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6M-3859

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Page 1 of 41

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SUBJECT: BIWEEKLY REPORT FOR 26 AUGUST 1955

To: Jay W. Forrester

From: Division 6 Staff

Approved: Jlep
John C. Proctor

CONTENTS

	<u>Page No.</u>
SAGE SYSTEM TEST AND PLANNING (Group 61)	2
FSQ-7 PROTOTYPE DESIGN AND INSTALLATION (Group 62)	7
ADVANCE DEVELOPMENT (Group 63)	13
AN/FSQ-7 AND CAPE COD DIRECTION CENTER (Group 64)	18
VACUUM TUBES (Group 65)	24
PRODUCTION COORDINATION OFFICE (Group 66)	26
ADMINISTRATION AND SERVICES (Group 60)	30
STUDIES IN PROCESS	32
DOCUMENTS ISSUED	34
GLOSSARY	38
<u>INDEX</u>	39

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6M-3859

SAGE SYSTEM TEST AND PLANNING

(Group 61, J. F. Jacobs)

Master Program Preparation (H. D. Benington)

Operational Specifications are being studied by all members of the subsection for concurrence purposes as well as determining the programming requirements for the various operational functions.

Eleanor McEvoy has been assigned to this section to work on check-out studies.

A new proposal for duplex-standby activities is almost completed, and will be issued during the next biweekly period.

An outline has been prepared for the document on operational requirements of the various duplex functions.

Program Organization (W. Harris, L. Collins)

Preliminary plans have been prepared for the following tasks:
(1) Program sequencing-timing framework, (2) Track statuses listed by programming indexes, and (3) Gross organization of data storage.

Checkout

The WWI checker program is being studied. A survey is being made of the programs which will be applicable to checkout on the Whirlwind checker, to be checked out during the months of September and August.

Utility Program (C. H. Gaudette)

Specifications for the Compiler have been prepared, and the coding has begun. The Checker specifications will be completed by September 2nd.

Preparation of specifications for the Utility Control Program has been started. All utility programs will be stored permanently within the machine; the Utility Control and the Read-in Programs on an Auxiliary Memory Drum Field, and the remaining programs on a Magnetic Tape Unit. Utility programs will be selected by the switches of the Utility Control Consoles. The Utility Control program will interpret these switches and read into core storage the selected utility program. The original contents of core storage will be saved; and after the Utility program has completed its function, core storage will be restored to its original value.

6M-3859

Master Program Preparation (continued)

Card Preparation Room (H. Newhall)

The Card Preparation Room has set up a system of records which requires that all persons requesting punched card processing submit their request on a "Worksheet" form which can be obtained from the Card Room supervisor or Rm. C-162, ext. 157.

In order to convert all card files from .006 to .009 inch card stock, two shifts will work Friday, Saturday, and Sunday, August 26, 27, and 28. Estimated date of completion of this project is Monday, August 29.

Operational Specifications for SAGE System (C. A. Zraket)

Air Surveillance (J. Ishihara)

Use of beacons to check calibration of radar sets has been proposed. The feasibility of periodic checks during operations at the Direction Center is being studied. A proposal has been prepared and will be circulated for comment.

The first draft of 6M-3836, "Operational Specifications for Automatic Tracking in the SAGE System," by D. L. Bailey, has been issued.

Weapons Direction (C. C. Grandy)

Operational specifications for SAGE Height Finding and for Weapons Direction Crosstelling have been completed and are being distributed for formal concurrence. The Weapons Assignment specification will be distributed for concurrence during the week of 29 August. The Intercept Direction specification has been issued in final draft form and is now being reviewed and revised. Minor changes have been made in the interim operation specification for AA Direction (circulated for concurrence during the previous biweekly period) and a corrected specification will be issued.

J. J. Cahill, Jr., and C. A. Zraket participated in a comprehensive briefing at ADC Headquarters concerning weapons assignment and AA utilization in the SAGE System.

Work on mathematical specifications will commence in most weapons direction areas during the coming week.

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6M-3859

UNCLASSIFIED

Operational Specifications for SAGE System (continued)Identification, Manual Inputs, and Weather

CONFIDENTIAL

(F. M. Garth and S. J. Hauser)

The comments we have received thus far regarding 6M-3780, "Operational Specifications for the Identification Function in SAGE;" 6M-3814, "Operational Specifications for the Manual Data-Input Function in the SAGE System;" and 6M-3778, "Use and Presentation of Weather Data in the SAGE System," are being considered in the writing of a supplement to each memorandum. These comments are also being utilized in the identification mathematical specifications we are at present writing.

Training and Battle Simulation (J. Levenson)

CONFIDENTIAL

A rough draft of TBS OPS specifications has been completed and a draft should be distributed within a week.

Specifications of the data-generation process to be used in ESS and SAGE have been started with the help of J. Nolan and W. Wells. The mathematical aspects of data-generation is being studied by R. Russo. This involves calculations of points on flight paths and points at which a net of radars would see aircraft on the paths.

Margaret Clarke of Rand has consented to study and outline the types of information available for recording. From this list items will be selected for the System recording.

Combat Center (W. Lone, Jr.)

Minor changes have been made in the draft of 6M-3810, "Operational Specifications for Forward Telling in the SAGE System." It will be issued for concurrence when the other crossteling specifications have been completed.

"A Guide to Combat Center Operations" has been completed, and a rough draft is being prepared.

Training (S. B. Hibbard and G. C. Reed)

Tasks frequently planned for operator training on XD-1 to 1 July 1957 are described in 6M-3734, about to be published.

The 6520th AC&W Squadron has been requested to lend appreciable assistance to the effort by assigning Section "C" personnel to participate in many of these tasks. Manpower requirement for the work outlined reaches thirty by 1 October 1955 and remains near this figure

- 4 -

UNCLASSIFIED
~~CONFIDENTIAL~~

6M-3859

Training (continued)

until July 1956, thereafter dropping to ten.

Ten Air Training Command instructors are scheduled to report for permanent duty on XD-1 by 12 September 1955. It is expected that these men will greatly assist in building the XD-1 Training Course and will bring to the task a reservoir of field experience and creative ability which otherwise would have to be provided through increased Lincoln staffing.

Staff Training (A. P. Hill)

The syllabus is being written for the SAGE Familiarization Course to be held during the last two weeks of October. Approximately 15 properly cleared Lincoln people may attend this course. Application for attendance should be made not later than 26 September to A. P. Hill, C-147.

Computer Operation TimeWhirlwind I (W. Vecchia)

Analysis	10:15	
Raydist and FGD	41:45	
AF Sim. Training	1:30	
Equipment Checkout	1:30	
CCS	13:25	
Program Checkout	96:15	164:40
Time to Group 64	5:30	
Time to Group 6345	1:00	6:30
Time Lost (Computer Malfunction)		4:50
TOTAL ASSIGNED TIME		176:00

XD-1 (P. L. Guinard)

Program Checkout (Utility Assembly)	1:57
Down Time (Computer Malfunction)	0:08
Time Returned to IBM	0:25
TOTAL ASSIGNED TIME	2:30

6M-3859

FSQ-7 PROTOTYPE DESIGN AND INSTALLATION

(Group 62, N. H. Taylor)

XD-1 Installation (J. A. O'Brien and W. J. Canty)

Acceptance Test (J. D. Crane)

Results of the systems test performed on the central computer portion of the AN/FSQ-7 (XD-1) during the month of June showed that the computer functioned satisfactorily. Card machines, core memories, and components (1% resistors) caused the majority of machine failures. Complete details are given in memorandum 6M-3853.

Magnetic tapes and fifteen addressable magnetic-drum fields are now under systems test.

FSQ-7 Memories (W. J. Canty)

On Wednesday, 24 August, a meeting was held with K. Robinson and L. Notari of the Education Division at Kingston to discuss training of people to maintain FSQ-7 memories. The shortcomings of present training programs and memory maintenance techniques were outlined. A general method of core memory trouble diagnosis was presented.

Large Board Display (L. Sutro)

The Kelvin & Hughes camera projector is to be considered for use in SAGE by the Lincoln Laboratory Steering Committee on August 29th. If approved by them and by IBM, procurement by IBM or its subcontractor should start immediately. Kelvin & Hughes delivery schedule will affect XD-1 in that if camera projectors for the first production centers can be provided, there will be no need to install the manual projection system in XD-1. This system was to be installed there to determine how it would perform in the early production machines. Anticipating the move of the Kelvin & Hughes machine from Room B-352 to XD-1, plans are being drawn to provide the required power, compressed air, water, vent, and drain for corrosive liquids.

Display (R. S. Fallows)

System testing advanced very little during the report period. Frame 25 margins have been brought up to an acceptable level. Considerable improvement in drum performance has been made.

The display frames have been made available for console alignment on an eight-hour-per-day basis. The last week saw continuous, trouble-free operation of drum and display frames.

6M-3859

Display (continued)

There are 28 SD and 6 auxiliary consoles on hand. Nearly all have received preliminary electrical tests. One console is electrically complete and operational. Five others have received preliminary adjustment and are awaiting final electrical modifications. Five more are ready for adjustment.

The major problems in the console work now appear to be mechanical. Bill Mercaldi of IBM has the situation well in hand and is receiving the help he has asked for. The Project High management now views the XD-1 console situation as one of first-order importance.

The installation of display signal cables is at last reaching the point where the end is in sight. The cables to Room S (Building F, east side) have been tied into the frames before completion to provide signals for console testing.

A temporary lashup has been made to provide space for cabling to module N of frame 24. A new module N will have to be designed, built, and installed before frame 24 can be considered complete. It is expected that this will be accomplished sometime in December.

Work is continuing on Ben Gurley's console test rack.

The listing of signal inputs to consoles has been released by Group 61. This information is being reviewed to develop the final wiring for categories, display assignment bits, and mixings in Frame 24.

Display Development (C. L. Corderman)

Two M-notes are being written, one on the display decoders being used in XD-1 (6M-3885), and a second on the compensation of the magnetic deflection system in the XD-1 consoles.

Tests to determine the useful viewing area on a tube showed that a voltage on the compensating plates decreased the inscribed square area. This may mean a lowering of the post accelerator voltage.

A 19" charactron with a P-14 phosphor processed by Group 65 was evaluated in MFC. The output from the light gun remained the same as when operated with a P-7 phosphor.

CHT118, a ball-bat tube to determine parameters for a 5" charactron, was evaluated. The absence of compensation plates made it difficult to direct the beam properly through the second electrostatic lens. Further tests will be made using a yoke in place of the compensation plates.

~~CONFIDENTIAL~~

6M-3859

Display Development (continued)

UNCLASSIFIED

Bids have been received from four vendors on the development of a large display tube. They are now being evaluated.

Memory Test Computer (W. A. Hosier)

Frank Durgin has moved from MTC to the Systems Office. Art Hughes has come to MTC from the Systems Office. Both visited Soroban on 16 August to investigate the situation on the high-speed punch. Receipt of a new Ferranti tape reader has greatly improved reliability. System tests similar to those conducted with GFI equipment are planned for the LRI equipment. The LRI display is now under test using a test pattern transmitted from the MTC drum.

SAGE Subsystem Testing

CONFIDENTIAL

DDT-DDR-GFI testing has continued as previously under Boyd, Werlin, and Mayer. McCusker's r, θ display gear for LRI has been installed in a temporary location in Building F and is there displaying a pattern transmitted over 32 parallel pulse lines from the MTC drum to check out the South Truro LRI channels. Corderman, Woolf, and Ziemann will curtail their console development time on MTC hereafter to four hours a week, or so. As part of the general system tie-in tests of the LRI apparatus, Bill Canty has in mind using MTC to simulate radar output patterns which would be received and monitored by XD-1.

Maintenance and Records (H. L. Ziegler, S. Hazen)

Changes in the operating of MTC as outlined in 6M-3825 have been put into effect and appear to be working fairly well. MTC users are asked to please bear with an occasional delay caused by inexperience of the technician-operators. A few more weeks should solve this problem.

An attempt is being made to review the documentation of MTC with the aim of correcting, revising, and supplementing existing drawings and memos as necessary. The final goal is documentation with good continuity to aid new personnel in learning the MTC computer and to aid troubleshooters with complete up-to-date information. John Newitt is assisting in this to facilitate his survey of the marginal checking system.

We have adopted a new log form, after trying several modifications since August 1. The principal result seems to be a more complete accounting of time, and a more positive indication of satisfaction or dissatisfaction on the part of the users.

- 8 -

UNCLASSIFIED

~~CONFIDENTIAL~~

6M-3859

Memory Test Computer (continued)

The major project remaining to be completed is a system of tabulating the log into IBM cards, to discover elusive weak spots in the machine, and to give us a reliable estimate of mean free time from computer errors.

Installation

A new CR Tube was installed in the console, which gives better light-gun response.

Planning (A. Hughes)

Frank Durgin and Bill Hosier spent several days at Soroban Engineering, Inc., in Melbourne, Florida, investigating their Flexo tape high-speed punch (240 lines per second) which has been ordered for installation in MFC. A full report of the investigation has been written as 6M-3854, "High Speed Punch; Trip to Soroban," which is now ready for publication.

Reliability

Reliability this period has been phenomenally good (less than 1% interrupting failures), thanks mainly to the new photoelectric tape reader received from Ferranti. A third mechanical head has also been received, and the original head returned to Ferranti for repair; thus, much less trouble should arise from this source in the future.

Distribution of operating time this period has been as follows:

	Hours	Per Cent
Programming	113.6	43.4
Development	93.1	35.6
Reliability Check	11.1	4.2
Maintenance and Marginal Checking	41.0	15.7
Installation	1.5	0.6
Interrupting Failures	1.4	0.5
Total	<u>261.7</u>	<u>100.0</u>

Summary of defects found in tubes and components, 15 to 26 August:

<u>Tube or Component</u>	<u>Defect</u>	<u>Quantity</u>	<u>Hours Lost</u>
6145	Tap short	1	0
Crystal, type 1N34A	Back res. too low	1	0
Toggle Switch	Open	1	0
Resistor	Burned Out	1	0
		<u>4</u>	<u>0</u>

6M-3859

Basic Circuits (R. L. Best)

256² Core Memory (D. Shansky)

Digit Plane Driver - This unit is presently being tested in the electrical environment in which it will operate. Data has also been taken on the effect of transistor driving circuitry on operating margins. A physical layout of this circuit in a pluggable unit (TX-0) has been designed.

Gate Generator - The new design mentioned in the last Biweekly is now being debugged.

Flip-Flop, Mod A (DC-2) (N. J. Ockene)

Recent tests have indicated that no damping is necessary in the secondary circuit of the ferrite pulse transformers.

Initial tests on the XD-2 cards have shown good margins under light load conditions, but poor margins with heavy load. In addition, the cards which were built at IBM have produced poor margins even under light loading conditions. A visual and a test comparison between the cards have failed show why.

The next step will be an evaluation of the components used at Lincoln and at IBM to discern the differences, if any, of the components when used in the flip-flop.

Gap-Filler Sweep Circuit (B. Barrett)

In order to make marginal checking effective, a cathode follower has been replaced by a resistive divider. I am now trying to restore the former speed and stability to the circuit.

Charactron Vector Intensity Decoder

The amplifier circuit built by Bill Santelmann has been debugged to a large extent, but new requirements were imposed which led to a new circuit suggested by Dave Shansky. The new amplifier is being bread-boarded at present and should be ready for initial testing the week of 29 August.

Digital Data Receiver (E. B. Glover)

Due to a change in specifications of the DDR it is now desirable to have the automatic gain control circuit sensitive to the absolute amplitude of the azimuth pulse instead of differential amplitude as was previously the case. The circuit has been redesigned and initial tests proved satisfactory. A new filter has also been tried

6M-3859

Basic Circuits (continued)

in place of the IMI-1000 and so far looks encouraging. More strenuous tests are planned during the week of 29 August using MTC.

Display Line Driver (J. Kriensky)

Changes in the compensation circuits are being designed to improve the stability and rise time of this amplifier.

SAGE Systems Office (H. E. Anderson)

IBM-SO concurrence has been received on the revisions of the "Second Floor Layout of Building F," Drawing E-58233-11.

A list of changes to the CPDD Desk Specifications, D-81-3, have been compiled and published as 6M-3842, "Proposed Changes to Command Post DD Desk Specifications." A meeting concerning these changes was held in Kingston, N. Y., 26 August, with IBM and their subcontractors.

The design of the Liaison Desk was revised as suggested by Group 38, and published as 6M-3705-1, "Description of Liaison Desks in the Command Post."

XD-1 Specifications

A rough draft of 6M-3851, "Master Reference List of Equipment Specifications for XD-1," has been prepared and distributed for review and comment. The final publication of the document will be on 7 September and, therefore, all comments must be available to the authors no later than 2 September. When completed, this document will list the effective specification documents and all of the changes that have received concurrence by IBM Engineering and Lincoln Systems Office. For those changes that will not be included in the machine initially, the dates are being determined for the implementation of each change proposal. Revisions will be issued periodically as required. A special file containing a copy of each of the listed documents is being established as part of the Systems Office "brief" file.

AN/FSQ-8

Corrections and numerous revisions were made to 6M-3773, "Proposed Specifications for AN/FSQ-8 Equipment," incorporating suggestions from IBM and some Division 6 personnel. Publication of the revised edition awaits comments from Group 61.

Comments on IBM's AN/FSQ-8 Minimum Equipment List (MEL) have been prepared and will soon be returned to IBM.

6M-3859

SAGE Systems Office (continued)

Operational Specifications

The following Operational Specifications have been reviewed and commented upon:

Identification Function	Weather Data
Track Detection and Initiation	Interim AA Direction
Raid-Forming	

Two types of comments appear to be common to most specifications: (1) Planned use and arrangement of some telephone facilities does not meet the equipment specifications, and (2) Deviation from memos 6M-3632 to 6M-3636, "Panel Layouts and Labels." Changes require CER documents.

Personnel

Francis R. Durgin has joined the Systems Office and is working on Auxiliary Data Processing Equipment for XD-1.

Robert K. Gerhardt has joined the Systems Office and is working on an evaluation of the types and amounts of installation test equipment required for the SAGE System.

6M-3859

ADVANCE DEVELOPMENT

(Group 63, D. R. Brown)

Chemistry of Magnetic Materials (F. E. Vinal)Memory Core Production

The total number of memory cores manufactured and double-tested by the Chemistry Section to date for the 256 x 256 x 37 memory is 1,354,800. In addition 78,000 cores have been tested once, 110,000 are on hand for testing and 325,000 are on hand for firing to make a grand total of approximately 1,867,000 cores. (Sacco, Zopatti)

Experimental runs with the Colton-Press continue to be promising although the carbide tooling has not as yet been installed. The press, operating with 8 stations tooled with steel punches and dies, has produced cores at rates of 12,000 to 20,000 per hour during repeated experimental runs. These cores conform in all respects to the size and weight controls which have been established here for some time. Several thousand Colton-Press cores have been fired and tested showing at least as high a degree of uniformity as is obtained from the Stokes Press and excellent electrical properties. (L. B. Smith, Sacco)

Inorganic Chemistry

The program of work with spinel compounds in the LiMn_2O_4 - ZnMn_2O_4 system is continued. More preparations have been completed, and x-ray structure work is in progress. (Wickham, Croft)

Other preparations completed and awaiting crystallographic examination are ZnIn_2O_4 , CdIn_2O_4 and MgIn_2O_4 , while preparation of $\text{Co}(\text{CoGa})\text{O}_4$ is under way. (Maddocks)

The investigation of LiFe_5O_8 as a base material for the fabrication of square-loop ferrites is continued. H_c at maximum squareness has now been brought to a range of 1.0 to 1.2 Oersteds, preferred processing techniques are being discovered and some trends in magnetic flux values are observed. Continued study and technique refinement is required. (D. L. Brown)

A careful program employing chemical analysis is being coordinated with production of a special memory core batch to tighten even further our control of memory core production. (Sacco, Keith)

Analyses of memory production batches and inorganic preparations are performed as required. (Keith, Reimers)

6M-3859

Physics of Magnetic Materials (N. Menyuk for J. B. Goodenough)

The switching coefficient of polycrystalline magnetite is being studied as a function of temperature. A number of measurements ranging from 120° K to 360° K have been taken to date. These indicate a steady decrease of S_w with decreasing temperature, which is contrary to the results obtained by Galt on a single crystal of $(NiO)_{0.75}(FeO)_{0.25}(Fe_2O_3)$. The results indicate that the relaxation mechanism proposed by Galt for magnetite is incorrect.

At the ordering transition of magnetite (approximately 120° K) a sharp discontinuity occurs in S_w . No measurements can be obtained for S_w with the present set up. Further study of the transition region is contemplated.

The magnetic material evaluation test described in the last Biweekly Report is being performed on memory core samples from Lincoln Laboratory, General Ceramics, and IBM. The data obtained will give "shmoo's" of temperature and driving current, and will facilitate comparison of memory-core materials.

The D.C. Hysteresigraph is virtually complete with the receipt last week of the Moseley Autograf X-Y Recorder. Some work remains to be done on the power supply for the magnetizing current. It is expected that performance tests of the equipment will begin during the next period.

New Components and Circuits (T. H. Meisling)SBT Life Test Summary

<u>Test</u>	<u>No. Transistors</u>	<u>Hours</u>
1. Shelf-life test	16	2373
2. Diode-coupled shift register	16	1937
3. Direct-coupled shift register	16	2897
4. RC-coupled shift register	16	2848
5. FF	16	5773
6. FF	8	6568
7. Shift Register No. 1 (shielded)	99	3189
8. Shift Register No. 2 (unshielded)	99	1847

This represents a total of 800,000 transistor-hours with one failure caused by a short circuit. Shift register No. 1 has operated since June 8 (1824 hours) without error or shown by no change in a 11001000 pattern. Shift register No. 2 has just made an error after a run of 554 hours. The previous error-free run was 362 hours.

6M-3859

New Components and Circuits (continued)

Philco Subcontract

Meetings on Task 1 (reliability) and Task 3 (core driver transistor) were held at Lincoln on August 23. The effect on life of the potting compound, i.e. the grease which surrounds the transistor structure filling the can, is being measured in a series of high-temperature tests. Chemicals contained within the can produce a gradual deterioration of the state of the germanium surface causing the transistor characteristics to change. This effect is accelerated with an increase in temperature. Three high-temperature tests are in progress or will be started: (1) SBT with standard potting compound, (2) SBT with altered potting compound, and (3) experimental SBT in dry oxygen.

In addition, a series of life tests will be started or continued in which the transistor is exposed to various extremes of electrical operation such as high power, high reverse voltage, high pulse current, and high forward bias.

The difficulty in the design of a core driver transistor lies in the maintenance of good amplification at high currents (0.5 amperes). Present work is concentrated on this point. The decrease in amplification for high currents is due to a decrease in the efficiency with which the emitter injects holes into the base. The emitter efficiency may be improved by the use of different emitter materials or by diffusing the emitter slightly into the germanium. Both possibilities are being investigated.

Memory (J. L. Mitchell)

Experimental Switch and Plane

The regulation of the core-switch bias current is still not satisfactory and is causing the switch-core outputs to be nonuniform. Further experiments on this problem are under way. The gate generators are now operating satisfactorily.

TX-O Cooling and Supplies

The specifications for the cooling system and for the construction of the walls, ceilings, etc., in the basement of Building A are now in the hands of the contractors. All bids are to be in by September 2, at which time we will evaluate the bids and let the contract. Circuit-breakers for the memory frames are being ordered. A -200 v supply will be ordered this week.

6M-3859

Memory (continued)

256² Construction

Forty-one 64 x 64 planes have been tested and accepted to date. Of these, 34 will be delivered to Group 24 for their transistor-driven memory. Two hundred vacuum tube plug-in units have been ordered from an outside vendor.

Advance Development

Emerson and Cuming (plastic molders and manufacturers) are designing a molded plastic memory plane frame. Samples should be available within a month.

The common-mode rejection of the transistor sense amplifier being designed by Bradspies is still not satisfactory.

Work is continuing on a driving circuit for the transistor switch. Due to the large voltage swing, some trouble has been encountered in finding a transistor which has a high voltage rating and still has a 10-megacycle frequency response.

A meeting was held with Philco on August 25, and the transistor core driver was discussed.

System Design (K. H. Olsen)

TM-1 8-Digit Multiplier

The multiplier has been plagued with intermittent troubles on the etched wiring boards, but it seems that all these can be fixed in future work. When the multiplier is not disturbed, it works well and ran seven nights and three week ends without error.

TX-0 Circuits

Since the multiplier was assembled, we have learned how to decrease the minimum drive and lower the power dissipation in the flip-flops and gates while gaining a little in speed.

Parameter margins are being taken on the contact-operated pulse generator, the cable driver, and the register driver.

TX-0 Display

The 21-inch commercial display scope is due during this biweekly period. This is 21 inches in the TV sense, since the largest square we can get on the face is 10 x 10 inches.

6M-3859

System Design (continued)

Ten digit transistor, digital-to-analog display decoders have been laid out and are now ready for the Etched-Wiring Shop.

TX-0 Indicators

The first plug-in indicator register has been received from the Etched Wiring Shop. These will be more compact than the previous models and will take a small fraction of the installation time.

TX-0 Power Supplies

A transistor power supply proposed in Dick Gloor's thesis is being built for study. A commercial, magnetically controlled supply has been ordered for comparison.

Logical Design (W. A. Clark for N. L. Daggett)

It has been proposed that an experimental memory address register (EMAR) for the 256 x 256 memory selection system be constructed as a precursor to the TX-0 memory address register. The register would use transistor circuits similar to those of the TX-0 MAR but its control would consist of Burroughs test equipment. The entire setup would provide valuable data on matrix decoding, line driving and timing problems and would serve as a testing device for the memory selection system and individual memory planes as they become available. Target date for the completion of EMAR would be 1 October 1955. The logical design of the equipment is described in 6M-3820 "EMAR: An Experimental Memory Address Register."

6M-3859

AN/FSQ-7 AND CAPE COD DIRECTION CENTER

(Group 64, S. H. Dodd, Jr., E. S. Rich)

Cape Cod Engineering (L. L. Holmes, A. J. Roberts)

WWI Computer Operation

The percentage of good operating time for this biweekly period was 95.5 per cent. Sixteen incidents of interruption resulted in 13.9 hours of down time during 316.8 scheduled computed operating hours. Several types of failure contributed to one of the poorest periods of reliability in 2 years:

- (1) A faulty drain trap cover in the Barta building's power transformer room created a hazard during the recent torrential rains. The building's power and the computer were turned off for a 5-hour period as a preventative measure.
- (2) There were four related interruptions for a total loss of 4.3 hours during a 6.5-hour period. The unlocated trouble appears to be in the magnetic drum power system. Brush recorders have been connected to likely points of trouble. The majority of the down time was required to manually erase several tracks on both drums.
- (3) A loose video cabling connection on the output of a cathode follower resulted in a PRF trouble. The interruption lasted 1.5 hours.
- (4) A wiring error in a newly installed piece of equipment resulted in one hour of down time.
- (5) An accidentally broken wire in the drum system caused the loss of 1/2 hour.

Room 156 Voltage-Interlock System

Al Blumenthal is designing a voltage interlock system that will provide added protection for the drums and MITE equipment. The final system block schematic is almost finished. Panel drawings and the procurement of hardware will be started during the coming period.

6M-3859

Cape Cod Engineering (Continued)

Direct Printer and Punch Systems

The control for the above systems has been modified to provide time for the release of the selection relays. Previously, if sufficient programmed delay wasn't provided, it was possible to operate simultaneously both devices though only one was selected.

Auxiliary Drum

A system to index GSR from the SAR end-carry has been installed. The system must be pulse checked before it is made available for general use (about 1 September).

Crosstell Input

The crosstell input system is now connected to the buffer drum. It shares the same slot as MITE 2. A simple check program using computer test orders was run successfully. A more sophisticated program to check close timing is planned.

Height Finder

A height mission was conducted on 24 August. Intermittent height replies were received because of loss of the busy bit at the height finder. The range information correlated within ± 5 miles and the azimuth within ± 1 degree.

Fred Sturm and Warren Arnsperger of WE-ADES are assembling a rack of Burrough's test equipment to simulate a WWI request to the height finder. This will allow the system to be set up without the use of the computer.

Demodulators

Envelope delay distortion, which shows up as abnormally high targets, is still present at the gap filler inputs. Tests conducted by Group 24 and our own group indicate that a low pass filter with a high cutoff frequency will reduce the amount of delay distortion. The nonlinear portion of the phase characteristic is shifted further up in the spectrum where the signal energy is lower.

Group 24 efforts to obtain UTC*1500-cycle low-pass filters have been unsuccessful thus far. We are ordering a 2000-cycle low-pass filter (UTC standard stock) and a 1500-cycle low-pass filter.

*United Transformer Co.

6M-3859

Cape Cod Engineering (Continued)

Ampex Recorders

Considerable slippage between the tape and capstan has been noticed when using 3M Mylar base tape or a sample of "Irish Ferrosheen" acetate base tape. An order for a capstan with a sandblasted surface will be placed with Ampex.

Personnel Assignments

Norm Alperin and Al Shortell are now engaged in preliminary thesis work at Building 10. All inquiries regarding phone lines or phone line equipment should be directed to Lou Norcott.

Eric Ellington and Albert Gumbs of WE-ADES will join our group on 29 August. They will be assigned to C. S. Lin for indoctrination and training.

Test Planning and Coordination (K. E. McVicar)

Recent Memos

Several studies have been underway for the past two months, and are now or about to be covered by memos:

1. 6M-3855, "Test Planning, Concurrence, and Conduct in SAGE System," is an outline of the logical steps necessary to proceed smoothly. (In preparation)
2. 6M-3839, "Final Report of Task Group Studying the Duties and Responsibilities of the C & E Duty Officer." This memo outlines how the function of "maintenance coordination" or "systems technical control" should be done in SAGE. (Issued) A meeting to discuss this report will be held Thursday, 1 September, at 10 A.M. in A-166. A CER, asking for space in the D.C. building for the people involved, has been given to Joe Giordano.
3. 6M-3844, "Final Report of the Task Group Studying Record Keeping Systems for SAGE", is an outline of a practical system for SAGE which, it is hoped, can be tried out in ESS. (In preparation) A meeting to discuss this memo will be held soon.

6M-3859

Test Planning and Coordination (Continued)

4. 6M-3746, "Proposed S.O.P. for System Scheduling and Maintenance," one method of implementing system tests in Cape Cod. This memo was issued in July, but is still pertinent.
5. Memorandum 6M-3441, "Reliability of Duplexed Equipment," by R. C. Jeffrey, issued in May, is being summarized, and another memo reviewing the subject and containing upper and lower limits for FSQ-7 reliability as agreed upon will be issued in the near future.

GFI System Test

A rough draft of the GFI systems test plans for the Experimental Subsector has been prepared. It is hoped that this will appear as an M-note before the next Biweekly Report.

Programs are being prepared for both MTC and XD-1 to carry out computer testing of portions of the GFI system, and some are in the process of check-out.

Some difficulties have been uncovered in the first computer test of the DDR. These difficulties (the sensitivity of the DDR to target pattern, Sync-to-timing phase, and Carrier-to-timing phase) are being taken care of by minor redesign. A revision in the scheduling of other systems tests requiring a DDR has been necessitated by the DDR troubles.

Computer Programmed Systems Tests

Programs have been written for MTC for the purpose of checking DDT and DDR equipment in a more flexible way. Work is still continuing on these programs in an attempt to make them easy for other people to operate and in an attempt to provide still more flexibility. Programs with assistance of ADES personnel have also been written for checking the GFI equipment in Building F using the phone line link between MTC and Building F. Further refinements are necessary and are being worked out. An attempt is also being made to combine this GFI test program with the DDR test program mentioned above.

Work is being started on a program which will allow MTC to send video signals to SDV equipment on the third floor of Building B. These video signals will be compatible with the type of signals received from a radar antenna.

6M-3859

AN/FSQ-7 AND CAPE COD DIRECTION CENTER (continued)Special Studies (R. H. Gould)Dual Beam Scope

Tektronix has finally become convinced that there is a market for dual-beam scopes and expects to produce an engineering model in a few months. This model is planned to be essentially two type 545 scopes in a single box with a two-gun tube, and will be awaited with much interest.

Video Probe

The XD-2 installation will be used for a small scale test of a video probe system in conjunction with a dual-trace scope (electronic switched, not dual-beam). We hope to provide two probe types, the "hot" and the "cold," that can use the same installed power and signal lines. The "hot" probe has a vacuum tube in it and drives a 26-foot coax. The "cold" probe contains a passive attenuator which drives an eight-foot coax at whose end is a box with vacuum tubes. It is planned to hand this box on a track at the top of the frame and run a loose cable to the junction box. Both probe types have their disadvantages and design difficulties, but each has possibilities and a comprehensive test of both is desirable.

Light Gun

Tests have indicated that the light gun is electronically adequate. I attended a meeting on 12 August between Hazeltine and Baush and Lomb engineers who discussed mechanical design changes for simplifying manufacture and increasing usefulness. The result of these changes may be less beautiful than the present gun, but will be a better gun. One change in the optical system is doubtful and will be tested carefully before a firm decision is made.

Some troubles have been reported with the light gun amplifier and a study of it will be undertaken to see if some changes in it will not improve the light gun system. I believe the problem of bounce of the light gun trigger switch contacts can be resolved by a change in the amplifier.

Lighting and Display Test Room

Tests on the charactron in the lighting test room have shown a large difference in legibility depending upon whether the alignment was done by a careful but unskilled hand (mine) or by the hand

6M-3859

Special Studies (continued)

of the master (Corderman). It seems desirable to check variation in legibility when the alignment is done by various hands between these two extremes.

When the present series of charactron tests is finished, which should be within a week, the P7 charactron in the test room will be replaced by a charactron with a P14 phosphor. Tests on MTC have indicated that visually the P14 is better than the P7 and that they are equivalent for light gun operation. Legibility tests will be run with the P14 charactron.

6M-3859

VACUUM TUBES

(Group 65, P. Youtz)

Tube Techniques (D. C. Lynch and J. S. Palermo)

Initial tests have indicated the desirability for an additional 19-inch charactron tube with a P14 screen. Toward that end, CHT-121 was processed and is in transit to Lexington.

Preliminary experiments in our chemical laboratory have successfully reproduced quality phosphor screens in approximately one-half the usual settling time. Further work and evaluation is necessary before this method can be considered for the Lincoln Tube Process Specifications.

Charactrons (P. C. Tandy)

Six MIT 19-inch tubes and three Convair charactrons have completed from 785 to 4976 hours on life test. Tests made have indicated that there were no tube failures since the last report.

Two 19-inch tubes have been given initial tests and were found to be satisfactory for shipment to C. L. Corderman. CHT-121 was found to have approximately 200K grid-cathode resistance when heater voltage was applied. This leakage was sparked off with no apparent damage to the cathode.

Thirteen cathode-study tubes have completed from 1140 to 1450 hours at one-half cutoff d-c. Latest test results have indicated no poor tubes.

Typotrons (L. B. Martin)

Sixty-cycle a-c current tests on collector and storage meshes of typotrons show that use of the General Radio Impedance Bridge for measuring collector-storage capacity is not responsible for burned-out collector meshes. The collector meshes of typotron tubes 268 and 383, both retired from life test, were purposely burned out in an attempt to relate the type of burn with the collector appearance. It seems that a d-c burn results in significantly fewer holes in the interior of the mesh as compared to destruction by a-c. In both cases the mesh all around the periphery is vaporized, but the annular section is more even in the case of d-c burnout.

Because of the recent trouble with typotron collector and storage meshes, it has been decided to assemble equipment to examine the interior of the tube by TV with the use of the writing-gun beam. This was done on the MIT storage tubes, and it is hoped much of the equipment is in storage.

6M-3859

Typotrons (continued)

The eight old-type Typotrons will be indefinitely discontinued from life test in favor of more new type tubes. A report will be written to sum up the old life test.

Six Typotrons have been on life for 3448.2 hours and three have been on for 2722.5 hours. All are satisfactory.

Receiver Tubes (S. Twicken)

The life test of type 5687 with Cathaloy A31 cathode alloy has reached 6200 hours, one section conducting and the other cut off. Plate current has held up well. There is considerable grid emission on the cutoff sides, as in the previous life test of standard tubes, resulting from the excessively high temperature at which the 5687 cathode operates. With regard to interface impedance, the results are promising: four of the ten conducting sections have from 10 to 35 ohms and 2% of the ten cutoff sections have 25 ohms.

There is now considerable interest in the industry in this tungsten-nickel cathode alloy. Sylvania has just completed a small 9000-hour life test on Cathaloy 7AK7's which showed no interface and has requested permission to produce a larger lot of 2420's with Cathaloy cathodes for further evaluation.

All 5881's in WWI of lots with peeling cathode difficulties have been replaced as a preventive maintenance measure.

Commercial Tubes (T. F. Clough)

Thirteen K1084-P7 cathode-ray tubes were removed from the Cape Cod 16-inch display scopes because of grid emission. The grids of these tubes were r-f heated to eliminate the grid emission. And those tubes restored to service by Group 64 were reported satisfactory after this r-f treatment.

Group 24 has experienced some hum difficulty with one manufacturer's type 5749 in a video pre-amplifier application. This trouble appears to be the result of magnetic pickup due to a peculiarity of the particular mount construction of this tube.

6M-3859

PRODUCTION COORDINATION OFFICE

(Group 66, B. E. Morriss)

Power (J. J. Gano)

Motor-Generator Starting

Memorandum 6M-3817, "Starting of Motor-Generator Sets in Sage System Power Plants," Jackson and Moreland, has been distributed. Calculations on starting torque and voltage drop were made for across-the-line, autotransformer, and reactor starting. A summary table presents the expected performance in the various plants. In direction centers the voltage drop is not sufficient to cause fluorescent light drop out; in combined centers a small number of lights may drop out.

Equipment Cooling

IBM has concurred on 6M-3692, "Equipment-Cooling Loads for a Direction Centers." Much of the delay was due to the failure of IBM to recognize the fact that the load breakdown for equipment-cooling design is different than that for power equipment design. Since it is hoped that IBM can supply this information directly to W. E. in the future, Jahn has invited IBM's personnel to hear an explanation of our methods. This document will be distributed along with Francis Associates report "Heat Loads in a Direction Center," 6M-3790, which expands on the data in the first document by calculating the requirements for fresh-air and humidity control and the air flow for each area and ducted electronic frame.

XD-1

At a meeting attended by Lincoln and IBM personnel, definite action was taken on all items on power control in the list of deficiencies compiled by Coffin. IBM is initiating the changes recommended. The same groups met with G. E., and discussed troubles in the d-c supplies. G.E. will make the modifications requested. G. E. requested a deferment of three weeks to study the suggestion of reducing the number of variable potentiometers from eight to one or two in the production units.

Power and Air-Conditioning Status Indicator (Mimic Panel)

Sandy has revised the draft of memo 6M-3628 to incorporate IBM's suggestions which were mainly on the mechanical design.

6M-3859

TX-0

Clark is now working on the relay control section. Relay power of 72 v has been selected to overcome the contact trouble due to dust experienced in XD-1 and WWI where 48 v relay power is used.

Communications (C. J. Carter, F. E. Irish, H. J. Kirshner)

A meeting was held at Lexington to discuss the status of the ESS external and internal circuits and equipment. A status report is contained in 6M-3846.

A meeting was held at Lexington to discuss problems and status of communications facilities for SAGE. Minutes of the meeting are to be distributed by AT&T Co. shortly.

Communications siting teams visited Brunswick NAS and Hanscom AFB.

A demonstration of the BTL-ADES teletype message composer was witnessed at Whippany. This device has application in the SAGE system. If adopted, the Message Composer will provide more error-free message transmission at faster speed and lower cost than equipment presently contemplated for use. A demonstration of the Message Composer will be held here some time in September.

An installation check of the XD-1 internal and external voice circuits is being planned which will determine whether or not these circuits have been connected to the specified console position. So far only a preliminary study has been made of the internal communication system. These internal circuits have been divided into eight groups so that each of them can be checked by a team of about ten people. Only the termination and signaling will be checked on these internal circuits. It is assumed that it will not be necessary to check transmission level.

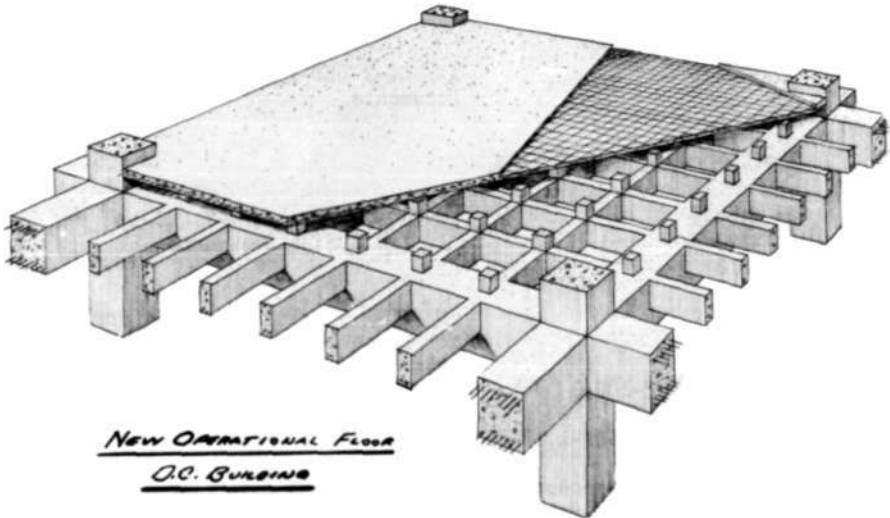
Facilities (W. H. Ayer, E. L. Smiley, J. J. Carson)

The WE-ADES and Burns & Roe building engineers have submitted a new and vastly superior flexible floor design for the operational areas of the Direction Centers, to begin with the fourth building at Fort Lee, Virginia. This scheme, the result of a long series of conferences between Lincoln and WE, is the ultimate that we believe can be achieved without resorting to levitation or Indian rope tricks for supports. It may be described as a concrete floor supported by eight inch posts at the intersections of a grid of concrete beams on four foot centers. All access to cables and air ducts is from below, eliminating the need for removable panels or trap doors in the operations rooms.

The sketch below shows the floor with its supporting posts and the

GM-3859

grid of concrete beams. Raising the floor on posts above its supporting beams allows holes to be cut for air and cable access to a console directly above a beam. The only places where a hole cannot be cut are at the columns, which occur every 30 feet, and over the eight inch posts that are four feet apart. A console can straddle one of the posts with no difficulty, however. New holes can be cut in a matter of minutes with a special concrete boring machine that reportedly creates no dust or noise outside of a genteel hum. Design work on a more flexible air and cable duct layout to match the new floor is continuing in New York, although it may be some time before any final results are obtained.



Burns & Roe has also completed construction drawings for installation of the broad-band blue operation lighting system in all Direction Centers, beginning with the first site at Maguire AFB in New Jersey. A review of the drawings showed that they have done an excellent job of interpreting the Lincoln requirements and producing a satisfactory lighting system.

6M- 3859

TIR's and Coordination (E.D. Lundberg)

The following material has been released as engineering data for the AN/FSQ-7 and SAGE System:

<u>TIR #</u>	<u>Document Numbers</u>	<u>Subject</u>
1-91	6M-3754 6M-3756 6M-3737 6M-3757, Suppl. 1 6M-3758 6M-3765 6M-3765, Cor. 1	AN/FSQ-7 Display System Documents
1-92	6M-3753 6M-3755 6M-3758 6M-3765 6M-3765, Cor. 1	AN/FSQ-7 (XD-1) Display System Documents
1-95	6M-3399-1 6M-3728 6M-3818	AN/FSQ-7 and AN/FSQ-7 (XD-1) Display System Documents
1-96	6M-3439-2 6M-3660 6M-3842 IBM D-81-3, P-182-3 IBM D-85, P-173 Drawings: D-75501-1, D-75497-1, C-75496.	AN/FSQ-7 (XD-1) Specifications for Large Board Display and Command Post Desk

Memorandum 6M-3515-2, "Proposed Site and Equipment Locations in the Experimental Subsector," giving the location, use, and operational date for the AN/FSQ-7 (XD-1) of the various equipments in the experimental subsector has been coordinated internally and will be presented to the Planning Approval Committee on Monday for action. When approved, this will be released by TIR.

Release of supplemental specifications for the AN/FSQ-7 and a master reference list of AN/FSQ-7 specifications have been further delayed to include later information, but should be released during the next biweekly period.

6M-3859

ADMINISTRATION AND SERVICES

(Group 60, J. C. Proctor)

Personnel

New Staff

Mary Ferguson is a new staff member assigned to Group 61. She received her BA from Carleton College in June.

Arnold Rupp is a new staff member assigned to Group 61. He received his MA in Physics from Columbia University. He has had many years of excellent experience.

Terminations

Jack Dominitz, Jack Raffel, James Schallerer.

Material (H. B. Morley)

Specifications as prepared by Francis Associates for air conditioning the TX-o computer have been given to the Purchasing Department for submission to a list of approved bidders.

A 5KW gasoline-driven generator has been obtained from the Air Force for emergency use at Barta Building.

General Engineering (A. R. Smith)

Though vacations have delayed all mechanical design and fabrication involving outside participation, the Model Shop continues to meet Group 65 requirements, supplying jigs and fixtures for tube assembly and quality checking.

The Card Room air conditioner has been operating for one week, although a reheat coil, automatic controls, and duct registers are to be installed this week to complete the program.

Standards and Components Test (H. W. Hodgdon, C. Morrione, Jr.)

Hodgdon, with IBM representatives, visited Hi Q Division of Aero-vox Corporation in Olean, N. Y., to observe their manufacturing techniques on deposited carbon resistors.

A Kelvin bridge is being ordered which will allow us to make measurements of resistance as low as 0.00001 ohms with accuracies to 0.0 per cent.

6M-3859

Test Equipment (L. Sutro)

The two differential preamplifiers most used with scope in Division 6 have been found defective within the past month. The Differential Video Probe, designed by H. Zieman two years ago, has the wider bandwidth, and has been observed to add a small amount of ripple to signals. H. Zieman has added two V-R tubes which appear to cure this trouble. The Tektronix 53D/54D can respond to a wider range of voltage amplitudes. However, when it is adjusted for maximum common mode rejection on one sensitivity setting, much poorer rejection on the other settings is revealed. Advice of both Tektronix and the Vacuum Tube Laboratory is being sought in an effort to solve this problem.

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6M-3859

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STUDIES IN PROCESS

<u>Study</u>	<u>Responsibility of</u>	<u>Expected Completion</u>
<u>GROUP 61</u>		
Analytical Tracking	R. F. Jenney	
CCS '54 Tracking	H. A. Keit	
Data Reduction Program Specs	F. W. Graham	
Digital Display Program Specs	H. Briscoe	
FGD Characteristics	B. R. Stahl	
In-Out Program Specs	A. Shoolman, A. Ginsberg	
Interceptor Guidance Errors	C. Friedman	
Magnetic Tape Read-in Program	M. Curran	
Radar Input OPS Specs	F. Brooks	
Random Number Generation Test		
Program Checkout	H. D. Neumann	
Single Track History Printout Program	D. P. Latimer	
Situation Display Program	A. Schwartz	
Switch Interpretation	R. Olsen	
Table Storage Requirements	L. B. Collins	
Track Log Printout Program	O. T. Conant	
Track Scan	F. Ogg, P. Strait	
XD-1 Inactivity Alarm Proposal	M. Feldstein, P. Vance	
	A. Shoolman	
XD-1 Startover Program, OPS Specs	P. R. Vance	
<u>GROUP 62</u>		
<u>XD-1 Installation</u>		
LRI Systems Test Plan	W. J. Canty	
Programming for XD-1 LRI and GFI	H. L. Rundquist,	
Systems Test	S. L. Thompson	
<u>Memory Test Computer</u>		
Card and Tape Symbolic Address Assembly	B. G. Farley	
Drum Storage Probability (for Grp 66)	H. I. Rundquist	
Flight Test Analysis (for Grp 22)	P. Harris, C. Uskavitch	
Marginal Check System	J. A. Newitt	
Pattern Recognition (for Grp 24)	G. P. Dineen	
Pattern Recognition (for Grp 34)	J. J. Selfridge	
Simulation (for Grp 22)	H. Neumann, B. Stahl	
Technicians' Training Manual, IV	A. Vanderburgh, Jr.	

- 32 -

UNCLASSIFIED

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CONFIDENTIAL

6M-3859

Systems Office

Ground Rules for Cabling of Display Consoles in AN/FSQ-7	R. D. Buzzard and IBM
Installation Test Equipment for SAGE	R. Gerhardt, WE-ADES
Justification of XD-1 as a SAGE Research and Development Tool	J. P. May
Mark X (SIF) and Problems during Imple- mentation into SAGE	J. P. May, J. V. Harrington
Proposal for Close Engineering Coordina- tion Concurrence with IBM for Future Changes to AN/FSQ-7	J. P. May

GROUP 66

Communications

Investigation of Procurement and Techni- cal Problems Connected with an Improved Large Board Display System	L. Sutro, R. Buzzard, J. Carson
---	---------------------------------------

Facilities

Orifice Testing	F. Manning	Oct 55
Building Redesign Study	W. Ayer, E. Smiley	Oct 55
Blue Filter Specifications	W. Ayer	Sep 55
Building Design Changes	E. Smiley	Aug 55
XD-1 Schedules	J. Carson, F. Manning	---

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6M-3859

UNCLASSIFIED

DOCUMENTS ISSUED

(Frances Christopher)

The following documents were published by Division 6 or received from IBM during the period 12 to 29 August 1955:

<u>No. 6M-</u>	<u>Author</u>	<u>Title</u>	<u>Cls.</u>
SAGE SYSTEM TEST AND PLANNING (Group 61)			
3572	R. A. Gildea	Sine Table for Fine-Grain Azimuth Positions	U
3728	R. R. Reed	Category and Display Assignment Bit Assignments for SAGE Situation Display Console	C
3774	F. Brooks, E. Wolf	Operational Specification for SAGE System Radar Data Inputs	C
3779	H. Benington, M. Feldstein	Need for Additional Data-Processing Facilities to Save XD-1 Time	C
3780	S. J. Hauser, F. M. Garth	Operational Specification for Identification Function in SAGE	C
3795	P. Bragar	Operational Specifications for Subsector Command Post in SAGE	O
3814	S. J. Hauser, F. M. Garth	Operational Specifications for the Manual Data-Input Function in the SAGE System	C
3817	Jackson, Moreland	Starting of Motor-Generator Sets SAGE System Power Plants	U
3818	H. Rising	AN/FSQ-7 and AN/FSQ-7(XD-1) Activate Bit Assignments	U
3828	H. Frachtman	Operational Specifications for the Height Finding Function in a SAGE Center	C
3829	---	AN/FSQ-7 Basic Programming Courses Manual Input-Output and Display	C
3831	W. S. Attridge	Minutes of Group 61 Leaders Meeting 10 August 1955	C
3849	A. Wright	CCS Weekly Operation Schedule	U
3850	H. Benington	Group 61 Requirements for Installation of XD-1 Console	U
5032	M. Curran, M. Smith	Test Specification: B-29 Tracking Accuracy Tests Maneuvering Courses	C
5033	A. E. Budd	Test Specifications for Interception Series 2, 3, and 4	C
5035	F. W. Graham	Post Test Data Reduction for the Interception Studies	C
5038	J. B. Stewart	Effect of Association between Radar Data from Successive Scans, etc. .	C

- 34 -

UNCLASSIFIED

~~CONFIDENTIAL~~

3859

5039	W. E. Butler	Great Circle Distances and Bearings between 1954 CCS Radar Sites with Overlapping Coverage	C
5040	W. B. Rohn	Measurement of SDV Returns from Weather in Selected Regions of Radar Coverage	C
5041	P. S. Olmestead	Tables for Radar Track Simulation	U
5042	J. D. Drinan	A Technique for Measuring Areas of Weather Cutter	C
5043	J. D. Drinan, V. A. Nedzell	Frequency of Weather Clutter on L-Band Radar	C
5045	P. S. Olmestead	Scan-to-Scan Association of Radar's Returns from Aircraft	C
5046	P. S. Olmestead	Occurrence of Multiple Radar Signals in the SDV System	C
5047	W. E. Butler	Location of Radar at Montauk, N.Y.	C
5048	E. F. Ennis	Collection of Radar Data for Noise Study	C
5049	W. Wells, A. Nedzel	1954 Cape Cod Test Program Schedules	C
5050	E. F. Ennis	Analysis of Radar Returns Resulting from Weather	C
5052	G. B. Harris	Radar Coordinates	C
5055	E. F. Ennis, A. Herckmans	Data on Equipment Troubles in the Lincoln System	U

FSQ-7 PROTOTYPE DESIGN AND INSTALLATION (Group 62)

3823	J. Woolf	Vector Generator for Display Equipment	U
3842	N. Jones	Proposed Changes to Command Post DD Desk Specifications	U
3845	L. Sutro	Test Equipment Committee, 23 Aug.	U

ADVANCE DEVELOPMENT (Group 63)

3820	W. A. Clark	EMAR: An Experimental Memory Address Register	U
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AN/FSQ-7 AND CAPE COD DIRECTION CENTER (Group 64)

3839	C. Watt	Final Report of Task Group Studying the Duties and Responsibilities of the C & E Duty Officer	U
3852	S. Dodd	Equipment Needs in XD-1	C

~~CONFIDENTIAL~~

6M-3859

UNCLASSIFIED

VACUUM TUBES (Group 65)

3806 F. Caswell Maintenance and Operation of the
Vacuum Tube Assembly Room U

PRODUCTION COORDINATION OFFICE (Group 66)

3832 J. J. Carson SAGE System Meeting, 15 August U
3846 C. Carter Installation Status of External
Telephone Circuits and Equipment U
for the SAGE ESS

ADMINISTRATION AND SERVICES (Group 60)

3835 Div. 6 Staff Biweekly Report for 12 August 1955 C

- 36 -

UNCLASSIFIED

~~CONFIDENTIAL~~

6M-3859

Accessions List (Continued)

<u>No.</u>	<u>Author</u>	<u>Title</u>	<u>Cls.</u>
<u>IBM DOCUMENTS</u>			
IBM-797	H. E. Conkey	Optical Frquency Generator Engineering Report Project High	U
IBM-798	E. J. Smuro	Variable Gate Amplifier Model B	U
IBM-800	E. J. Smuro	Convergence Current Regulator Model A Engineering Project High Report	U
IBM-801	R. C. Eisele	Gap-Filler Input Element Read-Out Register Engineering Project Report	U
IBM-802	R. S. Grant	Type Test Operation-- Project High Engineering Report	U
IBM-803	J. J. Mihok	Handling Procedures for the Situation Display Cathode-Ray tube	U
IBM-804	R. Cunningham	Card Assemblies Released for AN/FSQ-7 combat Direction Central	U
IBM-805	F. Grace	Forth Quarterley Progress report Diode Development	U
IBM-806	Z. Dearden	Digital Display mesh Level and erasure unit	U
IBM-807	B. Housman	AN/FSQ-7	C
IBM-808	J. Wilford	Gap-Filler input Element target amplifier circuit	U
IBM-809	W. Elliott	Gap-Filler input Element Sweep circuit	U
IBM-810	J. Beesley	Transition time Computations	U
<u>LL-DR DOCUMENTS</u>			
DR-304	R. C. Marden	Concurrence on XD-1 Console Equipment and Label Layouts (P-207)	U
DR-306	P. A. Dungan	P. A. Test Equipment	U
DR-305	-----	Maintenance Furniture and Misc. Nonexpendable items, list for Duplex Central	U

GM-3859

GLOSSARY

AA	antiaircraft	IBM	International Business Machines
AD	Air Defense		
ADC	AD Command		
ADES	AD Engr'g Service	LRI	long-range radar input
AEW	Airborn Early Warning		
AF	Air Force	MAR	memory address register
AFB	AF Base	MEL	minimum equipment list
AFIRO	AF Installation Requirements Office	MISP	Manned Interceptor Simulation Program
ARDC	Air Research and Development Command	MITE	multiple input terminal equipment
ATC	Air Training Command	MTC	Memory Test Computer
ATCF	ATC Facility	NAS	Naval Air Station operations
		OPS	
BTL	Bell Telephone Labs		
		PIUMP	plug-in unit mounting panel
CC	combat center	PCO	Production Coordination Office
CAT	category	PRF	pulse repetition freq.
CCS	Cape Cod System		
CER	change evaluation request	RAFD	Rome AF Depot
CHT	charactron tube	RD	radar data
CP	Command Post		
CRT	cathode ray tube	SAGE	Semiautomatic Ground Environment
C&E	communications and electronics	SBT	surface barrier transistor
		SAR	storage address register
DAB	display assignment bit	SD	situation display
DC	direction center	SDG	SD generator
DD	digital display	ADV	slowed down video
DDG	DD generator	SIF	selective identification feature
DDR	digital data receiver	SC	Signal Corps
DDT	digital data transmitter	SCEL	SC Engineering Lab
		SOP	standing operating procedure
ECM	electronic counter measure	SO	Systems Office
ECP	enr'g change procedure		
EMAR	experimental memory address register	TBS	training and battle simulation
ESS	experimental subsector	TD	track data
		TIR	Technical Information release
FGD	fine grain data	WE-ADES	Western Electric-ADES
FF	flip-flop	WWI	Whirlwind I
FORX	FGD orientation with Ray-dist and calibrated Mark X		
GFI	gap filler input		
GSR	group selection register		

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6M-3859

INDEX

	<u>Page No.</u>
<u>SAGE SYSTEM TEST AND PLANNING</u> (Group 61, J. F. Jacobs)	2
Master Program Preparation (H. D. Benington)	2
Program Organization (W. Harris, L. Collins)	2
Checkout	2
Utility Program (C. H. Gaudette)	2
Card Preparation Room (H. Newhall)	3
Operational Specifications for SAGE System (C. A. Zraket)	3
Air Surveillance (J. Ishihara)	3
Weapons Direction (C. C. Grandy)	3
Identification, Manual Inputs, and Weather (F. M. Garth and S. J. Hauser)	4
Training and Battle Simulation (J. Levenson)	4
Combat Center (W. Lone, Jr.)	4
Training (S. B. Hibbard, G. C. Reed)	4
Staff Training (A. P. Hill)	5
Computer Operation Time (WWI, XD-1) (W. Vecchia, P. Guinard)	5
 <u>FSQ-7 PROTOTYPE DESIGN AND INSTALLATION</u> (Group 62, N. Taylor)	 6
XD-1 Installation (J. A. O'Brien, W. J. Canty)	6
Acceptance Test (J. D. Crane)	6
FSQ-7 Memories (W. J. Canty)	6
Large Board Display (L. Sutro)	6
Display (R. S. Fallows)	6
Display Development (C. L. Corderman)	7
Memory Test Computer (W. A. Hosier)	8
SAGE Subsystem Testing	8
Maintenance and Records (H. L. Ziegler, S. Hazen)	8
Installation	9
Planning (A. Hughes)	9
Reliability	9
Basic Circuits (R. L. Best)	10
256 ² Core Memory (D. Shansky)	10
Flip-Flop, Mod A (DC-2) (N. J. Ockene)	10
Gap-Filler Sweep Circuit (B. Barrett)	10
Charactron Vector Intensity Decoder	10
Digital Data Receiver (E. B. Glover)	10
Display Line Driver (J. Kriensky)	10

UNCLASSIFIED
~~CONFIDENTIAL~~

6M-3859

SAGE System Office (H. E. Anderson)	11
XD-1 Specifications	11
AN/FSQ-8	11
Operational Specifications	12
Personnel	12
<u>ADVANCE DEVELOPMENT</u> (Group 63, D. R. Brown)	13
Chemistry of Magnetic Materials (F. E. Vinal)	13
Memory Core Production	13
Inorganic Chemistry	13
Physics of Magnetic Materials (N. Menyuk, J. Goodenough)	14
New Components and Circuits (T. H. Meisling)	14
SBT Life Test Summary	14
Philco Subcontract	15
Memory (J. L. Mitchell)	15
Experimental Switch and Plane	15
TX-0 Cooling and Supplies	15
256° Construction	16
Advance Development	16
System Design (K. H. Olsen)	16
TM-1 8-Digit Multiplier	16
TX-0 Circuits	16
TX-0 Display	16
TX-0 Indicators	17
TX-0 Power Supplies	17
Logical Design (W. A. Clark for W. L. Daggett)	17
<u>AN/FSQ-7 AND CAPE COD DIRECTION CENTER</u> (Group 64, S. Dodd)	18
Cape Cod Engineering (L. L. Holmes, A. J. Roberts)	18
WWI Computer Operation	18
Room 156 Voltage-Interlock System	18
Direct Printer and Punch System	19
Auxiliary Drum	19
Crosstell Input	19
Height Finder	19
Demodulators	19
Ampex Recorders	20
Personnel Assignments	20
Test Planning and Coordination (K. E. McVicar)	20
Recent Memos	20
GFI System Test	21
Computer Programmed Systems Tests	21

6M-3859

Special Studies (R. H. Gould)	22
Dual Beam Scope	22
Video Probe	22
Light Gun	22
Lighting and Display Test Room	22
<u>VACUUM TUBES</u> (Group 65, P. Youtz)	24
Tube Techniques (D. C. Lynch, J. S. Palermo)	24
Charactrons (P. C. Tandy)	24
Typotrons (L. B. Martin)	24
Receiver Tubes (S. Twicken)	25
Commercial Tubes (T. F. Clough)	25
<u>PRODUCTION COORDINATION OFFICE</u> (Group 66, B. E. Morriss)	26
Power (J. J. Gano)	26
Motor-Generator Starting	26
Equipment Cooling	26
XD-1	26
Power and Air Conditioning Status Indicator	26
TX-0	27
Communications (C. J. Carter, F. Irish, H. Kirshner)	27
Facilities (W. H. Ayer, E. L. Smiley, J. J. Carson)	27
TIR's and Coordination (E. D. Lundberg)	29
<u>ADMINISTRATION AND SERVICES</u> (Group 60, J. C. Proctor)	30
Personnel	30
New Staff	30
Terminations	30
Material (H. B. Morley)	30
General Engineering (A. R. Smith)	30
Standards and Components Test (H. W. Hodgdon, C. Morrione)	30
Test Equipment (L. Sutro)	31