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

SUBJECT: BIWEEKLY REPORT, September 25, 1953

To: Jay W. Forrester

From: Division 6 Staff

CONTENTS

SECTION I - CAPE COD SYSTEM

1.1 Group 61

1.10 General

(C.R. Wieser) (CONFIDENTIAL)

It was decided some time ago to set up a flight-test service to plan and carry out flight tests for Group 61 programmers. The proposed procedure requesting tests is described in M-2288, Scheduling and Preparation of Flight Tests for Cape Cod, July 7, 1953, by Jack Arnow. Since extensive flight tests for the 1953 Cape Cod System are about to begin, this service has now been organized. R.N. Davis will be responsible for all flight test arrangements.

Summary

Testing of the input end of the SDV monitor station is now complete and the equipment is in operational use. One position for ground-to-air communication from Room 222 is now operative and others will soon be operative. The Fall River and Clinton sites were off the air on different days due to storm damage to open-wire telephone lines near the sites. Several stations will be equipped with illuminated labels within the next biweekly period. M-2343, Lighting Conditions and Design Considerations in the SCC Control Center, (J.Newitt), is being issued. An investigation indicates that the recent increase in computer speed will allow changing the interlace on the auxiliary drum from 8 to 4 μsec.

1.10 General (Continued)

(C.R. Wieser) (CONFIDENTIAL) (Continued)

A program for timing the rotation rates of two radars has been written.

The completion of the majority of the programming and testing of NTWS problems has made staff time available for work in connection with AN/FSQ-7 XD-1 and for work on advanced aspects of interception, AAA, height finding, and flight-plan input problems.

Superposition of radar data and trouble tracks for the track-monitor display (instead of using separate scopes for this purpose) did not produce any significant improvement. A solution which does not involve storage of past scans of radar data has not been found.

Since such a large number of alphabet abbreviations are in use, each biweekly entry will now explain each abbreviation the first time it is used in that entry.

See M-2431 (SECRET) for further reporting.

1.11 Equipment Engineering

(N. Alperin) (CONFIDENTIAL)

An investigation of the light cannon is being made to eliminate spurious pulses originating from it. An interim system has been devised and will be installed September 28.

(H. Kirshner) (CONFIDENTIAL)

Testing of the input end of the SDV monitor station is now complete, and the equipment is in operational use. A feedback loop for monitoring outputs of the various demodulators will be constructed shortly.

Remote facilities for ground-to-air radio equipment are now, for the most part, installed and checked. One position in Room 222 (Bedford Radio Operator) is operative; others will become operative as soon as a necessary panel is received from the electrical shop.

Two sites (Fall River and Clinton) were off the air on different days because of storm damage to open-wire telephone lines near the sites.

The Real Time Clock has been modified so that the increment of time is now 1/15th second.

1.11 Equipment Engineering (Continued)

(J.H. Newitt) (CONFIDENTIAL)

During the past biweekly period I have tested prototype models of illuminated panels and illuminated data shelves for the Control Center. Both experiments met with sufficient success to warrant final design work. This is now underway.

We have made good progress in standardizing the nomenclature for the illuminated labels in the center and have frozen enough of this to equip several stations with illuminated labels. These labels (for several positions) will be made and installed together with their lamps within the next two weeks. The remainder of the Control Center is to be equipped with illuminated labels as rapidly as possible. This decision was reached on the basis that regardless of room-lighting experiments these labels will be required and seem to be the only proper answer to our need. Once the lamps are installed for illumination of the labels it is possible to remove and replace any panel label in less than one minute. This allows future changes to be easily accommodated.

I have been in close collaboration with R. Garrett and Francis Associates with regard to the room-lighting problem of the Center. Since there are many things to consider on this complex problem (some of which have not been considered to date), I am issuing M-2423, Lighting Conditions and Design Considerations in SCC Control Center, which will cover all phases of the many special lighting problems in the Center (room, panel, map, and spot lighting). This note is intended primarily to inform the programmers and operators of our thoughts and intentions with regard to future modification of the Center and to solicit new problems that I may have missed. Since this note points out some desirable conditions for future Center design, it should be of interest to Group 62.

(A.V. Shortell, Jr.) (CONFIDENTIAL)

A test-equipment setup was assembled to investigate the possibility of generating a pattern which outlines all mapped areas. The scheme worked quite well, but its incorporation into the Cape Cod System would require a considerable amount of storage and would necessitate missing a scan of radar data every time this display was called for.

A scheme for reintensifying all unblanked pulses was also tried but caused elongation of the spots, and the contrast between single and multiple spots was poor.

1.11 Equipment Engineering (Continued)

(G. Young, B. Morriss) (CONFIDENTIAL)

The investigation of the in-out instructions and In-Out Control (IOC) indicates that the recent increase in computer speed will allow changing the interlace on the auxiliary drum from 8 to 4. Thus successive words would be transferred every 32 μsec instead of every 64 μsec.

A program was written and checked out for testing the proper operation of the 5-inch expanded display scopes. The program displays in an expanded form the si addresses of all display lines which may be seen by these scopes.

The project of keeping a set of programs up to date for checking all of the equipment in Room 222 and surrounding areas and keeping the manuals which explain the test for the individual consoles up to date is always slightly behind the actual situation, but it is hoped that September 27 will find the programs and manuals current. If this should be true, the programs will be recorded on magnetic tape early next period and a memo distributed describing their operation. Most of the manuals have been revised and should be attached to the consoles next period.

1.12 Data Screening

(R.L. Walquist) (CONFIDENTIAL)

Computer reliability appears to have been at an all-time low during the past two weeks. Because of this it has been very difficult to check out the modifications to the TWS program which were discussed in the last biweekly report. Several other jobs requiring computer time were postponed and top priority was given to checking out these program modifications. For the most part these modifications appear to be working satisfactorily. Only the changes in the FTU program (which generates simulated track data) have not yet been checked.

The last biweekly mentioned that we were attempting a superposition of radar data and trouble tracks for the Track Monitor display instead of using separate scopes for this purpose. Operation with this form of display does not appear to produce any significant improvement over the two-scope method. A solution which does not involve storage of past scans of radar data has not been found.

Training of Air Force personnel to man the TWS operating positions has been started. Several AF men have been trained in the mapping operation. Two AF men have been acting as Track Initiators. Training AF men to be Track Monitors will be started in the near future.

1.12 Data Screening (Continued)

(H. Seward) (CONFIDENTIAL)

The sequential display program for Truro data was revised and operated. The reading section of E. Wolf's magnetic-tape storage program was checked out. Operational tests of the Track-While-Scan programs continue.

(J. Levenson) (CONFIDENTIAL)

All revised monitor programs have been checked out both statically and in combination with all TWS programs. Operation has been satisfactory to date. Flow diagrams have been drawn for these programs, and my two memos describing their operation (M-2233, Track Trouble Detection, Interpretation, and Monitor Display Generation, June 11, 1953, and M-2238, Input Switches Interpretation for Track-While-Scan (TWS), June 12, 1953) are being revised.

(J. Ishihara) (CONFIDENTIAL)

Operational testing of 1953 Cape Cod-TWS-2 continues. Correction of errors and keeping up-to-date copies of programs and records have taken up the major part of my time.

Minor revisions to change the storage location of data-transfer parameters to facilitate the combination of TWS-2 with NTWS programs have been made and partially checked. This program, to operate without NTWS or FTU program, should be ready for recording on magnetic tape after another check-out.

(D. Goldenberg) (CONFIDENTIAL)

The Division 6 Quarterly Progress Report on the earth's curvature problem has been prepared and submitted.

A memo containing the final set of coordinates of the radars in the Cape Cod System relative to both North and South Truro has been prepared.

Work has continued on the memo on the earth's curvature problem.

(E.W. Wolf) (CONFIDENTIAL)

The over-all operation of the Magnetic Tape Storage Program has been improved by the addition of a number of program refinements.

1.12 Data Screening (Continued)

(H. Frachtman) (CONFIDENTIAL)

A few changes have been made in the Tracking Officer's Digital Information Display.

The tracking-data analysis programs are almost ready for testing.

(H. Peterson) (CONFIDENTIAL)

As before, the last two weeks was spent in acting as a Monitor in refining the display programs of the Cape Cod System, and in writing flow diagrams for these programs.

(W.S. Attridge, Jr.) (CONFIDENTIAL)

We have experienced extremely poor computer reliability during the past biweekly period. Out of 39 hours assigned to the TWS section only 14 hours 40 minutes (38%) have been useful. Consequently the testing of the new features and improvements of the TWS program has been delayed by more than one week.

The new Master Control Program works correctly and is available for use by the NTWS section.

(W. Wolf) (CONFIDENTIAL)

A calibration program for the 5-inch scopes has been written which displays a rectangular grid of vectors. The number of vectors displayed between the intersection points of the grid is a linear function of the distance from the center.

A program has been started which will display the 32-mile range circle about each gap-filler site as well as the site itself.

New Air Force personnel are being trained in the positions of Radar Mapper Operators.

1.13 Tracking and Control

(J. Arnow) (CONFIDENTIAL)

See M-2431 (SECRET).

(H. D. Neumann) (CONFIDENTIAL)

See M-2431 (SECRET).

(M. Frazier) (CONFIDENTIAL)

A program for timing the rotation rates of two radars has been written. The NLS-2c (non-linear smoothing) parameter study program will be modified to obtain further information about the smoothing-equation parameters suggested in the last biweekly.

(S. Best) (CONFIDENTIAL)

Work is continuing in trouble-shooting three programs: (1) a tracking program, (2) investigation of velocity-heading smoothing, and (3) simulation of crossing tracks. See M-2431 (SECRET) for additional reporting.

(W. Lone) (CONFIDENTIAL)

The Flight Test Umpire Simulation Program described in the September 11 biweekly report has been written and awaits checking. Lack of usable computer time has been responsible for the delay.

In addition to participation in the daily tests of the TWS section some time was spent in the indoctrination of a new staff member.

1.14 Weapons Direction

(D.R. Israel) (CONFIDENTIAL)

The first combined Non-Track-While-Scan Program, NTWS-1 (described in the previous biweekly) was successfully operated on a number of occasions during the past two weeks. On these occasions, full-scale simulated tests of 1 to 2-hour duration were held with Air Force personnel manning the majority of the operating positions. The program operated satisfactorily at all times and a large amount of operational experience was gained by Group 61 staff members and by the Air Force personnel.

The initial testing of NTWS-2, a revision of NTWS-1 to use only six drum fields, has been delayed by one week. The preparation of NTWS-2 requires a major revision of the Identification Programs and less extensive rewrites of the Display and Weapons Direction Programs. The progress on the rewrites has been satisfactory; however, delays have accumulated in retesting the new Programs and computer time has been lost to demonstrations and computer malfunctioning. The first combined test of NTWS-2 is now definitely scheduled for this weekend, with initial attempts at merging with the TWS Program scheduled for September 30.

During the past week, detailed consideration has been given to the data-taking activities of operating personnel during flight tests of the Cape Cod System. Several criteria have been established to help determine what data each position should take; in general, operating personnel will take data to provide certain "summary figures" regarding the test, but will not attempt to take data pertaining to the evaluation of the action or time requirements of that station. The "summary figures" desired for each station have been chosen, and on this basis Frank Heart has prepared Log Sheets and Summary Sheets for the NTWS stations. The Log Sheets will be used during the tests; the Summary Sheets are to be filled out after the tests. The initial formats of the sheets have been made out, and many have already been used during the operational tests with NTWS-1. A memo describing the data-taking activities and including sample copies of the forms is in preparation.

Two major items of equipment remain to be installed for the NTWS operating stations: the telephones at the Height Technician stations, and the Teleregister Availability and Scramble Indicator. A review of the display line allocations has resulted in the desire for a number of additions and changes. These have been submitted to J.A. O'Brien. A number of the additions are to improve the visitor facilities in Room 250; the 5" scope previously planned for use as a Digital Information Display (DID) scope will be replaced by a 16" scope with switches for selecting several DID's.

Preparations are being made for the forthcoming use of edge-lit Plexiglas sheets to label all of the push-button panels, toggle-switch panels, and intercomm boxes. G. Rawling has prepared the wording and abbreviations for these labels.

1.14 Weapons Direction (Continued)

(D.R. Israel) (Continued)

With the completion of the large majority of the programming and testing of the NTWS Programs, members of the Air Defense Center Operations Sections are devoting their time to new problems. Six staff members will devote a large part of their time to work in connection with AN/FSQ-7 XD-1 (see Section 1.16). Zraket, Nolan, Murray, Garth, and Lemnios are beginning the study of advanced aspects of interception problems. Jack Cahill is considering similar problems in connection with AAA and height finding. Study of the use of punched card equipment together with the buffer drum for the input of flight plan information is under way.

(C. Grandy, H. Benington) (CONFIDENTIAL)

During the past biweekly period the Display Section has written the final version of the Display Master Make-Up (DMM) Program. In addition to these previous features this Program now includes a section to read the Identification (ID) switches for changes in identification and a section to process light-gun returns from the Track Situation Display. Also the Airbase, Height-Finder Sites, and AAA geography displays have been integrated with the DMM program. The combined program (DMM and Geography) has been checked out and, with the exception of spacing constants, should need no further revision.

The Flight Test Umpire (FTU), Visitors, Weapons Direction, and Height Supervisor Digital Information Displays (DID's) have been combined and preliminary check-out indicates they are working correctly. The Georef Geography Display has been integrated with these DID's.

The revision of Memorandum M-1999, "Display Categories and Assigned Scope Displays," has been completed and issued as M-1999-1 (C. Grandy, H. Benington, September 24, 1953).

(Michael A. Geraghty) (CONFIDENTIAL)

Two modifications to T 2898, the Combined AA and Height-Finding (HF) Guidance Program, were introduced. The second, to economize on drum space, is not checked out as yet.

(William Lemnios) (CONFIDENTIAL)

The final form of the Interception Program was rewritten by C. Zraket. A few preliminary tests were held with it.

The Final-Turn Program has been written; it will be incorporated into the Interception Program in the near future.

1.14 Weapons Direction (Continued)

(John Nolan) (CONFIDENTIAL)

During the past biweekly period, time has been spent testing the rewritten forms of the Weapons Assignment (WA) Programs as well as assisting in the NTWS System test runs.

The two Assignment Action Programs have been rewritten as a single combined program and attached to the final program in the Intercept Direction set of programs.

The rewritten forms of the WA calculations and the WA Display Programs have been checked out and incorporated into the new system of WA Programs; they perform correctly within the system for hostile displays. Testing of the performance of these programs with flight-plan aircraft will be done as soon as the Intercept Direction Programs are joined into this System.

(F. Garth) (CONFIDENTIAL)

The rewritten Intercept Direction (IND) and Radio Operator's Digital Information Display (RODID) Table Make-Up and Display Programs have been checked out and married with the rewritten Interception Program.

Most time during the past biweekly period has been spend with W. Lemnios laying the ground work for putting "final turn" into the Interception Program. I have worked out a method for obtaining the final-turn calculations which shouldbe a worthwhile simplification of the one in current use.

(L. Murray) (CONFIDENTIAL)

The Data Link Make-Up (MU) and Relay Program, the Intercept Direction (IND) and Radio Operator 's Digital Information (RO DID) Make-Up (MU) Program and the IND and RO DID Program have been rewritten, checked, and married into the Weapons Direction rewrite.

A new scope-calibration program has been written for the IND and RO DID scopes. When character, line and block spacings have been decided, S. Hauser will include these in his calibration program.

(Stephen Hauser) (CONFIDENTIAL)

The Georgaphy Display Programs have been tested and are presently being inserted into larger display schemes.

A calibration program for all scopes in the System has been tested and is being used. Modifications to the program will have to be made to allow for changing Digital Information Display (DID) Programs.

1.14 Weapons Direction (Continued)

(C.A. Zraket) (CONFIDENTIAL)

System testing of the NTWS Programs has continued during the past bi-weekly period with Air Force personnel manning the various console positions. All of the Weapons Direction and Assignment Programs have operated as originally designed although the following features have yet to be checked:

Data Link Program. Checking the transmission of data-link messages must wait upon the connection of the data-link equipment to the computer.
Final-turn interception calculations. The Interception Program has been rewritten to allow for the incorporation of final-turn interception calculations. W. Lemnios and F. Garth are now studying this problem for the Cape Cod System and are writing the subprogram for these calculations.

(E.W. Wolf) (CONFIDENTIAL)

The operating portion of the Intervention and Activate Button Check-out Program has been rewritten to permit operators at stations without a 16" scope to see their displays on 5" scopes.

(O.T. Conant) (CONFIDENTIAL)

The Digital Information Display (DID) drum storage has been moved to Group 4 to permit operation in conjunction with TWS.

I am now undertaking a study of requirements for DID's and internal telephone communications for the AN/FSQ-7 XD-1 system.

(F. Heart) (CONFIDENTIAL)

Time was spent preparing various pre-test, post-test and during-test operation record forms for the Cape Cod System.

(J.J. Cahill, Jr.) (CONFIDENTIAL)

Some time was spent during this period assisting at simulated exercises of the Non-Track-While-Scan Cape Cod Program. Training of Height-Finder Talkers during these sessions is going forward.

Meetings of the Lincoln Height-Finding Committee have been attended. Some time has been spent studying the programming aspects of complete or partial automatization of height-finding on a demand basis.

1.14 Weapons Direction (Continued)

(John J. Cahill, Jr.) (Continued)

Thought is being given to the time and storage requirements of a more subtle Automatic Height-Finder Priority Program, of the type which might conceivably be used in the Transition System, with the view in mind of possible testing of such a program with the Cape Cod System.

Similar thought is being given to a Weapons Assignment Program which would include an automatic target and battery assignment feature.

(P.O. Cioffi) (CONFIDENTIAL)

Testing of the NTWS Section was continued according to proposed schedule. Emphasis was placed on determining what data was necessary for analysis and system evaluations and how it will be recorded.

(M. I. Brand, A.W. Curby, C.H. Gaudette, S. Knapp, F. Heart) (CONFIDENTIAL)

The rewritten version of the Identification Program has been completed. The new version consists of six subprograms, four in subframe 4 and two in subframe 2. The rewriting has resulted in a saving of approximately 30% in drum storage and considerable savings in operating time. Testing has begun on this system. It is expected that the new program will be completely checked out and operating in the system early in the next biweekly period.

Due to the speed with which the new system has been rewritten and the imminence of its inclusion in the complete system, some obvious improvements and corrections in the initial system which could have been made have not been included in the present operating system.

(F.A. Webster) (CONFIDENTIAL)

This period has been largely devoted to the preparation of simulated flight tests and operating the FTU position in conjunction with R.N. Davis and P.O. Cioffi. A new parameter and drawing of generalized vectors has been made up. This permits a wide selection of specific problems for any given test. Some consideration has been given to the design of equipment for more effective manual operation of the variables involved in aircraft control.

(J. Hayase) (CONFIDENTIAL)

The past biweekly period was spent performing a number of miscellaneous tasks in the Air Defense Room and assisting in the rewriting of the Identification Display Programs.

(G. Rawling) (CONFIDENTIAL)

Activity in the past period has been devoted to cataloguing, revising, and preparing rough-draft drawings of panel identification plaques with the assistance of J. Hayase; preparation of telephone-panel identification plaques; and supervision of label modification and lighting in the Air Defense Room.

1.15 Direction Center Operations

(M. Brand) (CONFIDENTIAL)

The following is a summary of Group 61 computer operations:

Scheduled Time	94 hrs
Track-While-Scan	34 hrs 10 min
Non-Track-While-Scan	37 hrs 20 min
Tracking Control	1 hr
Time Lost to Computer	21 hrs 10 min

(P.F. Dolan) (CONFIDENTIAL)

There were no "line flight tests" conducted during the last biweekly period.

Considerable time was spent in recording data for analysis from the FPS-3 radar in conjunction with gap-filler radars.

It is expected that we will resume line flight tests during the next biweekly period.

1.16 AN/FSQ-7 XD-1 Support

(D.R. Israel) (CONFIDENTIAL)

With the completion of the majority of the work in connection with the initial NTWS programs, more consideration is being given to the study of problems related to AN/FSQ-7 XD-1. The following staff members have been assigned to give attention to XD-1 problems:

Conant - DID displays and the intercomm system;

Rawling - programming and order-code study;

Geraghty and Hauser - manual inputs and switches;

Benington - Track Situation Displays and Cross-Telling;

Grandy - physical layout of operating station in XD-1.

A high priority is being given to the preparation of a floor plan for the Combat and Direction Center areas of the installation in the basement of Building A.

1.16 AN/FSQ-7 XD-1 Support (Continued)

(W.A. Clark) (CONFIDENTIAL)

Work on the joint report on cyclic transmissions with the GE data link was completed during the past period.

Some assistance has been given to Group 24 on the organization of a programmed investigation of the sequential observer and related devices.

(H.D. Benington) (CONFIDENTIAL)

I have started familiarizing myself with the display system to be used with AN/FSQ-7 XD-1; several conferences have been held with R. Von Buelow.

(G. Rawling) (CONFIDENTIAL)

I have started reviewing pertinent literature.

(M.A. Geraghty) (CONFIDENTIAL)

Considerable reading of background material on XD-1 has been done and the question of quantity and types of manual inputs investigated. The next period will be spent principally on this question, aside from time devoted to tests of the Cape Cod System.

(C. Grandy) (CONFIDENTIAL)

Considerable time has been spent during the past biweekly period reading a great accumulation of material about the AN/FSQ-1 XD-1 system. Particular attention is being given to the over-all system requirements in anticipation of coming work on the physical installation of XD-1 in Building A in Lexington. A study of personnel and console requirements has been made, and a large scale mock-up of the floor plan is being made.

1.17 Associated Studies

These activities are covered by Wells and Smulowicz in M-2431 (SECRET).

1.2 Group 64

(S. H. Dodd) (CONFIDENTIAL)

Electrostatic storage has now been removed from operation in Whirlwind I, and electrostatic-storage-control panels are being removed to allow better access to Core Memory for maintenance. Core Memory has been causing some trouble with parity alarms. Many of these parities have been traced down to tube shorts in the sensing amplifier, and it is hoped that a new sense-amplifier design will correct this difficulty. None of the parities so far encountered have indicated any troubles within the cores themselves.

Feasibility of adding a parity-check system to the auxiliary drum is being investigated. If this is not too difficult equipment wise, it will probably be installed within two or three weeks.

To insure coordination of activities in Room 222, all changes and additions to equipment are now being cleared through O'Brien and his in-out section.

The suggested lighting methods for the operation rooms in the Cape Cod System have been tested in Room 228. The proposed scheme seems to be generally satisfactory, and the Flight Test Umpire room and Sector Commander room will be experimentally lighted as a check before Room 222 lighting is modified.

1.21 WWI System Operation

(N. L. Daggett) (UNCLASSIFIED)

On September 14 all power was removed from Electrostatic Storage row. On September 24 the process of dismantling racks EX1 through EX8 was begun. This should bring most welcome relief from the space problem around the Core Memory.

Reliability of the Core Memory has been relatively poor during the last week. There is no indication of any basic difficulty with the cores; it appears that the trouble is entirely in the circuitry associated with them. Unstable write gates in the second bank of core storage have been cured by replacing one Selection Plane Driver Control Switch Panel. A problem of close timing has been found and eliminated: the Memory Address Register was being cleared before the write gates had properly terminated.

A number of failures have occurred in the sensing amplifiers for the Core Memory. As a hedge against further trouble with them, a prototype of the Magnetic-Core Memory, Mod. II, sensing amplifier is being tried out.

1.21 WWI System Operation (Continued)

Core Memory

(S. Desjardins, L. L. Holmes, A. J. Roberts) (UNCLASSIFIED)

During the past biweekly period we have continued to apply our time to improving the Core Memory System. As a result the following things were accomplished:

a. Designed and installed a Memory Address Register Inverter GT Panel to permit reading out of the Memory Address Register for transfer-check and block-order operation.

b. Installed new and relocated other circuits involving Core Memory Control pulses. This resulted in our being able to turn off the power in E Row, ES Control, and Program Register.

Work will continue along the same lines during the forthcoming period. This will result in our readying rack space for Core Memory in the E Row area.

Marginal Checking

(T. Leary) (UNCLASSIFIED)

Within a week we expect to have each of our marginal-checking test programs arranged to store itself on drum Group 9 immediately following read-in from PETR. They will also each have a PMC program which is self-contained and does not need the Flexowriter reader for storage of MC line numbers. When applying margins produces program-destroying errors, the test program and PMC program may be recovered from drum Group 9 by starting over at 35 (octal). This will save much time over reading in the program again from PETR; the additional time saved by not using the Flexowriter reader should greatly speed up the marginal-checking routine.

We will be marginal checking the Core Memory and Control on a routine basis within a day or two.

Auxiliary Magnetic-Drum System

(H. L. Ziegler) (UNCLASSIFIED)

The clean-up of the Auxiliary Drum Monitor System is essentially complete. The few remaining minor items should be finished early next week.

1.21 WWI System Operation (Continued)

Auxiliary Magnetic-Drum System

(H. L. Ziegler) (Continued) (UNCLASSIFIED)

Attention is now being directed to the testing of the drum chassis, particularly the Type 9 Chassis. The group-selection relays seem to have slowed down considerably in their release time and consequently cause occasional errors.

Addition of a parity check to the drum systems is being studied. Present indications are that the CM Parity-Check System plus a few additional circuits can be used for this prupose. Most of the timing difficulties have been resolved; barring unforeseen difficulties in the block diagrams and circuit additions, a complete proposal for the system should be ready sometime during the coming week.

(K. E. McVicar) (UNCLASSIFIED)

Recent checks reveal that the relays which select the writing circuits have slowed down in their operation. The result is that the time required to set up the group selection for the write operation is very close to the delay counted by In-Out Control. The alternatives of speeding up the relays and increasing the setup delay are being investigated.

Flexowriter and Paper Tape

(L. H. Norcott) (UNCLASSIFIED)

Modifications to our paper-tape verifiers have been completed, and all three verifiers are now in operation in the tape room.

During the past two weeks several FL punches and readers have been torn down for routine inspection and maintenance. Overhaul of our FL typewriters will begin next week.

1.22 Terminal Equipment

(J. A. O'Brien) (UNCLASSIFIED)

Most of the past biweekly period has been spent trying to consolidate our gains in the display room. All of the drawings are not up to date, but we appear to be holding our own with the changes. There have been a few cases of confusion between people installing equipment in the room because of insufficient liaison between the various groups involved.

1.22 Terminal Equipment (Continued)

(J. A. O'Brien) (Continued) (UNCLASSIFIED)

The result has been a few designs incompatible with each other or with the maintenance problem. To eliminate this problem, the In-Out Section has been given the responsibility for the entire room, and all additions or modifications have to clear through the writer. This system has been operating satisfactorily for the past few days and has clearly brought to light that an extremely large number of people are interested in adding gadgets to the room.

(R. H. Gould) (UNCLASSIFIED)

Testing of the Output Coder Control (Ground-to-Air Link Control) disclosed a logical difficulty (solved by the addition of another gate tube to Block Control) and a timing difficulty that has not yet been cured. It should be fixed with no great trouble.

The display scopes in test control are now intensified by the new display system. The three scopes are intensified together under control of four switches in the rack on the central table. Points, characters, and vectors are available on each of the three left switches. The rightmost switch puts all displays on the scopes.

The operation of display control will be changed next week so that a pulse will sense the light-cannon and light-gun circuits in the middle of the point-intensify time. This should solve the problem of timing of light-gun pulses and stop the spurious-pulse troubles of the light cannon.

The equipment in Room 222 seems to operate as it should. No known troubles exist but changes are to be made and troubles are quite likely to arise. These will be quickly and effectively dealt with.

Operational Check

(S. B. Ginsburg) (UNCLASSIFIED)

The Cape Cod System was checked out completely during this period. All wiring changes were checked and all wiring errors were corrected. The system appears to be operating correctly and will be checked periodically to assure no intermittent operation.

1.22 Terminal Equipment (Continued)

Indicator Lights

(S. B. Ginsburg) (UNCLASSIFIED)

The indicator light circuits were modified in a manner which allows I.O.S. to gate the gas tube off more easily. Since the modification, the circuits have all operated correctly and no tubes have failed.

MITE

(R. B. Paddock, A. M. Werlin) (UNCLASSIFIED)

The new MITE which has been wired into L-8 has been statically tested independently of the drum and appears satisfactory. The next MITE which is to be in L-7 is partially completed and should be checked out during the week of September 28. Checking of the new MITE in conjunction with the Buffer Drum by test programming will begin in the same week.

Ferranti PETR

(F. E. Irish) (UNCLASSIFIED)

A breadboard circuit consisting of photoelectric tubes followed by cathode followers has been constructed for the purpose of testing the optical system of the Ferranti PETR.

The tests have shown that the signal levels in the various channels when measured with a given phototube are within $\pm$10% of a mean value. The variation in phototube sensitivities, however, completely obscures the variations in signal levels due to the optical system. The selection of the 927 phototubes used had a spread in sensitivities of 2 to 1.

Another quantity which was thought to be of interest is the cross talk between adjacent channels. This was found to be negligible when the phototubes are properly positioned.

Magnetic Tape Print-Out

(E. P. Farnsworth) (UNCLASSIFIED)

A low-pass filter has been added at the input of each channel of the print-out reading amplifier to eliminate the cross talk from computer magnetic-tape switching transients and record pulses into the delayed print-out circuits. These filters are effective because the frequency of the capacitively coupled cross talk is about ten times that of the normal magnetic-tape read-out signals.

1.22 Terminal Equipment (Continued)

Read-in via Buffer Drum

(E. P. Farnsworth) (UNCLASSIFIED)

The extent of modification to existing IBM punch-card readers which would be necessary to adapt them to the read-in via buffer-drum system has not yet been determined. A trip to Poughkeepsie may be necessary for this purpose.

Buffer-Drum System

(K. E. McVicar) (UNCLASSIFIED)

The auxiliary-storage section of the buffer drum has been run with the computer successfully. Operation is not yet completely satisfactory due to marginal operation of some parts of storage control and several drum tracks with low read-out signals.

The buffer-storage section of the buffer drum is now ready for test with the one MITE which has been installed in Room 156.

Marginal Checking

(T. Sandy) (UNCLASSIFIED)

Methods for marginal checking the new in-out equipment are being investigated. The main problem seems to be to marginal check the equipment without anyone operating the different scope positions.

Power Installation in Room 222

(F. Sandy) (UNCLASSIFIED)

All scopes have been converted to the new power-distribution scheme. This involved removing two panels from the scope console and adding two new ones.

This new scheme provides:

1. Blown-fuse indication in test control for all d-c voltages and the alternating current supplied to the 5" scopes.

1.22 Terminal Equipment (Continued)

Power Installation in Room 222

(F. Sandy) (Continued) (UNCLASSIFIED)

2. A means of killing all power to the console for purposes of working on the panels or scopes and changing fuses without shutting off power to the entire room.

3. Removing the -30 volts and +5 volts supplying the scope consoles via the junction box and feeding these voltages to the consoles directly from Rack J1 in Room 156.

4. The scopes are fused separately from all other equipment in the console, thus helping in trouble shooting.

5. A method whereby voltages supplied to the equipment in the console other than the scope itself can come on only if the scope is on.

1.23 Records of Operation

(F. J. Eramo) (UNCLASSIFIED)

The following is an estimate by the computer operators of the usable percentage of assigned operation time and the number of computer errors for the period September 11-24, 1953:

Number of assigned hours	137
Usable percentage of assigned time	89
Usable percentage of assigned time since March, 1951	85
Number of transient errors	40
Number of steady-state errors	8
Number of intermittent errors	9

Component Failures in WWI

(L. O. Leighton) (UNCLASSIFIED)

The following failures of electrical components have been reported since September 11, 1953:

Components	No. of Failures	Hours of Operation	Reasons for Failure
Crystals			
D-358	1	19000 - 20000	Low R_b
1N34A	2	2000 - 3000	Low R_b

1.23 Records of Operation (Continued)

Component Failures in WWI

(L. O. Leighton) (Continued) (UNCLASSIFIED)

Components	No. of Failures	Hours of Operation	Reasons for Failure
Capacitors			
0.01 MFD Ceramic Disc	1	0 - 1000	Shorted
Switches			
S10-17 (SPST)	1	19000 - 20000	Intermittent Contact
Tubes			
0A2	1	10000 - 11000	Leakage
6AS7G	2	11000 - 12000	Short
5U4G	1	8000 - 9000	Short
L463	2	0 - 1000	Open cathode; low I_b
5881	1	0 - 1000	Low I_b
6SN7	1	0 - 1000	Low I_b
	1	17000 - 18000	Short
8008	1	0 - 1000	Open filament
SR-1407	2	3000 - 4000	Unbalanced cutoff
3E29	1	0 - 1000	Short
6AG7	1	13000 - 14000	Low I_b
	2	18000 - 19000	Low I_b
6AS7	1	8000 - 9000	Short
	2	9000 - 10000	Short
	2	17000 - 18000	Short
6L6G	1	11000 - 12000	Low I_b
	5	16000 - 17000	Low I_b
6Y6G	2	1000 - 2000	Short
	2	2000 - 3000	Low I_b; leakage
	3	20000 - 21000	Low I_b; short; grid emission
6145	8	0 - 1000	6-Short; 1-leakage; 1-grid emission
	3	2000 - 3000	1-Short; 1-leakage; 1-unbalanced I_b
7AK7	1	2000 - 3000	Low I_b
	1	6000 - 7000	Short
	1	15000 - 16000	Short
	1	17000 - 18000	Short
	3	18000 - 19000	2-Short; low I_b
	1	19000 - 20000	Low I_b

1.23 Records of Operation (Continued)

Component Failures in WWI

(L. O. Leighton) (Continued) (UNCLASSIFIED)

Components	No. of Failures	Hours of Operation	Reasons for Failure
Tubes (Continued)			
5696	10	0 - 1000	4-Short; 6-high tube drop
7AD7	1	1000 - 2000	Low I_b
	1	3000 - 4000	Gassy
	1	4000 - 5000	Low I_b
	2	8000 - 9000	Short
	2	10000 - 11000	Short; low I_b
	6	11000 - 12000	4-Short; 2-low I_b
	4	12000 - 13000	1-Short; 2-leakage 1-low I_b
	1	17000 - 18000	Short
	2	18000 - 19000	1-Short; 1-low I_b
	1	19000 - 20000	Short
	1	20000 - 21000	Short

1.24 General

D-C Power Supplies

(S. Coffin) (UNCLASSIFIED)

Dynamic response studies have been completed on the 250-v, 50-amp regulated d-c supply being redesigned for WWI. This supply will be ready for installation as soon as final testing is completed.

Equipment Conditioning WWI

(R. E. Garrett) (UNCLASSIFIED)

In order to reduce losses, a new duct has been installed from the filters to the air-handling units. A temporary duct has been installed for cooling the Core Memory. A new maintenance program is being undertaken to insure adequately stocked spare parts and better all-around maintenance.

1.3 Group 65

1.31 Storage Tubes

(P. Youtz) (UNCLASSIFIED)

At the end of this next biweekly period any further storage-tube production will be stopped. Four or five 800-series storage tubes will be constructed this next period.

The storage-tube work will be cleared out of certain areas and this space can be assigned to other groups. The other facilities will continue to be used for tube-construction work.

Work will be done for the cathode investigations of H. B. Frost. Experiments for Group 25 leading toward an electroluminescent direct-view storage tube will be continued. Work on the electron optics by Group 25 for the Charactron studies will be continued.

Work on reliable computer tubes of the receiving-tube type for Group 62 will be continued.

1.32 Test

Storage Tube Reliability Tester

(L. B. Martin and R. E. Hegler) (UNCLASSIFIED)

Three storage tubes were tested in the STRT and found satisfactory.

Television Demonstrator

(A. Zacharias) (UNCLASSIFIED)

During the period three 800-series storage tubes, ST883, ST884, ST886, were tested and found to be satisfactory.

The intervening time was spent repairing and overhauling the TVD.

SECTION II - AN/FSQ-7

2.1 Group 62

2.11 Systems

Outputs

(J. F. Jacobs, K. Olsen) (CONFIDENTIAL)

The schedule for the output system has been revised to allow for three months' study and liaison. Specifications should be completed by December 1st.

Inputs

(J. F. Jacobs, K. Olsen) (CONFIDENTIAL)

A testing program for the video mapper and the SDV demodulator is being worked out with M. Raffensperger, Paul Rosen, and Ed Rich. Rich will propose a set of tests which he considers to be adequate. He will also be available for judging the performance of the mapper when these tests are applied.

Phone Lines

(J. F. Jacobs, K. Olsen) (CONFIDENTIAL)

A first approximation to the phone-line characteristics which can be expected was made by the members of the CADS-2 on September 4th.

Internal Machine

(J. F. Jacobs, K. Olsen) (CONFIDENTIAL)

Block schematics of two sets of change drawings have been received from MIT and are available in the Systems Office file.

(R. P. Mayer) (CONFIDENTIAL)

The IBM block schematics for the internal machine have undergone some slight revisions and additions. These are not yet summarized on any of our drawings. The largest changes are taking place in the command generator, but this study, by IBM, is not yet complete.

2.11 Systems (Continued)

Internal Machine (Continued)

(R. P. Mayer) (CONFIDENTIAL)

The comprehensive diagram for a complete center has not been redrawn. Instead, it is being expanded to provide data on timing, programs, other centers, etc. The diagram will be on four coordinated E-sized sheets. P. R. Bagley is assisting half time.

Note E-560, "Status of XD-1 Internal Logical Design," will be available shortly.

Outputs

(R. C. Hopkins, R. C. Jeffrey) (CONFIDENTIAL)

A schedule for the AN/FSQ-7 XD-1 output equipment has been adopted in which a period of study and liaison, to be concluded by December 1, 1953, will precede the actual logical design. During this period a set of specifications will be worked out in cooperation with representatives of all groups responsible for parts or aspects of the output equipment.

The study group, currently consisting of I. Aronson, R. Cypser, R. Hopkins, R. Jeffrey, B. Widrow, and, occasionally Jack Jacobs, has completed a review of the AN/FSQ-7 XD-1 outputs as far as they are now known. R. Cypser is preparing a memo summarizing that review. Detailed work on outputs to manned interceptors has begun.

(I. Aronson) (CONFIDENTIAL)

I have been investigating phone lines and SDV. Three trips to Building B were made as a start in familiarizing myself with the ground-to-ground-communications problems as applied to outputs.

~~A Study of High-Speed Multipliers~~

(W. A. Klein) (UNCLASSIFIED)

The Drafting Room has finished about 30 of the figures for R-223, and these have been checked. It is hoped that the report will be published in another 6 weeks.

2.11 Systems (Continued)

Circuit Application Manual

(A. Heineck, R. Callahan) (UNCLASSIFIED)

The following circuit-application memos were received this week from IBM and have been distributed to holders of the circuit-application manuals:

a. Low-Speed Flip-Flop, Model 1,
b. Level Inverter,
c. Level Amplifier,

The following circuit-application memos have been revised and sent to IBM for printing:

d. High-Speed Flip-Flop,
e. Low-Speed Flip-Flop, Model 2,
f. Gate Circuit,
g. Pulse Amplifier, Models 1 and 2,
h. Register Drivers, Models 1 and 2,
i. Cathode Follower Design Procedure,
j. Design Procedure for Logical Diode Circuits.

We should receive the finished reports from IBM and have them distributed within two weeks.

A neat scheme has been devised by the basic circuits' groups at IBM and MIT to simplify the interconnection of pulse circuits. The scheme is to give the input impedance and load driving capabilities of these pulse circuits in terms of Load Units. Thus, the input impedance of the following circuits is one unit of load:

a. Gate Circuit, Model 1,
b. Pulse Amplifier, Models 1 or 2,
c. Set or Clear High-Speed Flip-flop.

The following is considered two units of load:

a. Complement High-Speed Flip-Flop.

Then the load-driving capabilities of a circuit are given as follows:

Gate Circuit, Model 1, can drive:

a. 4 units of load within the same pluggable unit or from 1 foot of open wire,
b. 1 unit of load from up to 50 feet of coax.

2.11 Systems (Continued)

Circuit Application Manual (Continued)

(A. Heineck, R. Callahan) (UNCLASSIFIED)

Pulse Amplifier, Model 2, can drive:

8 units of load within the same pluggable units, through 1 foot of open wire, or from up to 10 feet of coax.

Register Driver, Model 1, can drive:

17 units of load.

A more complete list of load-driving capabilities is contained in the reports that will be distributed in about 2 weeks.

Marginal Checking

(R. Fallows, R. Pfaff) (UNCLASSIFIED)

Decision was made at IBM to put most marginal-checking relays in a separate frame, with only shorting contactors in equipment frames. Since the drum system will contain test equipment which can be used to some extent for marginal checking, a second amplidyne has been ordered.

Present activity consists of the logical design of relay and control circuits at IBM and logical division of main-frame marginal-checking lines at MIT.

2.12 Magnetic-Core Memory

Miscellany

(W. N. Papian) (RESTRICTED)

Memoranda M-2405 and M-2428 report on the conferences of September 9 and 22, respectively, between the MIT and IBM memory sections. The design decisions made about the AN/FSQ-7 XD-1,2 memories are summarized therein. All major points of design are firmly settled now; further work will take place at smaller, more frequent meetings from now on.

IBM Trips

(W. J. Canty) (RESTRICTED)

A trip was made to IBM on September 22 to discuss Sensing Amplifiers and Digit-Plane Drivers for AN/FSQ-7 XD-1. Agreement was reached on the circuitry for both of these units.

2.12 Magnetic-Core Memory (Continued)

Decoder for MTC II Memory

(W. J. Canty) (RESTRICTED)

A decoder circuit for the MTC II Memory Address Register has been breadboarded and should be evaluated in the next biweekly period.

Core Switch

(J. Raffel) (UNCLASSIFIED)

A Master's thesis proposal entitled "A Large Planar Switch for Register Selection in a Magnetic-Core Memory" was approved by the E. E. Department. Dave Brown has agreed to supervise this thesis.

Experimental and analytical work on single switch cores continues preparatory to the design and construction of the switch.

Magnetic-Core Memory, Mod. II

(E. A. Guditz) (UNCLASSIFIED)

The memory frame and most of its hardware is completed and has been placed beside Test Setup V. The filament panels, a-c fuse panel, and power distribution panel have been mounted on the rack.

Memory Test Setup V is being modified to accommodate the larger memory.

Two sample 64 x 64 planes are under construction. Work on the planes for the memory will begin in a few days.

Switch Cores

(A. D. Hughes) (UNCLASSIFIED)

Using samples available, tests are being made to determine the proper size and shape metallic switch cores for a 64-position Olsen switch to drive 32 memory cores. Dependent on the switch-core size is the type of driving source (impedance) and the secondary load impedance for the switch core.

A low impedance source gives a better secondary current waveform for driving the memory cores, but the regulation of secondary current when driving 1 or 32 memory cores is not good. A high-impedance source gives good secondary current regulation, but the waveform is bad.

2.12 Magnetic-Core Memory (Continued)

Sensing Techniques

(S. Fine) (UNCLASSIFIED)

An introductory chapter for a Master's thesis has been written and is awaiting supervisory approval. Experimental work for this thesis is being continued. Experimental and analytic data on noise pickup between the sensing winding and driving lines is being correlated and analyzed.

Selection-Plane Drivers

(J. L. Mitchell) (RESTRICTED)

Work is continuing on the design of a transformer for use in the MTC Magnetic-Core Memory, Mod. II. A new breadboard of the driver has been finished and will be used for the evaluation of the transformers.

A meeting was held at IBM and the AN/FSQ-7 XD-1 driving problems were discussed. A number of problems were settled. Another meeting will be held during the week of September 28.

2.13 Vacuum Tube Circuits

(R.L. Best) (UNCLASSIFIED)

The decision as to which low-speed flip-flop shall be used in AN/FSQ-7 has not as yet been made, but enough data is now on hand concerning the performance of the circuits and the system requirements to permit a decision to be made during the next biweekly interval.

Most of the basic circuits used in the arithmetic section of FSQ-7 have been or are being printed for the Circuit Application Section of the Military Reference Data Book, with the circuits as correct as can now be determined. It is hoped that these may be approved, and that changes will be made later as new developments occur.

Where large numbers of 5965's must be paralleled to drive a heavy load from a level, it would be more economical in terms of tubes to use a 5998 power triode, fed by a simple feedback circuit. Such a circuit is now under development. In some respects it will surpass cathode follower performance, but in others it will never quite equal it.

Basil Remis is now in Poughkeepsie helping to design control, and Harlan Anderson is there familiarizing himself with drums and drum circuits so that he can build these circuits into MTC when a drum is delivered to MIT.

Low-Speed Flip-Flops

(Hal Boyd) (UNCLASSIFIED)

Sufficient data was obtained on the peaked, unclamped low-speed flip-flop in conjunction with its cathode-followers to determine the reliability and performance of the pair in driving capacitive loads and gate-tubes. On the basis of a 25% reduction in margins under load, the flip-flop output cannot drive more than a 30-μμf balanced load directly; as unbalanced loads are hard on the flip-flop, padding for balance is desirable. Plate peaking in the order of between 1.5 mh and 2.5 mh is necessary in order to get sufficient performance from the unit. When driving and/or sensing gate tubes the flip-flop must be followed by a cathode follower which is also padded up. The padding is necessary to obtain favorable gate-tube transfer characteristics. On the basis of a 25% reduction in margins (flip-flop plates peaked and balance-padded) the cathode follower cannot drive more than 250 μμf, nor less than 80 μμf. In counting applications 80 μμf is not sufficiently large to obtain favorable transfer characteristics from the gate-tube. Padding the cathode follower to a total of 240 μμf, on the other hand yields the same transfer characteristics as the clamped low-speed flip-flop (without cathode follower). Rise and fall times are

2.13 Vacuum Tube Circuits (Continued)

(H. Boyd) (Continued) (UNCLASSIFIED)

larger than what is wanted, however, with 240 μμf. It is possible though that less padding might still do the job.

The clamped low-speed flip-flop has been packaged in a plug-in unit assembly and will be used in MTC for the drum write circuits. The peaked low-speed flip-flop will likewise be made available for plug-in units in the event of its acceptance for XD-1.

Sense Amplifier

(C. A. Laspina) (UNCLASSIFIED)

Margins of the MTC II sense amplifier are satisfactory: bandwidth is approximately 800 kc, rise time is approximately 0.3 μsec.

A modification is now being studied which decreases the number of parts in the unit by two.

Gate Tube Investigation

(C. A. Laspina) (UNCLASSIFIED)

The droop in plate current of a gate tube when driving a simulated drum write head was investigated and the least amount of droop was present when the control grid current was limited 1 ma. The droop is 1/3 as much when the control grid current is 1 ma than when the control grid is driven directly from a flip-flop.

High-Speed Gate-Tube Circuit

(H. J. Platt) (UNCLASSIFIED)

The breadboard of the gate-tube circuit was cleaned up by relocating some decoupling capacitors and ground connections, thus giving a clue to some of the problems that may be found with pluggable units. A new breadboard is under construction which tries to simulate the layout of the gate tube in a pluggable unit. Grounding techniques will be investigated.

Some loading problems listed in IBM Report H-34 are being investigated for practicability. It was found that the gate-tube circuit will successfully drive another gate tube, four other gate tubes, or the complement inputs of two flip-flops over short distances. Investigation will continue for other loads.

2.13 Vacuum Tube Circuits (continued)

Power Cathode Follower

(D. Shansky) (UNCLASSIFIED)

Design work on this circuit has begun.

Core Driver

(D. Shansky) UNCLASSIFIED)

A driver for use in testing memory cores has been designed. The circuit will deliver positive and negative full-amplitude and half-amplitude current pulses into a 2-terminal load. The specified waveform calls for a pulse approximately 1.2 amp high, adjustable manually to zero, with a linear rise and fall time variable from 0.2 to 0.5 μsec. Overshoot is to be as close to 0% as possible. The circuit is to be self-monitoring by means of feedback.

Register Driver

(S. Bradspies) (UNCLASSIFIED)

The register driver (RD) input has been successfully tried with a 1:3 step-up input transformer tied to -30 volts. The RD is driven by a gate tube.

Input pulses to the gate tube which are less than about 9 volts are completely rejected. This allows for a lot of stray pulse amplitude which does not even appear at the pulse amplifier output.

Using a 28:7 step-down transformer in the RD output (a 32:8 gives just about the same results; 20:6 gives somewhat less output), we find that unity gain is exceeded for gate-tube inputs ranging from 11.5 volts to 32.0 volts. The RD output saturates at 32.0 volts, and remains there for GT inputs ranging from 26 volts on up (38-volt pulses were the largest tried).

When a 7AK7 which is down by 27% replaces the good tube, unity gain is exceeded from 13 volts to 29 volts, at which we have saturation.

The gate tube driver also is capable of driving two PA's, and of saturating at outputs of 29 volts.

Delay-Line Drivers

(J. S. Gillette) (UNCLASSIFIED)

Circuits using 1350-ohm delay lines are being investigated. A 7AK7 tube, pentode connected, has been used to drive the delay line which is 30 volts below ground. The output of the line is connected to a 7AK7 gate tube. Circuits for driving 0.25-, 0.5-, 1.0-, and 2-μsec lines are in operation and are being studied.

2.13 Vacuum Tube Circuits (continued)

Magnetic-Memory Driving Transformer

(E.K. Gates) (UNCLASSIFIED)

A new driving panel has been installed and a final transformer design will be decided upon next week.

Pulse Transformer

(E.K. Gates) (UNCLASSIFIED)

Several dozen of the new 4:1, 0.1-μsec pulse transformer for use in gate-tube applications have been supplied to R. Callahan. The transformers were made here but in the future, Sprague Electric Co. will supply the transformers.

2.14 Memory Test Computer

MTC Drum

(H.E. Anderson) (UNCLASSIFIED)

Several trips to IBM have been made in the past biweekly period. The MTC drum was plated at Poughkeepsie on September 17 and is currently being tested for uniformity of plating, etc. During the week of September 28, I will be at High Street to participate in this testing.

Preliminary circuits for reading, writing, and switching should be ready by October 1 so that they can be built up in the near future here in Cambridge.

General

(W. Ogden, W. Hosier) (UNCLASSIFIED)

Construction of equipment was continued in connection with the charactron and magnetic drum programs. Progress on the drum investigation will be reported in part in Section 2.13, Vacuum Tube Circuits.

Work on the MTC Power Supplies has been progressing at a good pace during the last biweekly period and should be completed sometime in October.

A periodic tube-tapping program was initiated last week. Discussion with Bonnell Frost and others led to the decision to tap all tubes except those related to digits 0 thru 7 once a week unless serious trouble results. The latter group will act as a control lot and will not be tapped at all. Reports will be issued in connection with this work as soon as sufficient data is obtained.

2.14 Memory Test Computer (continued)

Power Supplies

(R.G. Farmer and D.M. Fisher) (UNCLASSIFIED)

The required output of the +150-volt and -150-volt supplies has been increased above 10 amp. Since each supply is rated at only 10 amp and it doesn't seem possible to parallel these supplies, it has been decided to parallel 2 rectifiers and add more series tubes to the supply.

The original plan to obtain a -450-v supply was to float a -150 supply on the -300 supply. Since the current requirements of the -450 supply have increased to about 3 amp, this plan has been abandoned and a separate -450-v supply will be used.

Elimination of oscillations from the supplies has been the main difficulty encountered and has delayed use of the supplies. All of the supplies exhibit the same characteristics; as soon as one supply is completely straightened out the rest will follow rapidly.

Computer Operation

(R. Hughes) (UNCLASSIFIED)

Computer operation continues to be good. A test program using most of the tubes in the machine is run for long periods daily when the computer is available. The occasional errors that occur are suspected to be due largely to transients in the power supply.

A 6AG7 peaker tube in control developed an open heater last week. This is the first open filament observed in 1400 filament hours.

MTC Drum System

(P.R. Bagley) (UNCLASSIFIED)

General agreement has been reached on the Interim Drum Storage System for MTC and is outlined in the following drawings:

SD-56291 Block Schematic, Interim Drum Storage System, MTC

SB-56306 Rack Layout, Drum Storage System, MTC

A more detailed discussion of the drum work is covered in the report of the Vacuum Tube Circuits Section.

Auxiliary units of equipment associated with the Drum System are:

Memory Group Selection Control, now being designed (see SB-56443);

A-Register Input Mixer, already constructed;

Control units to provide new instructions (bk, ti, ni) described in M-2414, being planned.

2.14 Memory Test Computer (continued)

MTC Alternator

(R. Jahn) (UNCLASSIFIED)

The special transformers for the feedback rectifier have been completed and tested. Noise in the feedback loop has been reduced to 1 volt peak to peak.

Drum Circuitry

(Hal Boyd) (UNCLASSIFIED)

The Drum Address Register-Angular Position Counter (DAR-APC) coincidence-detector has been designed and is now being built in breadboard form for testing.

The MTC, Mod. I, gate-tube circuit was modified so that it can be used to reliably drive the high-speed flip-flop, Mod. II.

The APC counting gates, hitherto called a "new" gate-tube circuit, differ only slightly from other gate-tube circuits due to external requirements.

Present plans call for the packaging of the (+10-v) drum control gates in plug-in-unit form for 19" rack mounting.

A layout of a coincidence-detector panel has been made and will be sent to the shop for construction.

The level-inverter (now of XD-1 origin) will be laid out for assembly into plug-in-unit form, and will be placed in the space available at the 12th digit of the APC flip-flop panel. In the 13th digit space will be located another (+10-v) gate-tube circuit (coincidence gate) in pluggable form.

Bob Hughes is directing work on the building of the APC flip-flop panel and APC gate-tube panel. The DAR flip-flop mounting panel has been built and is ready for test. The APC mixer panel has been built and is ready for use in testing the APC counter. Work has started on the write gate-buffer panel, and is expected to be completed before the next biweekly. A Mod. I flip-flop mounting panel will have to be modified slightly for use with the low-speed flip-flop, Mod. III which will make up the drum-write flip-flops.

Drawing SB-56306 shows a tentative layout of the drum logic.

2.15 Equipment Design and Schedules

(A. P. Kromer) (CONFIDENTIAL)

A proposal indicating the quantity of each item of equipment for the AN/FSQ-7 XD-1 and XD-2 systems is being prepared in collaboration with IBM and Division 2 representatives and will be issued for comment within a few days.

Several discussions with representatives from the CADS II organization were held during the period. These covered general background on the AN/FSQ-7 and other phases of the Transition System, and matters related to Lincoln, IBM, CADS II, and Air Force relationships.

(J. D. Bassett) (UNCLASSIFIED)

Work on the joint MIT-IBM subcommittees for mechanical components, materials, and methods has been discontinued as originally organized, in favor of a faster method for getting this information into the hands of the designers. A selected group at High Street is choosing parts from AN drawings in a special meeting between 5 and 6 P.M. daily. Material and components chosen will be reviewed weekly by an MIT representative in order to keep advised of the work being done and the relationship of items to standard Air Force specifications.

Experiments are being conducted with a model of an edge-lit Plexiglas push-button panel for manual input use, suggested by A. P. Kromer. Results will be published later.

A Western Electric "Wire-Wrap" tool has been received and a program of tests is being devised to evaluate the mechanical and electrical characteristics of the wrap-around solderless connections made by this tool. Results will be published when tests are completed.

A meeting was held at High Street on Wednesday, September 23 with IBM video mapper people and Bendix representatives to discuss the mapper sub-contract. Close contact will be maintained with these people as the program gains momentum.

(W. Ayer) (UNCLASSIFIED)

Work on the layout of Bldg. A continues. Unfortunately many frames have shown an alarming tendency to double in size, thereby slowing up the final results. The following week should produce a preliminary plan that will be circulated for comments.

Mechanical design and etched-wiring layout have been delayed during the past period by changes in the pluggable unit due to cooling requirements and the projected use of the 5998 tube. Work should pick up again next week when a final pluggable unit that includes the recommendations of the cooling-equipment consultants is available for approval.

2.15 Equipment Design and Schedules (Continued)

Drafting Standards

(J. Giordano) (UNCLASSIFIED)

The final proposal of the Drafting Subcommittee will deal with mechanical drafting standards. A. Falcione and I will prepare these standards and forward them to IBM.

Procurement

(C. W. Watt) (UNCLASSIFIED)

Watt and Paine are alternating at High Street as MIT representatives on a full-time two-man committee writing purchase specifications for XD-1 components. This work, which we hope will insure that the best components obtainable in a reasonable time will be used, has been delayed by IBM organizational problems but now seems to be progressing. By September 25, purchase specs for the following reliable components had been written, tested on several vendors for their reactions, and released by the committee:

Fixed-composition resistors,
Fixed-film precision resistors,
Fixed wire-wound power resistors,
Fixed mica capacitors,
Tube sockets.

A spec on pulse transformers is finished and will be issued next week. Specs on three germanium-diode types are ready for typing. Specs on paper capacitors, both tubular 600-v and tubular 100-v types, will be ready next week.

It is hoped that work can be started on other components beyond those needed for pluggable units during the next biweekly period.

This activity will go on for several weeks; at the moment this committee is ahead of the demand, because the job of determining the detailed values and quantities of each component is a slow and tedious one. The responsibility for this data reduction job is being taken by Dan Lawrence of IBM, who receives the completed specs from the Components Committee. After quantities are added to the specs and they are signed by Crago, the complete package is turned over to the Production Control group which initiates Purchase Requisitions. The Purchasing department then can place orders for XD-1 components. The Components Committee will be called in by Purchasing if vendors prove unable to meet the specs in time; the Committee has the authority to waive such provisions as are necessary to insure delivery.

2.16 Transistors

Transistor Accumulator

(D. J. Eckl) (UNCLASSIFIED)

Some minor changes are being made in the accumulator to improve operation. In the near future the present obsolete circuits will be replaced. Various types of plug-in flip-flops are being considered.

Junction Flip-Flop

(E. U. Cohler) (UNCLASSIFIED)

The theory of d-c operation of a junction flip-flop has been worked out. This flip-flop shows some marked differences from either vacuum-tube or point-contact types. Stability conditions have been developed which relate the parameters for various states of operation. Conditions have been derived for maximum voltage output, and the S-curves for base triggering have been studied. A more complete theory of S and N curves will be worked out after a more extensive study of those in this flip-flop.

2^5 Counter

(E. U. Cohler) (UNCLASSIFIED)

The work on the 2^5 counter using transistors has been put in a note which is now "in the mill." A reliability test has been designed and will be implemented in the near future.

An α tester and a test for V_{c43} in junction transistors have been worked out and will be described in a forthcoming supplement to E-485.

Minority Carrier Storage

(N. T. Jones) (UNCLASSIFIED)

A special sample of Transitron T6 diodes was tested for Hunter and Harrington of Transitron. These were of the gold-bonded type but exhibited excellent reverse recovery characteristics. They were sent to Heath of IBM for testing to correlate his results with ours and Transitron's.

A number of diodes were destroyed and the mechanical structure observed under the microscope. A diode type with poor reverse recovery has greater point contact area than another type with good recovery, comparing Hughes 1N67A and 1N96 units. This has been predicted to be one of the factors involved in reverse recovery characteristics.

2.16 Transistors (Continued)

(N. T. Jones) (Continued) (UNCLASSIFIED)

The static parameters of the junction diodes were measured in a special diode tester constructed for such use in the storage and diode test program.

Additional experiments are being run in conjunction with Kingston and Neustadter of Group 35 in the effort to explain the forward current delay in the grown junction diodes.

Magnetic-Core Drivers

(S. Oken) (UNCLASSIFIED)

A note entitled "Regenerative Transistor Magnetic-Core Drivers" (M-2426) will be published shortly.

Four regenerative core drivers have been successfully paralleled. The main problem yet to be solved is that of uniformity of the output pulse from the core driver with different transistors. This aspect will be investigated during the next biweekly period.

Transistor Gate

(C. T. Kirk) (UNCLASSIFIED)

A transistor gate is being developed employing a blocking oscillator circuit and an emitter load switching network. Such a gate features a relatively low impedance output and a large amount of isolation between a flip-flop and gate.

2.17 Display

(C. L. Corderman) (CONFIDENTIAL)

On September 17 a meeting was held at Project High covering display-console power supplies, expanded track-display presentation and intensification amplifiers. Proposals were made for the console supply requirements in the event that Charactron tubes are used. The necessity of selecting characters from a fixed matrix implies that a stable and drift-free source be used for the accelerating voltage.

Original plans for expanded track displays were based upon using a second tube at each console for the expanded display. It was pointed out that this arrangement is quite undesirable from an operator's standpoint. The system presently under consideration will have rotary switches

2.17 Display (Continued)

(C. L. Corderman) (Continued) (CONFIDENTIAL)

giving fixed steps of expansion and off-centering. Experiments are planned to check the feasibility of analog expansion and a proposed method for digital expansion is being evaluated.

The week of September 28 to October 1 will be spent at Convair, their tube sub-contractors, and the Hughes Aircraft Co. There is some possibility that a Hughes Direct-View Storage Tube having character matrix will be suitable for use in the Digital Information Display.

(M. A. Epstein, R. H. Gerhardt) (CONFIDENTIAL)

The past biweekly period was spent reworking the logic of D. C. Ross's proposal, "Output Switching Logic for Drums II, III, and IV." The logic for the Crosstelling Frame, Track-Display Frame, and Digital-Display Frame is being designed in order to learn what control pulses from each Drum Frame are needed.

Charactron Display Scope

(H. Zieman, J. Woolf) (UNCLASSIFIED)

A block diagram has been drawn of the Charactron display system for MTC. The necessary components to build such a system have been designed and are under construction. These include electrostatic, magnetic, intensification, and defocus amplifiers. The HV power supplies for the Charactron tube are being hooked up to the tube.

2.2 Group 63 (Magnetic Materials)

(D. R. Brown) (UNCLASSIFIED)

We have accepted 48,985 cores from General Ceramics on our order for 100,000 cores. The first 23,943 went into the WWI magnetic storage; the remainder are for the new magnetic-core memory. The additional 51,015 acceptable cores required will be obtained mostly from untested shipments on hand.

General Ceramics has received an order for 200,000 cores from IBM. The first shipment of 20,000 cores was ready September 23. The order is to be completed by November 15.

Cores satisfactory for use in AN/FSQ-7 have been made in our own pilot plant.

Ferrite-Core Pulse Tests

(J. Schallerer) (UNCLASSIFIED)

Production testing of the ferrite cores for the second magnetic-core memory is progressing at a satisfactory rate.

The semiautomatic tester has done all of the testing to date, but it is expected that the automatic tester will be operating next week. Eighty-five thousand three hundred and seventy cores have been tested, resulting in 52,734 good cores for a yield of 61 percent. In getting these cores, 200,000 tests were made.

Twenty-three thousand of the good cores have been used in the WWI Bank "B" memory. Approximately 30,000 good cores are on hand for the new magnetic-core memory.

(J. R. Freeman and E. Stevens) (UNCLASSIFIED)

Core-test equipment has been assembled to operate in conjunction with the production test setup. The new tester enables half-selected output measurements to be made on a production evaluation basis as well as other collateral measurements. A 12-watt heating chamber enables tests to be made at elevated temperatures. For the F-394 size, tests are performed with 100 core stacks. Core stacks are mounted on 5-1/4" x 1-3/8" phenolic cards which are filed by lot number in a cabinet. The cards are mounted on the tester on three binding posts. Approximately 20 minutes is required for the complete evaluation of a lot excluding temperature checks.

2.2 Group 63 (continued)

Pilot-Plant Production of Ferrite Cores

(R. A. Maglio) (UNCLASSIFIED)

Material DCL-2-255 of $MgO.MnO.Fe_2O_3$ composition has been prepared for production of F-394 magnetic cores. About 1500 cores have been pressed for firing tests. The processing of this material was different in that a much higher prefiring temperature was used in order to produce a harder particle; also 100% reacted or prefired material was used to obtain a smoother flowing powder.

A comparison of cores made from 100% reacted material and cores from a 30% raw-70% reacted material indicates a much higher firing temperature is required for the 100% reacted material in order to produce the same degree of squareness and a comparable coercive force.

A number of samples will be prepared varying the quantity of raw material in order to test the pressing quality and the shrinkage. It is because of these two factors that raw material is added, and it appears that the quantity of raw material necessary will vary with composition.

(J. Sacco) (UNCLASSIFIED)

Two large batches have been processed with the intention of supplying material for the Stokes press. F-394 cores from one batch have been pressed, fired, refired, and tested. At first indications, they seem reasonably similar to the General Ceramics cores. However, several more firings are to be made before the data is complete.

The second batch is now being prepared for pressing, and the electrical data on this material will be obtained during the following week.

(F. E. Vinal) (UNCLASSIFIED)

Contact has been made with the BMS Carbide Specialties Company, Inc., of Boonton, New Jersey, in regard to the preparation of suitable dies for the automatic pressing of memory cores. This company appears superior in every way to other companies we have contacted in this field. An order has been placed for four sets of carbide-tip dies. The first set is promised for approximately one-week delivery and the remaining sets for two to three weeks later at a cost much lower than had been indicated by our contacts in this vicinity. This company has the background in the preparation of similar dies for the General Ceramics Corporation.

2.2 Group 63 (continued)

Study of the Phase Diagram of $MgO.MnO.Fe_2O_3$

(R. A. Maglio) (UNCLASSIFIED)

A Master's thesis proposal for the study of the thermal, chemical, and physical changes which occur in the firing of $MgO.MnO.Fe_2O_3$ system has been approved. The furnace which is to be used for differential thermal analysis, an analytical tool for indicating thermal change, is undergoing redesign. Leeds and Northrup furnace-control equipment is being modified for use in the control circuit of the test furnace.

Actual experimental work will begin in about 2 weeks. During this preliminary period most of the time will be devoted to test runs and learning the method of x-ray analysis at Building 22 under Mr. Tuomi's direction.

Chemical Analysis of Ferrites

(F. S. Maddocks) (UNCLASSIFIED)

Continuing work on setting up procedures for the chemical analysis of ferrite-core materials has produced satisfactory results in the case of Fe_2O_3. Analysis of General Ceramics #1326B, February 1953, batch has shown an alarming discrepancy between its supposed and actual compositions; before complete composition will be known, a method for determination of MgO in the presence of Fe_2O_3, MnO, and CaO must be found. Work on this method is now in progress.

Evaluation of Ferrites

(G. Economos) (UNCLASSIFIED)

Data on $MgFe_2O_4$, Fe_3O_4, $MnFe_2O_4$, and some square-loop ferrites have been tabulated. Values of B_r, B_m, H_c at twenty-five oersteds and M_o at low frequency (1 kc) are being studied; a preliminary survey shows a definite inter-relationship between these quantities for all these ferrites. There are, however, a few deviations in the case of the square-loop ferrites which tie in with the loss in squareness. An attempt is now being made to correlate more quantitatively the ceramic parameters with the measured electrical data.

Conductivity of Ferrites

(J. H. Epstein) (UNCLASSIFIED)

Conductivity as a function of ferrite composition in the neighborhood of magnetite is being measured as a function of temperature. It will be several months before sufficient data are available to draw conclusions.

2.2 Group 63 (continued)

Composition of Square-Loop Ferrites

(J. B. Goodenough) (UNCLASSIFIED)

A study of the composition of good and poor squareness in the magnesium-manganese ferrite system is leading to the conclusion that the Mn^{+4} ion limits the region of good squareness. The Mn^{+4} ion orders to cause the lattice to become tetragonal spinel. The tetragonal lattice twins readily along (101) planes. An analysis of the internal stresses shows that Mn_3O_4 can be expected to precipitate at the twinning surfaces. The lamellar precipitate offers a planar discontinuity in the magnetization at which domains of reverse magnetization are created. This destroys squareness of the B-H loop and increases the coercivity. A further complication is that the manganese ions can affect the valency of the iron ions. This latter effect is controlled by the atmosphere in which the material is fired. Theoretical composition limits, outside of which the magnesium-manganese system will not give square B-H loops, are being estimated. Within the region favorable for square B-H loops a region of critical firing atmosphere can be delineated.

Stress Sensitivity of Ferrites

(N. Menyuk and J. B. Goodenough) (UNCLASSIFIED)

Measurements have been made on a Ferroxcube ferrite of the switching coefficient S_w and the threshold field H_o as functions of stress. Both factors were found to increase with increasing stress, in accord with our qualitative predictions. Measurements of the hysteresis loop of this core as a function of stress are about to be taken.

Literature Survey of Ferromagnetic Anisotropy

(N. Menyuk) (UNCLASSIFIED)

A survey has been made of existent literature in the field of ferromagnetic anisotropy. The results of this survey have been used as the basis of the first two meetings this year of A. Loeb's Seminar on Magnetism and will be printed in a memorandum.

SECTION III - CENTRAL SERVICES

3.1 Purchasing and Stock

(H. B. Morley) (UNCLASSIFIED)

Quotations applying to recently revised and upgraded Standards indicate that the requirements laid down by component test in several cases may not be compatible with military specs nor with manufacturing techniques. Some revisions may be necessary to prevent delay in the placing of orders and to permit more thorough technical investigation of all data needed to reach a realistic appraisal of availability in terms of technical operation, time, and money.

Specific items now being analysed in this light are power wire-wound resistors and plug-in capacitors.

Kardex has been reorganized, and a tighter system of inventory control put into operation in closer coordination with stockroom material. At the same time, a test is under way of a new method of providing buyers with open-to-buy information.

A by-product of this revision was the discovery that a year ago approximately 30% of standard material for construction was being provided from stock; 90% or more of similar material is now provided from stock.

3.2 Construction

Production Control

(F. F. Manning) (UNCLASSIFIED)

There have been 29 Construction Requisitions totaling 344 items satisfied since September 11, 1953; there are 27 Construction Requisitions totaling 265 items under construction by the Group 60 electronic shops.

For further information please call the Production Control office (ext. 3492).

Outside Vendor

(G. A. Murdoch) (UNCLASSIFIED)

There are 10 orders now open with vendors, totaling 1233 items. Deliveries in the past biweekly period have totaled 106 items. Information on specific orders may be obtained from the writer (ext. 3476).

3.3 Component Analysis and Standards

3.33 Standards

(H. W. Hodgdon) (UNCLASSIFIED)

Standards Book revisions and additions issued this period:

6.501	Standard Practice Instructions	New
6.046-14	Connectors	New
6.066-1	Fuse Holders	Rev.
6.076-3 & 4	Dial and Shaft Lock	Rev.
6.176-1	Switch	New
6.180	Terminals	New
6.182-1 thru 3	Terminal Boards	New
6.198-1	Transformer	Rev.

Procurement difficulties have developed recently with several items on which higher quality or reliability has been specified in new standards. The only apparent solutions seem to be return to former quality standards or to provide multiple-quality lines of similar items. This will require further investigation to determine what our policy should be.

3.34 Vacuum Tubes

Thesis Research

(H. B. Frost) (UNCLASSIFIED)

Because of the large amount of time spent on the road during the past two weeks, most of the research has been confined to continued evaluation and testing of RT410. This tube appears to be very satisfactory for the work at hand. However, its cathode possesses certain peculiarities not observed in RT409. The exact nature of the differences is now being examined.

A second tube similar to RT410 is ready for processing and will be processed on September 28. This tube has more cathode coating than RT410.

Additional progress on the equation which governs the diffusion of barium in a cathode emitting current has been made. An error in the statement of the boundary conditions has been found and rectified. The problem now appears ready for coding for solution in WWI. The additional analysis has revealed that only one term of the equation cannot be determined directly; this term determines the time scaling of the solution.

3.34 Vacuum Tubes (Continued)

Tube Data

(H. B. Frost) (UNCLASSIFIED)

About half of my time during this past period has been spent on trips. September 14 was spent in Owensboro, Ky., in discussions with General Electric concerning the Z2177. Information was obtained on the maximum ratings of this tube. General Electric feels that the ratings as published for the 5965 represent absolute max ratings and should not be exceeded at any time. Life-test information indicates, however, that the ratings are not excessive. Some tests have run to 10,000 hours at IBM without excess deterioration. There is some variation between lots. However, improved structures and slightly better processing of the Z2177, along with the bulb cooling which will be used, should allow operation very near if not at these published ratings with no serious degradation on life (opinion of author).

A visit to Tungsol by Frost, Youtz, Fallows, Geisler, Briggs, and Durgin was made on September 15. (The latter three men are from IBM.) The 5998, which is being considered for use as a driver for the magnetic memory, was discussed in detail. The 5998 appears to be a reasonably well-constructed tube and generally satisfactory for the service. However, there may be some difficulty with cut-off because of the large number of tubes which must be connected with common cathodes.

On September 17 a visit was made to Project High in Poughkeepsie. Tube applications in XD-1 were discussed. There appear to be many places in XD-1 where many Z2177 tubes must be run in parallel as cathode followers. The number of tubes in parallel can be reduced only by an increase in the timing cycle. In addition, circuits in which the 5651 and 6136 appear essential have appeared. As a result, these tubes are tentatively approved for design use in the input-output parts of the machine.

On September 24 a visit was made to the RCA plant at Lancaster, Pa. Tube types 6146, 6293, 4X150A, and 6161 were discussed. Types 6146 and 6293 appear to be essentially equivalent at this time for our purposes. We have received and tested a sample of the 6293; this is a tetrode modulator tube rated for 3.5 kilovolts. It probably will be used primarily in the input-output sections of XD-1 in circuits similar to those which require 3E29 tubes in WWI. The only life data for the 4X150A pertains to UHF service, which is presumably more severe than our proposed service. The actual operating conditions of yoke-drive service are quite lenient, but the acid test is life experience. Life tests are in progress here and at IBM, and a prototype scope is being constructed for evaluation by the Display Section of Group 62. An alternative type is the 6161, which is a UHF power triode. RCA claims very good life in UHF TV service out to 4000 to 5000 hours, as long as the tubes have run. This triode is husky enough so that only one is required per side to drive the yoke at 250 ma, instead of two tubes as required when 4X150A tubes are used.

3.34 Vacuum Tubes (Continued)

JETEC 5.5

(H. B. Frost) (UNCLASSIFIED)

At a meeting of the multigrid task force of JETEC 5.5 on September 15 the results of the recent questionnaire on multigrid tubes for computers were discussed. Apparently only three organizations are conducting active tube programs. Our Laboratory is one of these organizations.

Numerous other facets of computer-tube activity were discussed during the main JETEC 5.5 meeting on September 16. This Committee is going to try to define a short circuit in a tube as the definition should be applied to computers.

Tube Testing

(S. Twicken) (UNCLASSIFIED)

The 4X150A life test has completed 600 hours. During the first 100 hours the low-current tubes increased and the high-current tubes decreased toward similar levels in an apparent stabilization action. During the subsequent 500 hours in which 4 tubes were operated cut-off and 5 conducting, the current of all tubes increased 7-8%. Accompanying this increase, 3 of the conducting tubes showed grid emission probably due to the loss of the grid gold plating as a result of the high operating temperature. The life test will be continued.

Twenty-five 6AG7's have been culled out and tested for an ASTM round-robin test for correlation of various methods of measuring interface impedance.

Delivery of the new console tube tester, long overdue, is now promised for the end of next week.

3.4 Test Equipment

Test Equipment Committee

(L. Sutro) (UNCLASSIFIED)

The Committee authorized loan to IBM of more pieces of standard test equipment. Construction of one attenuator for each of the 15 Differential Video Probes has also been authorized. Design of the attenuator is being completed by Zieman.

3.4 Test Equipment (Continued)

(L. Sutro) (Continued) (UNCLASSIFIED)

The Committee has received from Tektronix, Inc., specifications for the new 535 oscilloscope, designed to take the place of the Types 511, 512, 513, and 514. It appears to be able to do anything these scopes can do. In addition it contains a precision delay variable from 10 to 20,000 μsec and a plug-in preamplifier. The latter may be any of three kinds: dual trace unit, differential-input high-gain unit, or wide-band a-c unit.

Test Equipment Headquarters

(L. Sutro) (UNCLASSIFIED)

A 5YP1 cathode-ray tube has been installed in a P5 synchroscope, increasing the deflection sensitivity from 60 volts/inch to 30 volts/inch. The scope is now being used by Group 63.

Work completed:

	Video Check Only	Repair and Video Check
Standard Test Equipment	25	25
Oscilloscopes	3	15

3.5 Drafting

MIT-IBM Drafting Committee

(A. M. Falcione) (UNCLASSIFIED)

The last meeting of the Drafting Committee, held at Poughkeepsie on September 23 and 24, was attended by A. Falcione and J. Giordano from MIT and W. Cornett and R. Henn of IBM. It is expected that the Drafting Standards will be completed in the very near future.

3.6 Administration and Personnel

New Staff

(J. C. Proctor) (UNCLASSIFIED)

Frederick Williams Sarles, Jr. is working as a Research Assistant assigned to Group 63. He received his B.S. in EE from Duke University this past June.

Jerome P. Stirman is working as a Research Assistant assigned to Group 64. He received his B.S. in EE from the University of Pennsylvania this past June.

3.6 Administration and Personnel (Continued)

(J. C. Proctor) (Continued) (UNCLASSIFIED)

Eugene C. Hoy is working as a Research Assistant assigned to Adams' group. He received his B.S. in EE this past June from Tulane University.

David L. Bailey is working as a DDL Staff Member assigned to Group 61. He received his M.S. in Elec. Comm. from MIT in 1950 and after graduating worked for Bell Aircraft.

Terminated Staff

(J. C. Proctor) (UNCLASSIFIED)

David Finkelstein
John Baldridge

New Non-Staff

(R. A. Osborne) (UNCLASSIFIED)

Alma Bassett is a new Laboratory Assistant in Group 63.

Nancy Fitts has joined the Print Room as a Senior Clerk.

Jean Grine is a new member of the Drafting Room.

Esther Iovino is A. Falcione's new secretary.

Janet Landis, a special student at MIT, has joined Group 6345 on a part-time basis.

Henry Mogensen is an MIT undergraduate working part time in Group 63.

Terminated Non-Staff

(R. A. Osborne) (UNCLASSIFIED)

Students:

Andrew Bowen
Kaye Richey
David Sternlight
Milton Toorans

Others:

Mary Bragaw
Cornelia Buckley
Mathew Di Carlo
Gerald Goodman
Sheila Heffernan
Billy Ridener

3.6 Administration and Personnel (Continued)

Open Non-Staff Requisitions

(R. A. Osborne) (UNCLASSIFIED)

At the present time we have 13 unfilled non-staff openings. They are as follows:

1 Clerk Typist
1 Computer Operator
1 Electrical Detailer
3 Electronic Technicians
2 Inspectors
1 Janitor
1 Mechanical Detailer
1 Ozalid Machine Operator
1 Secretary
1 Senior Detailer