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Memorandum 6M-3312

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Division 6 - Lincoln Laboratory
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SUBJECT: LINCOLN-PROPOSED SCHEDULE MODIFICATIONS COVERING 8-MONTH PERIOD FOR INSTALLATION AND TEST OF FIRST DIRECTION CENTER

To: Distribution List

From: K. E. McVicar

Date: 19 January 1955

Approved: S. H. Dodd

Abstract: It is proposed to reduce by 14 weeks that time requirement scheduled by the ADES Engineering-Installation Phasing Subcommittees for the first SAGE installation-test-and-program-checking period. This reduction will permit the first Direction Center to be turned over to the Air Force on 1 March 1957.

The time savings have been effected by: increasing the number of programmers from 40 to 60, increasing the IBM installation and test schedule from 1.3 to 2.3 shifts, and scheduling some of the early program checking for the second and third production machines on the test floor at Kingston.

One effect of this tighter schedule is to put more emphasis on meeting certain allied SAGE System schedules to prevent delay in some prerequisite activity from causing the SAGE schedule to slip.

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I. INTRODUCTION

The schedules generated by the Computer Pre-operational Testing and the System Operation and Test Subcommittees of the Engineering-Installation Phasing Committee provide that the first Direction Center will be turned over to the Air Force about the middle of June, 1957. The attached sheets present a proposed modification of these schedules which would permit the Direction Center to be turned over to the Air Force on 1 March 1957. These schedules reduce the time requirement as set down by the Engineering-Installation Phasing Subcommittees by 14 weeks. The necessary time savings were effected as follows:

1. 7-Weeks Saving

The number of programmers to be used for writing and testing of the operational program was increased from 40 to 60. The number of computer hours per week to be utilized by these men was increased to make up for the shorter over-all testing time and to allow for the inefficiencies resulting from further subdivision of the task of program writing.

2. 4-Weeks Saving

The computer pre-operational testing subcommittee's schedule of computer installation and test provided for single shift operation with 30% overtime. This could be increased to two shifts of the same number of men, each shift to work 30% overtime. There should be a .3 shift overlap for communications purposes so that an over-all working period of 2.3 shifts is obtained. This leaves .7 of a shift to be used for related activities such as air-conditioning adjustments, equipment modifications, diagnostic and reliability tests. The sixth and seventh day of the week are to be used for installation and tests of retrofits and late equipment until November 15, 1956. After that time no more retrofits can be added.

The saving here results from:

a. Reduction in test period on drum frames from 4 to 3 weeks.

b. Reduction in test period on display frame and consoles from 8 to 4 weeks.

c. Reduction in installation and test period of manual-input equipment and radar-input equipment from 3 to 2 weeks.

d. Reduction in over-all system test period from 6 to 4 weeks.

It should be noted here that another major advantage is gained by increasing the number of shifts from 1 to 2. Under the original plan to operate a single shift with 30% overtime there would be no reserve manpower pool from which to draw in case it should be necessary to put in additional work to take up schedule slippage. Although it has been suggested that such manpower might be obtained from IBM's Poughkeepsie or Kingston Staff, this would reduce the manpower available for testing of subsequent machines and cause schedule slippage elsewhere. It should also be noted here that while the original schedule apparently provides for three shift operation only 1.3 shifts are for the purposes of installation and testing and the balance of 1.7 shifts is used to run extensive reliability tests and would involve only a skeleton crew. Adequate reliability data should be forthcoming from the remaining .7 of a shift which this revised schedule allows for such studies.

3. 3-Weeks Saving

The remaining 3-week saving necessary to meet the March 1 target date has been effected by using the 2nd and 3rd production machines on the test floor at Kingston for early program checking. This will permit a reduction of the time required at the site for programming work.

Requirements on the Kingston installation are as follows:

a. AN/FSQ-7 No. 2 is to be used for four weeks prior to shipment from Kingston on a 6-hour-per-day basis to supplement XD-1 tests (during August 1956).

b. FSQ-8 No. 1 is to be used for three weeks during early October 1956 on a 9-hour-per-day basis at Kingston prior to shipment.

c. The number of consoles at the Kingston test cell must be increased so that at least one of every type is provided. This is necessary to permit use of the 2nd and 3rd production machines for program checkout, and represents an increase of approximately 12 consoles over those already planned.

d. The following inside terminal equipment must be provided at the Kingston test cell for use by programmers: 2 Magnetic Tape Units, Line Printer, 3 input card readers and output teletype printer.

II. SCHEDULE REQUIREMENTS

This new tighter schedule puts some additional requirements on outside agencies who are contributing to the installation of the first Direction Center. Also additional emphasis is placed on the necessity for meeting schedules for related activity. The new requirements are as follows:

a. Increased storage capacity on XD-1 - It will be necessary to have the full storage capacity of at least 48,000 registers of auxiliary memory and two new index registers installed and operating in XD-1 by January 1, 1956 to permit this computer to be used for checking the operational program. Any delay in this installation will hold up work on the duplex program.

b. Some method of orientation of the radars and height finders, and calibration of data transmission equipment which does not require the computer must be developed.

c. The radars and FGD equipment at all of the sites in first subsector must be installed, tested, and operating reliably in time to permit calibration and orientation to be completed by August 15, 1956. (This will require development of special test equipment.)

III. RELATED SCHEDULES

Among the related schedules which might affect the SAGE System installation should they slip the following are emphasized:

a. Status of AN/FSQ-7 on 1 July 1956

Two and one-half months of systems tests on the AN/FSQ-7 at Kingston should be completed by 1 July 1956. These tests should include all Kingston supplied equipment. Prior to shipment the AN/FSQ-7 should have shown operating reliability and system performance (including thorough testing of the duplex function) as defined in AFCRC Exhibit No. 17.

b. Power Cables and Equipment

All power cables and power equipment must be shipped in sufficient time to be completely installed and tested prior to 1 May 1956.

c. Video Cables

All video cables must be fabricated and shipped in time to reach the Direction Center by 1 June 1956.

d. Use of XD-1

It is expected that XD-1 will be used extensively for purposes of training and program debugging. The operational program which will be developed for use of XD-1 will be made as similar as possible to that to be used on the duplex system. In addition, as much as possible of the duplex program is to be checked out on XD-1. An estimated 8 hours per day of computer time on XD-1 will be required for operational and maintenance program work for the SAGE System. If the XD-1 schedule should slip so that the computer were not available for this programming the SAGE System testing would be delayed.

e. Use of AN/FSQ-7 #2 and FSQ-8 #1

It has been assumed that AN/FSQ-7 #2 will be operating reliably during August 1956 and that it will be available on a 6-hour-per-day basis for programmers' use. FSQ-8 #1 should be operating reliably and available for use of programmers on a 9-hour-per-day basis during the first 3 weeks of October 1956. If the schedule for either of these computers should slip so that they are not operating reliably at these times the programming for the SAGE System would be delayed.

f. AN/FSQ-7 Troubles

The computer should be installed at the Direction Center and operating with 80% reliability by 15 October 1956 (the term 80% reliability as used here means that for each hour assigned to program checking a programmer can be assured of 80% of the assigned time being usable. For the program checking which requires one computer this would mean that either computer could be used. For program checking of the duplex operation both computers would have to operate 80% of the assigned time). It has also been assumed that no time-consuming modifications or retrofits will be made at the Direction Center after October 15, 1956 unless these modifications can be made without reducing the time available for systems testing.

g. IBM Computer Time Requirements

It has been assumed that after 15 October 1956 and until 1 March 1957 IBM will require no more than 8 hours per day during which time they will make the computer unavailable to operators. It has also been assumed that during part of the time when IBM is running diagnostic or maintenance programs on one computer the other computer will be available for program checkouts.

h. Communications Equipment

1. The communications equipment between the sites and the Direction Centers (including the DDR's and DDT's) must be installed, tested, and operating reliably by 15 August 1956.

2. The manual PBX must be installed, tested, and operating reliably by October 15, 1956.

3. All previously unfinished communications equipment must be installed, tested and operating reliably by 1 December 1956.

i. Training Program

The training program must be planned so that it requires no additional computer time other than that used to aid in the programming and system test at the Direction Center.

j. Aircraft Availability

These schedules have been generated on the assumption that sufficient aircraft will be available when necessary for tests. Unavailability of the aircraft for any reason could cause schedule slippage. Detailed aircraft requirements should be available for the final committee report.

k. The Combat Central Program

The Combat Central program must use FSQ-7 #2 or some other installation for program checking. It may be possible to use XD-1 and simulate additional data sources during the period that the Direction Central program is being checked out on FSQ-7 #1.

IV. STATUS OF THE DIRECTION CENTER ON 1 MARCH 1957

According to this schedule, on 1 March 1957 the Direction Center will be available to the Air Force on a 24-hour-per-day, 7-day-per-week basis for system reliability studies. The installation will be better suited at this time for Air Defense than the manual system. The SAGE System evaluation studies to be performed by ADES will occur after 1 March 1957. The March 1 date is the one on which the Air Force will take charge of the Direction Center and in general they will plan for 24-hour-per-day operation. At first operation will probably be in parallel with the manual system. It is expected that on some occasions it will be necessary to close down the center for short periods of time to make program modifications and equipment changes. Any time after March 1 it will be necessary for those wishing to make program or equipment changes to get Air Force permission.

Signed: K. E. McVicar
K. E. McVicar

KEM:hpm

Attachment: Schedule

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