equipment can be designed taking crosstelling into account. Otherwise, crosstelling might become a major problem later on. A proposed system has been drawn up and is described in IBM report IM #31 and in Project Grind Minutes of July 1 (M-2284) and July 15 (still in draft form).

Tape, Card and Switch Inputs

Work is proceeding on determining specifications for this equipment. It has been decided that relays will be utilized for manual switch inputs.

Auxiliary Memory & Display GroupAuxiliary Memory Drum

The size of the drum has been determined to be four fields. Refer to section on input buffer drum.

Central Display Generator & Selector & Display Console

The bulk of this work is still in the proposal and specification stage. The nature of what is to be displayed has been decided and can be found in the Minutes of the Project Grind Meetings of June 30 and July 1 (M-2283, M-2284). Two methods of display control are currently being studied. A decision is expected shortly after the end of the IBM vacation period. A proposal for category selection has been prepared and is available as M-2262. A study of the character generator is currently underway at IBM.

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Output Equipment Group

Output Buffer Drum

The size of the drum has been set at three fields. Work is commencing on circuitry.

Buffer and Transmitter for G/A Data Link

A first approach to the weapons output system has been completed and is available as M-2296. However, a recent discussion with representatives of General Electric Company concerning their data link has pointed out certain needed changes. A second approach to the problem is now being investigated and the results will be published soon. For further information, please contact R. C. Hopkins.

Signed: Arthur P. Kromer
Arthur P. Kromer

Signed: Philip J. Gra
Philip J. Gra

Approved: Robert R. Everett
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APK:PJG/mmt

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