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Memorandum M-2379

Page 1 of 51

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

SUBJECT: BIWEEKLY REPORT, August 28, 1953  
To: Jay.W. Forrester  
From: Division 6 Staff

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Auth: DD-254  
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CONTENTS

Section	I - Cape Cod System	Page	1
	1.1 - Group 61	"	1
	1.2 - Group 64	"	18
	1.3 - Group 65	"	28
Section	II - AN/FSQ7	"	30
	2.1 - Group 62	"	30
	2.2 - Group 63	"	44
Section	III - Central Services	"	47

SECTION I - CAPE COD SYSTEM

1.1 Group 61

1.10 General

(C.R. Wieser) (CONFIDENTIAL)

Installation of the SDV monitor station is nearly complete.

The series of programs for testing the equipment installed for the Cape Cod System has been largely completed.

Three Ampex tapes with good CPS-6B data have been recorded, but trouble with the gap fillers during these recordings has kept us from obtaining good recorded data simultaneously from the CPS-6B and two gap fillers.

Operational tests of the TWS program have been proceeding satisfactorily. The present TWS program has shortcomings in automatic handling of difficult tracking situations, and programming is now under way to improve these situations as much as possible in the minimum of time.

The Flight Test Umpire Program has been successfully introduced into the TWS system.

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1.10 General (Continued)

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

The results of a test of tracking aircraft with manual insertion of range and azimuth data (to test the emergency situation resulting from loss of SDV links) indicate low traffic capacity since a maximum of two returns per operator can be obtained within one radar scan.

Successful intercepts have been made on tracks generated at the Flight Test Umpire position. By the weekend of September 5 it is expected that all NTWS Programs can be joined and operated as a single unit.

Final arrangements have been made for flight-test coordination with the CAA.

1.11 Equipment Engineering

(N. Alperin) (CONFIDENTIAL)

The problem of the light guns being able to initiate on characters is still being investigated. The trouble is caused by the long decay time of the light-gun circuits which allows the grid of the pulse-generating tube to be up when the enable gate is raised to display points.

The relay panel which will allow channel-by-channel recording on the Ampex 14-channel recorder is in the process of being installed.

(H. Kirshner) (CONFIDENTIAL)

Installation of the SDV monitor station is nearly complete.

Completion of installation of new radio-terminal facilities is anticipated during the forthcoming biweekly period.

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

A drawing which lists all si addresses for in-out equipment on a single page has been completed. The drawing is C-55565 and A-size reductions are available.

The series of programs for testing the equipment installed for the Cape Cod System has been largely completed. Only the selection of a final vector and character size is necessary to complete the program written by Hauser for calibrating the scopes and to allow completion of the program for testing insertion switches. So far, 15 programs have been assembled and eventually will be placed on a single tape for ease of handling.

1.11 Equipment Engineering (Continued)

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

Twice, approximately 20 of the operating personnel have been assembled and the equipment tested by them using the test programs and the manuals which have been prepared for each station. Unfortunately this method of testing works smoothly only when the number of malfunctions is quite small and the valuable information about malfunctions which was not known by the systems group was largely obscured by the large number of malfunctions which were known and in the process of being fixed. Therefore, other large-scale testing has been postponed until the indicator lights, 5" scopes, and modifications already planned have been finished.

To date, Hill and Dolan have not received a single notification of when and what equipment is to be used by Group 61 programmers. Therefore, the scheduling of the times when the special equipment is to be used has been a complete failure.

(D. Neville) (CONFIDENTIAL)

A method of parity checking the Data Coder is being worked on using Burroughs test equipment. This is intended to provide a dynamic test. A preliminary test can be made on the coder at the present time.

(J.H. Newitt) (CONFIDENTIAL)

A console for MIV (Manual Intervention) position has been completed and will be installed August 31.

A map-illumination box (with Variac adjustment has been completed for M. Brand. This has been delivered to Room 222.

Some 18 special tables have been completed. These are for holding equipment frames which are not attached to 16" scope consoles. These were put in Room 222 on August 28.

Overhead scope-mounting enclosure in position M 11 is well under way and will be completed within a few days.

Room-lighting progress is well under way and will be completed very shortly.

An experimental illuminated map shelf for mounting on any 16" console in place of the present shelf has been tried with good success. An increase in shelf size was requested so this is being redesigned as a final prototype. A number of these map shelves will be produced for Israel. With this scheme it will be possible to insert maps or operating instructions between two sheets of Plexiglas on top of the shelf and make illuminated notes with a grease pencil on the outer surface above the illuminated map surface. The outer writing can thus be easily erased (by wiping) while the removable map and list of instructions remain indelible. The map and list of instructions would be negative so that their lines will be illuminated while the background

1.11 Equipment Engineering (Continued)

(J.H. Newitt) (Continued) (CONFIDENTIAL)

remains dark. This will reduce the radiant light in the area. The bottom of the lower Plexiglas surface is made reflective for map illumination; and since the upper sandwich portion of the Plexiglas is also illuminated, the opaque map areas will not obviate the writing of illuminated and erasable notes on the outer surface. I may write a memo on this unique situation.

A design has been started for a "snap-on" light filter (amber Plexiglas) for the 16" scope. This will relieve eyestrain from the blue flash. The same design can be used in clear plastic by Webster for laying indelible maps over the face of any scope and for writing track and other information on same with grease pencil.

Other miscellaneous items will be installed soon.

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

The "light cannon" scope E 32 was operated successfully during this period. The primary cause of trouble with this unit is lack of sufficient delay between the extinguishing of the room lights and application of high voltage to the phototube. A slow-operate close relay which keeps the CRT amplifier input grounded until after the high-voltage relay has been energized did not eliminate the trouble. Further investigation will be made, and further delay by means of integration will be attempted.

Modification of one of the Pathfinder scopes to minimize parallax will be made on the next installation day.

1.12 Data Screening

(R.L. Walquist) (CONFIDENTIAL)

Efforts to obtain reasonable recorded data from the CPS-6B have at last been successful. We now have 3 Ampex tapes with good 6B data. However, trouble with the gap fillers during these recordings has kept us from obtaining good recorded data simultaneously from the 6B and 2 gap-filler radars.

Operational tests of the TWS program have been progressing satisfactorily. Results of these tests have been both encouraging (in that the program has so readily worked as planned) and discouraging (in that equipment malfunctions have delayed operations, and program operation has left much to be desired from a systems viewpoint). The present TWS program is inadequate in its handling of difficult tracking situations. This inadequacy arises from the following three difficulties:

1. The Track Monitors are presented tracks which do not need monitoring, while in a few cases tracks needing monitoring are not presented.

1.12 Data Screening (Continued)

(R.L. Walquist) (Continued) (CONFIDENTIAL)

2. The Track Monitors do not have sufficient intervention facilities nor adequate displays in order to handle a trouble track rapidly and efficiently.

3. The program removes trouble tracks from the Track Monitors' supervision before some of these tracks should be removed.

Programming is now under way to improve these situations as much as possible in the minimum of time. Study has also been started in an attempt to find the best way of overcoming these difficulties after the present rush for the September tests is over.

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

I have written a new calibration program, T 3074 M2, which displays a 160-mile circle and a variable-radius circle using the new scale factor of 178 miles as maximum scope decoder deflection. A display-line test program, T 3051 M1, is also available for testing each scope. It is recommended that programmers take four or five minutes at the beginning of their operations to test their displays since the display equipment at this time is not 100% reliable or operative.

Some time soon the master control program will be rewritten. Anyone desiring to retain "low priority" or "frequency register" control should let me know; present plans are to have only one type of subprogram transfer (high priority) and data transfers both in and out.

Some investigation is being made into better ways to track aircraft when missed and in turns. Several times in our operations we have found that the tracking is completely confused because of misses on an aircraft and other data turning up near enough to ruin the track.

(H. Frachtman) (CONFIDENTIAL)

A program has been written and successfully operated which performs certain checking and clearing operations useful to the TWS function.

(D. Goldenberg) (CONFIDENTIAL)

Work has been resumed on the preparation of the memo on the earth-curvature effect.

The rectangular coordinates of the radars in the Cape Cod System relative to both the North Truro and the new South Truro radars are being calculated, using the computer. These coordinates represent stereographic projection of the earth on a plane elevated above the point of tangency by 5 miles. The point of tangency as an origin will be made for each radar site. The coordinates will contain the effect of the ellipticity of the earth.

1.12 Data Screening (Continued)

(J. Ishihara) (CONFIDENTIAL)

Operational testing of TWS-1953 Cape Cod continues. No major changes in the correlation-track sort sections are now contemplated. These programs will be rewritten to conserve registers.

(J. Levenson) (CONFIDENTIAL)

During the past biweekly period I have participated in the almost daily operation of the Track-While-Scan (TWS) program. At the same time, I have discussed changes and improvements in the monitoring sections of the TWS program with Walquist and Attridge. The following are some of the changes which have been incorporated into a new monitor program to be tested next week:

1. Every monitor action is checked to see if it is being done on an empty track position.
2. Tracks in no trouble may be assigned to a Monitor by the TO and a symbol indicating this will appear on the Monitor's scope with the track.
3. A range check will be made on tracks which miss data for 3 consecutive scans to see if they are flying out of the area.
4. When a track is no longer in trouble, its position, vector, and track number will continue to be displayed to its Monitor for several scans to allow the monitor to observe the track and even change his action.
5. When a track has poor correlation trouble (excessive data, data in the large search area only, or data in both search areas), it will not be assigned to the Monitor until it has had difficulty for two consecutive scans.
6. If the track has been in trouble and is still being shown in a forced display described in item 4 above, it will be shown with a trouble symbol the first time poor-correlation trouble is detected.
7. If a track has poor-correlation trouble and misses data, it will be shown to the Monitor for this trouble without waiting the customary three scans.

(H. Peterson) (CONFIDENTIAL)

During the last biweekly period a good bit of time was spent in evaluating and refining the TWS section of the Cape Cod Program. This has led to the rewriting of most of my section in order to split the blocks and to give the Monitors a more useful display.

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1.12 Data Screening (Continued)

(W.M. Wolf) (CONFIDENTIAL)

Supervision of Air Force personnel as Radar Mappers was begun and will continue as part of the operational testing of the TWS program.

An overlay of the eastern coastline, radar sites, airports, etc. for the Tracking Officer (TO) and Combat Data Director (CDD) scopes was begun. The drafting room has completed a tracing on vellum which must be sent to an outside vendor for proper scale factoring. How this overlay will be physically presented remains a problem.

The Data Count by Strip program was tested and a program error was observed. After correction the program will be rerun.

The Correlation Data Analysis program was run for a three-hour period yielding a quantity of significant results. It was found that North Truro, Clinton, Derry, and Fall River transmitted data which may be summarized as follows:

	SITE	TRACKS/RETURN	TRACKS (RETURN - STATIONARY CLUTTER)
Tape 5	North Truro	34%	55%
	Clinton (MTI)	52%	55%
	Fall River (MTI)	77%	84%
Tape 3	North Truro	32%	63%
	Clinton (MTI)	57%	59%
	Derry (MTI)	43%	86%

These results were obtained under operational mapping conditions. It is felt that a criterion for the reliability of data from a given site may be observed by running the program with each of the gap fillers.

1.13 Tracking and Control

(S. Best) (CONFIDENTIAL)

The program for tracking a single aircraft and printing  $r, \theta$  was tried for the fourth time. Another tape error was corrected, but the program still failed to operate possibly because all the terminal equipment was not properly turned on.

1.13 Tracking and Control (Continued)

(S. Best) (Continued) (CONFIDENTIAL)

It was found that there were still further errors in the conversion of the program for finding velocity-heading smoothing coefficients. Further programming errors were also found. The program which simulates crossing tracks was tried, and a number of programming errors were found.

(W. Lone) (CONFIDENTIAL)

The Flight Test Umpire Program has undergone extensive modification in order to be compatible with the Data-Collection Program of the TWS section. It was successfully introduced into the TWS system during the past week, and has provided simulated data to be used in checking out certain features of the tracking program in the September system.

In addition to being able to turn tracks which are being generated, the FTU Program can provide data which will split from or cross with tracks, both real and simulated. These situations which have caused so much trouble in the past can now be studied further with more tracking attempts.

See report by A. Mathiasen in connection with the attempt to gain data for Boeing report.

(A. Mathiasen) (CONFIDENTIAL)

What is hoped to be the last error in the simulated Tracking Study Program written by W. Lone and myself has been unearthed. The results should be obtained as soon as sufficient computer time is available.

The live-data counterpart in the tracking study is nearing completion and should furnish the information desired by Boeing.

Because of lack of computer time, the NLS-2c parameter optimization program written in conjunction with M. Frazier was not run.

(H.D. Neumann) (CONFIDENTIAL)

The possibility of tracking airplanes in case of emergency when SDV links are out of order, by means of manually inserted range and azimuth data, was investigated in a test held August 17. In this test  $r, \theta$  data was read by an operator from the PPI scope at North Truro and relayed by voice telephone to another operator at the computer center who simulated the insertion of data.

The results of this test are not encouraging since a maximum of two reports per operator can be obtained within one radar scan and the average is much lower than this. This makes tracking of even a couple of aircraft very difficult although more than one operator could be employed.



1.14 Weapons Direction

(D. R. Israel) (CONFIDENTIAL)

Satisfactory progress in the checking and testing of the NTWS programs has been made during the past two weeks. The activity has been slightly retarded during the past few days by a lack of sufficient computer time, but it is expected that this will be remedied in future schedules. Recently, computer time has been allocated to the NTWS section only in the early and late evening hours; this condition will exist for one more week until the completion of C. W. Adams' summer course. Equipment operation, with the exception of the 5" scopes, has been satisfactory during the biweekly period.

The Weapon Assignment and Direction Programs have been joined with the Flight Test Umpire (FTU) and Display Programs. This combined program has been operated with considerable success during the past week on tracks generated at the FTU position. The first successful intercepts of this type were made on the week-end of 23 August. The FTU and Display Programs have now been joined and tested with both the Identification Programs and with the AA and Height Finding Programs. A number of programming and tape errors have been discovered. Successful operation of each program is expected this weekend (29-30 August).

During the next 7-10 days, daily one-hour tests will be held with each of these three programs. By the end of the week it is expected that the programs will be fully checked out in all details and that we will have gained much-needed operational experience with each. This daily testing will use the simulated tracks made up by Cioffi and Webster. Cioffi, Webster, and Davis are preparing suitable one-hour tests for Identification and Weapons Direction for next week.

By next weekend, following the daily tests and checkout of the DID Programs, it is expected that all the NTWS Programs can be joined and operated as a single unit.

Changes in lighting facilities and in the tables for mounting 5" scopes have been made in the past few days. Following several equipment modifications on Monday, the NTWS equipment will be in the "frozen state" for several weeks. The telephone installation in Rooms 222 and 224 is nearing completion; the inter-communication-system installation has been completed.

At a meeting on Monday, August 24, at the Boston Air Route Traffic Control Center, final arrangements were made for flight-test coordination with the CAA. A memo describing the coordination with the CAA and Air Defense facilities is still in preparation.

M-2372, "Training and Operating Responsibilities," has been issued.

1.14 Weapons Direction (Continued)

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

During the past biweekly period the Display Section checked out the Display Master Make-Up (DMM) Program in nearly final form. This version is now being used by the other Non-TWS programmers in checking out their programs. Some small logical errors may still be present; detection and correction of these errors cannot be accomplished until the conventions and expectations of other programs are tested with the DMM.

The final version of DMM is now being written. This will differ from the above mainly in that small features will be added, e.g., indicator lights will be set, and the orders will be compacted to minimize drum space and read-in time. One significant change will be made: the new DMM will read all ID switches for changes in identification and take the appropriate action with respect to Display and ATDS. This revision proves economical in several ways.

The Weapons Direction DID was successfully run and only a few errors discovered. When these are corrected the FTU, Visitors, and Height Supervisor DID's will be added. Progress on the Geography Displays is excellent. The Airbase, Height-Finding Sites, and Georef Displays are checked out. The AAA Display has been written

A conference was held with B. Green and W. Harris concerning overlays to be used both on the situation and DID scopes. They are going to investigate the problem; some experience with several methods should be gained shortly.

(M. Brand) (CONFIDENTIAL)

Identification-The combined Cape Cod Identification tape T-2864 composed of 23 Identification programs has cycled and is partially checked out. It is expected that final check-out will be accomplished during this period. During this period it is hoped the flight-plan DID will be included. Data-Handling tests under the aegis of J. Degan of Group 38 are underway. Time correlated tests of flight plans and simulated tracks are also underway.

(P. Cioffi) (CONFIDENTIAL)

The work of the last period on the formulation of problem situations for testing the NTWS section has continued. This includes the formation of three problems each for the ID and WD functions. The problems have been made up to meet the requirements of the programmers concerned for the initial purpose of testing the various actions of the programs.

1.14 Weapons Direction (continued)

(M. Geraghty, J. J. Cahill) (CONFIDENTIAL)

All the individual AAA-Direction and Height-Finding Programs are checked out.

The marriage of these programs with the Master Control, Display Master Make-up, and Simulated Data (Brand's FTU) Programs has been tested four times. The results of the four tests were as follows:

1. August 21, 15 minutes. Tapes read in, but hung up in Master Control. No time to investigate.
2. August 23, 2 hours. Three errors uncovered. Summary-data display overlapped HF on the drum. Tape error on 2896, leaving si 0's in AA. sp to 366, instead of 3661, causing AA to hang up on above si 0.
3. August 25, 1 hour. Above errors were corrected, and program cycled all right. 5" scopes lacked calibration program. Several unexplained errors noticed in displays, but time ran out.
4. August 27, 2 hours. Spurious changes in the track total counter for AA and in the Track Rotation counter for AA, and unexplained and certainly spurious WD assignments to AA caused overflows in two distinct registers on two attempts to cycle. Since the only change of procedure or of programs from the comparatively successful test of August 25 was a correctly coded parameter tape, incorrect loading seems the most probable source of error.

(A. W. Curby) (CONFIDENTIAL)

A few minor modifications had to be made to the ID Programs for which I was responsible, but on the whole they have fitted successfully into the ID marriage. More errors may be found, however, since the ID system is not yet completely checked out.

Besides helping to check out the combined ID programs, I have recently been concerned with writing a FP DID Make-Up and Display Program. This is not yet running satisfactorily, but is expected to be ready for inclusion in the master ID tape within a few days.

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1.14 Weapons Direction (Continued)

(F. Garth, L. Murray) (CONFIDENTIAL)

The DID Table Make-Up and Display Programs for the Intercept Directors and Radio Operators have been married with the Interception Calculation. The former are now being used to aid the checking of the Interception Calculations.

A detailed flow diagram has been written for the Intercept Directors' and Radio Operators' DID. Material explaining the details at these displays is now being worked out.

(C. Gaudette, S. Knapp) (CONFIDENTIAL)

A scan-by-scan print-out program has been written for use in checking out NTWS subprograms. Flip-flop registers are used to select the type of print-out desired. The following types are available.

1. Track Data Storage (TDS), and Fighter Data Storage (FDS), (if applicable) information on any selected track.
2. TDS, ATDS, & FDS information for any aircraft paired together. (The target TRN (track number) is specified and interceptor information is given automatically.)
3. Any selected section of any block of ATDS.
4. Any FDS register for all 16 fighters.

In all cases, the information is recorded once per scan on magnetic tape for later printing.

The marriage of NTWS programs is progressing. All four of the main sections are now cycling satisfactorily, and remaining errors are being removed.

(Stephen Hauser) (CONFIDENTIAL)

Three geography displays were written, the Airbase, Height Finder, and Georef Displays. The programs are complete, except for minor changes to accommodate to the new vector length and character size.

(J. Hayase) (CONFIDENTIAL)

The past biweekly period has been spent fitting tapes 2855, 2857, and 2858 into the Cape Cod Identification System. The overall performance of these programs appears to be satisfactory, but minute details remain to be checked.

1.14 Weapons Direction (Continued)

(Frank Heart) (CONFIDENTIAL)

The past two weeks were mainly spent working on various aspects of Cape Cod programming, in particular, on the identification and weapons-direction problems.

(Wm. Lemnios) (CONFIDENTIAL)

The various Weapons Direction Programs have been married. Several fairly successful interceptions on simulated data have been carried out. More tests will be conducted in the future.

(John Nolan) (CONFIDENTIAL)

The past biweekly period was spent checking out the Calculations and Display Make-Up Program and in marrying this to the two Assignment-Action Programs and the Display Program into the NTWS system. These programs appear to operate logically within the system but minor errors, particularly for displays on flight-plan aircraft, have not as yet been completely eliminated.

(G. Rawling) (CONFIDENTIAL)

The complete flow diagram for the AA-HF Programs of the September System have been completed, and ozalid copies are available.

The past period has been spent in assisting the check out of the marriage of AA-HF, master control, and subsidiary programs, with participation in the equipment check-out phase.

A complete analysis of the AA-HF program is under way with accompanying description of each sequence of orders.

(F. A. Webster) (CONFIDENTIAL)

Most of the period has been spent calculating data on the series 30 simulated tracks and testing the FTU position. Together with P. O. Cioffi and R. N. Davis, data cards are being prepared for testing specific functions in the System under typical problem conditions.

1.14 Weapons Direction (Continued)

(E. W. Wolf) (CONFIDENTIAL)

The Intervention Buttons on all of the frames in Room 222 have now been checked out with the Intervention Register Test Program.

An error-analysis print-out feature has been added to this Program which will determine whether any malfunctioning on the part of any of the intervention buttons is due to program or equipment difficulties.

The operating time and display rate of the program have also been changed so as to improve its over-all performance.

The feature of the Magnetic-Tape Storage Program which will permit continuous recording between two specified drum addresses is working only intermittently and is not yet fully operational. Error-detecting routines are now being incorporated into the Program.

(C. Zraket) (CONFIDENTIAL)

All of the programs associated with Weapons Direction and Weapons Assignment (see last biweekly report) have been joined with the Master Control Program and Track Situation Programs and operated as a unit. Fairly successful results have been obtained in initial tests. Detailed testing of these programs will continue during the next week. When the programs are completely checked, the Interception Calculations Program and Weapons Assigner program will be rewritten to conserve storage and to include the final-turn calculations subprogram. Some thought is now being given to the initial inputs (winds, data-link addresses, etc.) that are required for the Cape Cod tests and to a data-link testing program.

APPROVED FOR PUBLIC RELEASE. CASE 06-1104.

DATE	TIME	SCHEDULED TEST		TEST ACTUALLY RUN		REASONS FOR CHANGES OR COMMENTS
		A/C	Description	A/C	Description	
8/18	1000-1200	6	Coverage & Tracking	-	Cancelled	6B - unavailable
8/19	1000-1200	6	Coverage & Tracking	-	Cancelled	6B - unavailable
8/20	1100-1300	6	Coverage & Tracking	6	As scheduled	
8/25	1000-1200	4	Coverage & Tracking	2	As scheduled	Cancelled 2 jets due to weather
8/27	1000-1200	4	Coverage & Tracking	-	Cancelled	Weather

Memorandum M-2379

1.15 Direction Center Operations

(P.F. Dolan) (CONFIDENTIAL)

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\* Added to schedule during week of test

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1.15 Direction Center Operations (Continued)

(P.F. Dolan) (Continued) (CONFIDENTIAL)

August 20, 1100-1300, Tracking and Coverage, Walquist

Three B'29's and 3 fighter aircraft were scheduled for this test which was delayed until 1135 due to shut down of data (6B). The phone link to P#10 was also out of order, which affected our flight plan since there could be no ADIZ penetrations. Very little computer time was used on this test but a good tape (#5) was recorded with six aircraft producing crossing tracks.

August 25, 1000-1200, Coverage & Tracking, Walquist

Two B'29's and 2 jet aircraft were scheduled for this test; the jet aircraft, however, were cancelled due to IFR (bad) weather.

Sites at Derry and Clinton were used in conjunction with the 6B with good tracking and good data on Clinton; Derry, however, gave some trouble at intervals. Both tracking and data were good on the 6B.

(P.F. Dolan) (CONFIDENTIAL)

The following statistics apply to the last biweekly period:

- 1. Computer hours scheduled for flight tests 10
- 2. Computer hours used for flight tests 2
- 3. Computer hours returned due to flight test cancellations 8
- 4. Total aircraft hours flown 12
- 5. Aircraft hours flown by 6520th Wing at Bedford 8
- 6. Aircraft hours flown by Navy (Quonset-based Squadron) 4

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1.16 FSC-7 XD-1 Support

(W.A. Clark) (UNCLASSIFIED)

An estimate of time lost in transferring information between computer and drums was made and presented at the drum-system meeting at Poughkeepsie on August 20. R.C. Jeffrey is preparing a summary of this analysis which will appear in the near future.

(B.G. Farley) (UNCLASSIFIED)

Some time was spent this period attending sessions of the Third International Congress of Electroencephalography and Clinical Neurophysiology at Radcliffe. A report is being prepared embodying some proposals for use of digital computers for diagnosis and research in medical electroencephalography.

1.2 Group 64

(S. H. Dodd) (UNCLASSIFIED)

The first bank of magnetic-core memory continues to operate very reliably in Whirlwind I. Plans are progressing well for the installation of the second bank.

Electrostatic storage has continued to operate with excellent reliability.

The noise on the deflection lines in the display system (discussed in previous biweeklies) continues to be a problem. Measurements on various parts of the deflection-line system have tended to isolate the sources of noise, and a new amplifier and a different level of signal transmission look very promising.

Equipment operation in Room 222 continues to show some difficulties. These difficulties, however, have had straightforward solutions, and operation in general has been adequate for programming check-out. An effort is being made to reduce the number of changes required by Group 61, and it is hoped that this will allow more engineering time for improving equipment reliability. In general, Room 222 progress seems quite satisfactory.

1.21 WWI System Operation

Magnetic-Core Memory

(N. L. Daggett) (UNCLASSIFIED)

By approximately August 31 the necessary control and driver equipment should be installed, ready to receive the second bank of magnetic-core storage. This second bank will probably arrive and be tied in during the week of August 31. Sufficient control equipment will be included to permit operation independent of the present ES control, so that this equipment can be pulled free whenever it is desirable to do so.

The core memory has continued to require practically no maintenance. As soon as the second bank has been installed, steps will be taken to ensure proper marginal-checking coverage of the new system.

(L. L. Holmes) (UNCLASSIFIED)

Presently, we are doing the preliminary work necessary to install the second bank of magnetic-core storage. It is intended to have the bank in service and operating at the end of the week of September 5.

We are assembling a new core-storage control system in a 26" rack. The rack will be moved out into the computer room following the arrival of the second memory unit. The new system will replace the majority of the present ES Control System.

1.21 WWI System Operation (Continued)

(L. L. Holmes) (Continued) (UNCLASSIFIED)

A new sense GT-BA Plug-In-Unit mounting Panel will be placed in service in the present bank on August 29. This panel contains WWI type plug-in units.

Electrostatic Storage

(A. J. Roberts, S. E. Desjardins) (UNCLASSIFIED)

The number of hours necessary for ES maintenance has decreased considerably. Storage reliability continues to be excellent. Both banks of storage are being maintained in good operating condition.

Marginal Checking

(T. Leary) (UNCLASSIFIED)

The new PMC program to go with the proposed system of putting all our marginal-checking programs on the drum is essentially complete. The control program is complete in outline. Much work remains to be done before we have our desired one long tape to be read in at the beginning of each PMC period.

(D. A. Morrison) (UNCLASSIFIED)

MC Counter-Selector-Decoder Panel assembly drawing is in process of being checked out.

Modified mounting bracket for Automatic Marginal Checking Panel has been received and is ready for mounting.

Auxiliary Magnetic-Drum System

(H. L. Ziegler) (UNCLASSIFIED)

The Marginal-Checking Power Supply for the Drum Test Rack has been completed and seems entirely satisfactory in operation. Several pending circuit modifications are now being evaluated with this equipment. Chassis testing will be resumed after the present testing is completed.

Temporary panels and wiring of the Monitor System are being replaced by permanent ERA type chassis and wiring. This work is progressing well and should be finished in the next few weeks.

Several erase methods that are simpler than the present one have been worked out and will be tried when time permits.

1.21 WWI System Operation

Auxiliary Magnetic-Drum System

(P. W. Stephan) (UNCLASSIFIED)

A new method for erasing the drum heads was tested but so far has proved unsatisfactory.

Part of the proposed auxiliary-drum power circuit was changed.

The modifications necessary to install the power circuit have been written. It is to be installed in a week.

1.22 Terminal Equipment

Display

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

A pair of new decoder-output amplifiers was tried in the display system on August 28. The amplifiers were used to drive one scope in Room 222. The resultant display was only 25% as noisy as that on an adjacent scope. The system is promising, but it has yet to be tried in driving a large number of scopes. The testing will continue next week.

(F. E. Irish, R. H. Gould) (UNCLASSIFIED)

Modifications on the 5-inch and 16-inch display scopes for improving intensification and focus, respectively, will be finished within a week. No fires have occurred in the high-voltage power supplies since the voltage output was reduced from 12kv to 10kv.

The Intensify Gate Amplifier plug-in units are being modified to remove the droop in the intensify gates. This droop became noticeable when characters were displayed, because characters are intensified for nearly twice as long as spots.

The light guns will still initiate on characters. A number of changes seem desirable in the guns and associated circuitry to cure the aforementioned difficulty and improve general operation.

Experiments on increased accelerating voltage on the 5-inch display scope have been inconclusive. The high deflection-amplifier gain needed caused cross talk between the intensify-gate input and the deflection. Work will continue.

1.22 Terminal Equipment (Continued)

Display

(S. B. Ginsburg) (UNCLASSIFIED)

Work is continuing in eliminating the noise present in the intensification circuits for the scopes in Room 222.

It is necessary to modify the intensify gate amplifiers. These units were designed to amplify a 100- $\mu$ sec gate and operated satisfactorily for spot presentation. However, the same amplifiers are used for vector presentation which requires a much wider gate. The units are presently being modified.

Modifications of circuits for indicator lights, light guns, and alarm panels are now in progress and are preventing effective check-out of correct operation.

Installation of Equipment in Room 222

(F. Sandy) (UNCLASSIFIED)

The past biweekly period has been devoted to making modifications requested by Group 61; preparing for the new Power-Distribution and Blown-Fuse-Indication Scheme; preparing for supplying voltages to side-frame panels via the power strip in each console instead of the junction box; and installing the meters for the voltages supplied to Room 156. Also, some of the skins for the scope consoles and side frame have been built and installed. The rest are to be delivered September 10. It will take about a week (maybe two) to install these.

The low-leveling lighting for the corridor and on the consoles is expected to be completed by September 4. The terminal-strip panels and the fuse-indication panels should be in our hands by September 10. It will take 2 or 3 weeks after we receive them to install them.

Wiring Schedules

(F. E. Irish) (UNCLASSIFIED)

Master copies of the schedules for the signal wiring of the remote stations are being typed. The typing should be completed sometime during the next biweekly period.

Wiring schedules for junction boxes 8 and 9 finally have been brought up to date; the Print Room has the master copies.

1.22 Terminal Equipment (Continued)

Modifications in Room 222

(F. E. Irish) (UNCLASSIFIED)

The last major modification to equipment layout and to signal connections in Room 222 should be completed on August 28.

Buffer-Drum System

(K. E. McVicar) (UNCLASSIFIED)

ERA has informed us that they do not consider it advisable to attempt repair of the surface nicks on a drum in the field. If we wish to have the buffer drum resurfaced it will be necessary to send it back to St. Paul. This will delay installation of the system in the computer by about a month. In view of this delay a memo has been written outlining the situation and proposing that we keep the present drum. The memo is being circulated to interested persons from whom comments are requested.

Testing of the buffer drum has just about reached the saturation point until we can install marginal-checking facilities. Video cabling of the drum with its external equipment and the computer is proceeding satisfactorily. Wiring of power supplies and indicator lights is moving slowly because of the shortage of technician help.

Buffer-Drum Groups II and III

(E. P. Farnsworth) (UNCLASSIFIED)

This equipment is presently in a state of flux. The paper-tape read-in and Flexo print-out originally proposed for this group may not be installed in WWI. Instead, one pair of status tracks may be reserved for spare; the possibility of using the other group as an intervention register read-in is being investigated.

MITE

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

All of the Gate-Buffer Amplifiers in MITE 2 have been replaced with modified units. MITE 2 now shows substantial improvement in margins, and the margins of the other MITEs have been improved during the past period.

Dummy MITE is now operating satisfactorily and can be used in conjunction with the video filters.

It is proposed that plug-in versions of pulse standardizers be used on the output of the demodulators, both to feed the MITE and to feed monitors in Room 224. The layout of these plug-in units has been designed and checked and is now in the construction shop.

1.22 Terminal Equipment (Continued)

(A. Werlin, R. Paddock) (Continued) (UNCLASSIFIED)

The layout of the new MITE to be associated with the Buffer-Drum is frozen, and the panels are now being constructed. These panels have been modified so that the components are mounted vertically thus permitting more direct wiring. Also twisted-pair leads will be used in many places where signals have to be routed any appreciable distance.

Magnetic-Tape Print-Out

(E. P. Farnsworth) (UNCLASSIFIED)

The cause of the occasional skipping of a line by the delayed punch reported previously was traced to a sneak circuit activated by slippage of the Flexowriter punch clutch, which generated a spurious start-tape pulse. A circuit change was made to prevent this sequence of operation in the event of clutch slippage. A mechanical break down in the punch was found to have been the cause of the abnormal clutch slippage.

The auxiliary rewind circuits were connected to units 3A and 3B and the print-out rewind panel was modified to operate from the auxiliary panels.

Magnetic-Tape Mechanisms

The machine shop has turned out a satisfactory splined hub adapter from a stock gear which will permit transferring reels of magnetic tape from NAB hubs to either type of Raytheon reels on a Magnicorder accessory panel. We have requested a second adapter to operate between the two types of Raytheon reels.

Magnetic-Tape System

Modifications of the reading amplifiers to permit locking out of the record function on unit 0 will be accomplished when time permits. The silver conducting micro-paint appears to be satisfactory for forming limit stops. Mylar tape is impervious to silicone according to data from Dupont, and a test made with a sample from the storage-tube lab indicates that the oxide coating is likewise impervious. Silicone paint and solvent has therefore been ordered for marking the unit 0 tape and for removing limit stops.

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 August 14 - 27, 1953:

Number of assigned hours	177
Usable percentage of assigned time	90
Usable percentage of assigned time since March, 1951	85
Number of transient errors	60
Number of steady-state errors	2
Number of intermittent errors	7

Storage-Tube Complement in WWI

(L. O. Leighton) (UNCLASSIFIED)

Following is the storage-tube complement as of 2400, August 27, 1953:

<u>Digit</u>	<u>STM No.</u>	<u>Tubes</u>	<u>Hours of Installation</u>	<u>Hours of Operation</u>
0 B	27	ST-868	15821	293
1 B	18	ST-865-1	15709	405
2 B	5	RT-393	15370	744
3 B	4	ST-821	14226	1878
4 B	33	RT-380	13516	2598
5 B	11	ST-836	14617	1497
6 B	44	ST-863-1	15662	452
7 B	17	ST-822	14846	1269
8 B	6	RT-391-1	15370	744
9 B	38	ST-874	16064	50
10 B	43	ST-864-1	15688	426
11 B	25	ST-753-1	13129	2985
12 B	41	ST-856	15290	824
13 B	3	ST-870	15895	219
14 B	32	ST-871	15919	196
15 B	16	RT-383	13629	2484
16 B	19	ST-845-1	14886	1228
17 B	26	ST-869	15846	268



Storage-Tube Complement in WWI (Continued)

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

<u>Digit</u>	<u>STM No.</u>	<u>Tubes</u>	<u>Hours of Installation</u>	<u>Hours of Operation</u>
0 A	30	ST-862-1	15641	474
1 A	20	ST-817	14148	1906
2 A	34	RT-388-R-1	15393	721
3 A	23	ST-802	13411	2703
4 A	39	ST-867	15794	320
5 A	40	ST-525	13389	2725
6 A	8	RT-389	15290	824
7 A	35	ST-800	13340	2773
8 A	45	ST-825	14307	1806
9 A	10	ST-861-1	15641	474
10 A	36	RT-401	15534	580
11 A	12	RT-387	15175	944
12 A	13	RT-390	15290	824
13 A	14	RT-381	13581	2533
14 A	29	ST-835	15460	654
15 A	37	ST-860-1	15641	474
16 A	9	ST-855	15194	920
17 A	2	RT-382	13629	2485

ES Clock hours as of 2400 August 27, 1953	16114
Average life of tubes in service in Bank B	1031
Average life of tubes in service in Bank A	1341
Average life of last five rejected tubes	3842

Storage-Tube Failures in WWI

(L. O. Leighton) (UNCLASSIFIED)

The following storage-tube replacements were reported during this biweekly period:

- ST-747 was rejected after 2479 hours of operation because of positive switching.
- ST-805 was rejected after 2438 hours of operation because of probable heater-cathode short.
- ST-624-C-1 was removed after 5412 hours of operation to make room for stannic-oxide tube.
- ST-720-C was removed after 3127 hours of operation to make room for stannic-oxide tube.

Component Failures in WWI

(L. O. Leighton) (UNCLASSIFIED)

The following failures of electrical components have been reported since August 14, 1953:

<u>Components</u>	<u>No. of Failures</u>	<u>Hours of Operation</u>	<u>Reasons for Failure</u>
<u>Capacitors</u>			
.01- $\mu$ f, 500-volt, disc ceramic	1	0 - 1000	Shorted
7-45 ceramic condenser (trimmer)	1	9000 - 10000	Suspected open
<u>Crystals</u>			
D-358	4	19000 - 20000	Low $R_b$
1N34A	1	9000 - 10000	Crystal shorted
<u>Resistors</u>			
220-ohm, 1/2-watt, carbon	1	0 - 1000	Burned up
5100-ohm, 1-watt, +1%, deposited carbon	1	1000 - 2000	Above tolerance
5000-ohm, 1-watt, +1%, deposited carbon	1	12000 - 13000	Above tolerance
<u>Tubes</u>			
5670	2	1000 - 2000	Low $I_b$
5687	2	6000 - 7000	1-Low $I_b$ ; 1-short
6AC7	1	5000 - 6000	Open cathode
6AN5	1	1000 - 2000	Short
6SN7	1	0 - 1000	Short
715B	1	2000 - 3000	Leakage
6145	2	0 - 1000	1-Short; 1-grid emission
	1	3000 - 4000	Short
7AD7	2	6000 - 7000	Low $I_b$
	1	19000 - 20000	Short

1.24 General

Air-Conditioning for WWI

(R. E. Garrett) (UNCLASSIFIED)

The bypass dampers have been reconnected in the room and computer air-handling units to reduce the relative humidity with bypass air. Readings will be taken to determine the effect. If the desired conditions cannot be maintained, consideration will be given to the addition of a hot-water coil for positive reheat.

In order to reduce the leakage and sun load in the penthouse, a duct is being installed directly from the filters to the intake of the units.

1.3 Group 65

1.31 Storage Tubes

(P. Youtz) (UNCLASSIFIED)

Some of the personnel in the Storage Tube Group were transferred to other groups in the Division this past biweekly period. There will be more personnel transfers over the next few periods. The remaining personnel directed two thirds of their efforts toward the construction and testing of 800-series storage tubes and their installation in ES row.

Work was done and will continue on research tubes for the cathode investigations of H. B. Frost.

Considerable work was done for Group 25. There are some commitments to that Group which will continue.

Work was continued on the Charactron tube.

1.32 Test

Television Demonstrator

(A. Zacharias) (UNCLASSIFIED)

During this past period eight tubes, ST870 to ST877 inclusive, were pretested at the TVD. Six were satisfactory, one marginal, and one rejected. ST872 was marginal because of a buckled mica spacer. It failed to hold a positive array for 10 minutes. The array had been written with the usual W+ gate amplitude. When the gate was increased, however, the array held for 10 minutes. This tube was marginal at the STRT. ST873 was rejected for a buckled mica spacer. The array could not hold for 10 minutes.

The low holding-gun currents of the tubes tested during the biweekly period August 1 to August 14 were found to be due to insufficient anode voltage caused by a power-supply failure which was previously undetected.

Storage-Tube Reliability Tester

(L. B. Martin) (UNCLASSIFIED)

Seven storage tubes, ST869, ST870, ST871, ST872, ST874, ST875, and ST876 were tested in the STRT. All were satisfactory except ST872 which was marginal due to a small spot-interaction area.

(R. E. Hegler) (UNCLASSIFIED)

The past two weeks were spent on assembling a 64 x 64 increment generator to be used in Charactron testing.

1.33 Research and Development

(C. L. Corderman) (UNCLASSIFIED)

Tests are in progress on a 16" display tube which has been reprocessed with a character matrix. This matrix has a number of 0.010" holes drilled in a 0.002" sheet of tantalum. It was used in preference to the one removed from the 5" Charactron in order to gain experience in the construction and processing of soft glass tubes before using a finished matrix. Although effects of secondary electrons from the matrix are present, the tube has been useful in studying the problems in operating the Charactrons which we will receive in September.

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SECTION II - AN/FSQ-7

2.1 Group 62

(N.H. Taylor) (CONFIDENTIAL)

Summary and Activities of Group 62

In order to give more assurance of meeting the scheduled delivery of the XD-1 computer to Lexington for operation in July 1955, it has been necessary to restudy the IBM testing activity and reschedule the delivery of components based on a new testing scheme.

The scheme revolves around the idea of building the central portion of the XD-2 computer ahead of the XD-1 and using it as testing equipment for terminal facilities of the XD-1 machine in Poughkeepsie. This plan avoids the design of rather complex systems-testing equipment for each of the three drum frames, the display scope, and possibly the magnetic tape and punched-card equipment. A heavy burden will fall on the testing and construction personnel, but less engineering will be demanded. This situation is not unfavorable from an IBM point of view as it uses the personnel available in Poughkeepsie.

A rather large production department has been transferred to the AN/FSQ-7 department in Poughkeepsie. This department has previously been associated with the construction and testing of 701 computers. One hundred and fifty people are associated with the group.

A new section has been established in Group 62 to handle all problems associated with display. C. Corderman of Group 65 has been transferred to Group 62 and will head this activity. The following personnel will report to Mr. Corderman: R. von Buelow, H. Ziemann, J. Woolf, R. Gerhardt, and M. Epstein.

The second WWI type magnetic memory is nearing completion. It will be installed and tested in the next period.

2.11 Systems

Character Generator

(K. Olsen, H. Henegar) (UNCLASSIFIED)

A magnetic-core character generator was assembled during the last biweekly period and is now being debugged.

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2.11 Systems

Marginal Checking

(I. Aronson, N. Fallows, R. Pfaff) (UNCLASSIFIED)

A marginal-checking proposal has been written and issued as IM-46. Those interested can obtain this report.

Display

(I. Aronson) (UNCLASSIFIED)

An integrator for use in the vector generator has been designed and breadboarded. Its performance is currently under investigation.

Input Counters

(C.J. Schultz) (CONFIDENTIAL)

The design and construction of panels containing variable R, L, and C components with plug-in connections was initiated. The use of these units will facilitate the optimization of magnetic-core shift registers and counters.

Circuit-Application Manual

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

The binders and 5 entries have arrived from IBM. Distribution is being handled by J. Giordano.

Basic-Circuits Meeting

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

A basic-circuits meeting was held at IBM to discuss the circuits used in the high-speed portion of XD-1. The results of this meeting are described in an M-note which will be distributed as soon as possible.

Delay-Line Adder

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

The delay-line adder mentioned in the last biweekly is now being breadboarded. Construction should be finished by the next biweekly period.

Etched Circuits

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

Two 8-tube pluggable units are being built by the shop. These units are built to hold etched-circuit cards and will be used to test this

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UNCLASSIFIED2.11 Systems (Continued)Etched Circuits (Continued)

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

type of circuit layout. Adaptors will be built so that these units can be used on a standard 19" rack.

Display

(R. von Buelow) CONFIDENTIAL)

A schedule has been evolved in which selection of the optimum character generator (of three types) now being considered will be made next week. The same schedule provides for comparison of the selected character generator and the Charactron by the 1st of November.

A further schedule was agreed upon by IBM and MIT personnel which requires freezing of display block diagrams by November 1.

Because of difficulties involved in rectangular tubes, the order for Charactrons has been changed to include all round tubes. This will not result in a delivery delay.

A memorandum containing recommendations on some of the psychological aspects of the display system has been received from Group 38. Further recommendations on character size and shape are forthcoming from this Group.

XD-1 Drum System

(R.C. Jeffrey, R.P. Mayer) (CONFIDENTIAL)

MIT participation in the work of the drum group at High Street is being continued on a regular basis, at the request of that group. We will each spend two days a week at Poughkeepsie and will keep each other and Jack Jacobs informed in detail of the progress of the work.

Input Counters

(H.K. Rising) (CONFIDENTIAL)

The analysis of the single advance pulse stepping register has proven quite messy for the RLC coupling network. In order to get a better feel for the problem, the simpler RC coupling network is being analyzed, and some calculated curves are being plotted showing the relationships between circuit-time constants and core switching time and drive. Experimental verification will be possible as soon as the variable R,L,C panels are completed.

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2.11 Systems (Continued)Comprehensive Logical Diagrams

(R.P. Mayer) (CONFIDENTIAL)

Drawing SD-47010-1 (2 pages), "Summary of Block Schematics: Internal Machine," shows 14 more IBM Block Schematics and revisions in nearly all the previous ones. Recent changes and additions by IBM now make this drawing partially obsolete. It should be noted that a delay-line clock is now proposed. The "or" circuits immediately above the CPO units are to be common cathode resistors of the cathode followers shown at the left of the large matrix, thus eliminating the cathode followers immediately above the CPO units.

Drawing SD-47007, "Incompleted First Draft, Comprehensive Logical Diagram for one Complete Center," will be redrawn during the next biweekly period. A number of circuits shown are being more thoroughly worked out.

Engineering Note E-560, "Status of XD-1 Internal Logical Design," exists in rough draft form; anyone seriously interested may obtain or borrow a copy. However, it is being typed and should be issued in the near future.

A Study of High-Speed Multipliers (R-223)

(W.A. Klein) (UNCLASSIFIED)

The Drafting Room is working on about 20 of the figures for R-223. It is hoped that work on the longest chapter of the report will be complete in one week.

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UNCLASSIFIED2.12 Magnetic-Core MemoryMiscellany

(W.N. Papian) (CONFIDENTIAL)

A first glance at the photos of output waveforms of the 64 x 64 test plane is very encouraging. It is most likely now that only one sense winding and one sense amplifier/discriminator will be needed per digit plane of the MTC Mod. II and the XD-1 memories.

The "shower stall" part of Test Setup V is now under MTC jurisdiction and is being prepared for movement to the Barta Building to become Bank B core storage for WWL. The next stall in this setup will be that for MTC Mod. II Memory.

64 x 64 Test Plane

(W.J. Canty, E.A. Guditz) (CONFIDENTIAL)

The sensing-winding-noise tests on the experimental 64 x 64 plane have been completed. The results indicate that only one sense winding per plane will be required for the MTCII and XD-1 memories. These tests were made with a balanced-input sensing amplifier and using the post-write disturb pulse.

Sensing Amplifier, MTC Mod. II

(W.J. Canty) (UNCLASSIFIED)

Electrical design of this unit is practically finished. Both a breadboard and a prototype model have been constructed and appear to work extremely well.

Digit-Plane Driver, MTC Mod. II

(W.J. Canty) UNCLASSIFIED)

Electrical and mechanical details of this unit are complete. Next week, wiring of these units should start in the shop.

IBM Visit

(W.J. Canty) (CONFIDENTIAL)

A visit to IBM was made on August 27. Details of Sense Amplifier and Digit-Plane Driver circuitry for XD-1 were discussed.

Selection-Plane Drivers, MTC Mod. II

(J.L. Mitchell) (UNCLASSIFIED)

The selection-plane-driver circuits are now designed and are being tested. The transformer design is still up in the air; however, we hope to be able to complete this problem in the next few weeks.

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2.12 Magnetic-Core Memory (Continued)

Thesis Proposal

(J. Raffel) (UNCLASSIFIED)

A Master's thesis proposal was completed and is being submitted to the EE Department for approval. Preliminary work on an MF-1312 core driving 32 memory cores has given promising results.

Sense Windings

(J. Raffel) (UNCLASSIFIED)

The probability distribution for the occurrence of different values of system delta in a memory plane is being calculated for the additive and cancelling type sense windings.

Test Setup I

(S. Fine) (UNCLASSIFIED)

A 256-bit ferrite-core plane has been constructed and installed in Memory Test Setup I, replacing Mo-Perm plane No.6. The x and y driving lines have 2 terms so that the lower available driving currents of the test setup can be used. Satisfactory operation has been achieved with this plane. Experimental data for use in a Master's thesis will be obtained.

Switch Cores

(A.D. Hughes) (UNCLASSIFIED)

Work is being continued on the evaluation of an equivalent circuit for a switch core. A low-impedance square-wave source is being used. Results, so far, indicate that a ferrite core acts as an inductance and current source in parallel; and that a metallic core acts like an inductance in parallel with a resistance which varies with input voltage, plus some anomalous effects not worked out yet.

Further work will be done to determine the effects of stray capacitance, air-core transformer action, stray output coupling, and possible observation errors due to scope or preamp distortion.

2.13 Vacuum Tube Circuits

Character Generator

(J. Woolf) (UNCLASSIFIED)

The four letters D, P, L, V were displayed in a 2 x 2 array at rates in excess of 10,000 characters per second.

Level-Setting Circuits

(J.S. Gillette) (UNCLASSIFIED)

Once again, there exists a need for level setters. We are trying to find out what transfer characteristics are needed so that we may decide upon a circuit.

Memory-Sensing Amplifier

(C.A. Laspina) (UNCLASSIFIED)

A prototype of the plug-in sensing amplifier for use with the MTC memory has been built. It has been tried with Memory Test Setup 5 (with a 32 x 32 plane and one fourth of a 64 x 64 plane as the memory unit) and operated satisfactorily. When the test setup used one fourth of a 64 x 64 plane, the inhibit and post-write-disturb pulses produced noise pulses of 0.4 volts on the sense winding. The amplifier is capable of accepting 0.6-v pulses without blocking or shifting its bias level.

The margins of the amplifier will be checked during the coming biweekly period.

Bill Ayer, Bill Canty, and I discussed the possibility of using etched-circuit techniques in building the sensing amplifier; we think that these techniques will greatly simplify construction without destroying circuit performance or reliability. Some etched circuits will be made next week, and a plug-in unit using them will be built and tested.

Pulse Amplifier

(S. Bradspies) (UNCLASSIFIED)

The results placing the gate tubes at 8 points (16 tubes) separated by 4" were not satisfactory due to the fact that the pulse width increased as the pulse traveled down the line. The pulse height was about 30 volts with an input to the pulse amplifier of 42.4 volts.

### 2.13 Vacuum-Tube Circuits (Continued)

I attempted connecting the grids 2" apart at 8 points; however, the pulses were smaller ( $Z_0$  of line was less) and if the terminating resistor was increased to boost pulses, then the pulses became excessively wide at all points, plus the fact that they were still not too large.

All data up to this point has been taken with 3:1 step-down hypersil transformer.

It was then decided that the ferrite transformers should be employed. A 27:9 step-down output transformer proved to be very poor. Pulses were wide, small, and ringing.

The 30:6 transformer, concentric solenoid, opposite sense proved to be just what was needed. The PA gain is greater than unity for inputs of about 10 volts to 32 volts. There is practically no overshoot; the pulses are never more than 0.1- $\mu$ sec wide, and they are large. Furthermore, no damping whatsoever is required. Finally we are able to make the termination fairly large without ruining the waveshapes, and this means that pulses hardly attenuate down the line.

A 30:6 transformer with windings 180° apart was not nearly so good.

Several 32:8 transformers have been tried, but they are not nearly as successful as the 30:6 described above.

### Pulse Transformers

(E. K. Gates) (UNCLASSIFIED)

Memory-Driving Transformer. Sprague Electric has made a 2-1 transformer which is acceptable. They are going to make some 3-1 since it looks as though a 2-1 current step-up is not enough for a 60% tube. This was decided at a meeting at High Street on August 27. The main problem with the transformer is current regulation when cores are switching. Further investigations are being made on this problem here and at Sprague Electric.

3-1 0.1- $\mu$ sec Pulse Transformers. Cores have been sent to Sprague for them to test for uniformity and to manufacture transformers from these cores.

2.13 Vacuum-Tube Circuits (Continued)

High-Speed Gate Tube

(H.J. Platt) (UNCLASSIFIED)

In circuit discussions with the people at Project High, it was decided that the transformer problem could be settled by allowing a transformer manufacturer to fabricate several pulse transformers of various configurations and turns. These transformers will be tested under like conditions both at Project High and at MIT, and a final decision will be made.

It was thought that variations in cores might have some effect on the performance of the transformer. But, in tests made by Earle Gates, no definite link has been found between our present core tests and final performance of the finished transformer.

Flip-Flop R-Report

(Hal Boyd) (UNCLASSIFIED)

R-227, "The Normalized Flip-Flop Chart", has been typed and should be available in book form within three weeks.

2.14 Memory Test Computer

General

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

Logical planning, as outlined below by P.R. Bagley, has gone ahead for several anticipated additions to the computer.

These additions will necessitate considerable purchasing and construction in the next few months; an effort is now being made to survey and organize this. In this connection, the MTC staff is to be augmented by the talents of Louis Sutro, who is tapering off his Test Equipment responsibilities over the next month as he assumes more of the MTC load.

Logic And Programming

(P.R. Bagley) (CONFIDENTIAL)

The major additions to MTC in the next few months will be:

2.14 Memory Test Computer (Continued) (CONFIDENTIAL)

1. A magnetic-drum-storage system;
2. A Charactron;
3. A 4096-register magnetic-core memory, the prototype memory for XD-1;
4. Memory register group selection circuits;
5. A Ferranti Hi-Speed Tape Reader (Mark II).

Planning for integrating these units into the computer is in the block-diagram stage. (Proposed Block Diagram, MTC, is drawing SD-47011.)

The target date for the comprehensive test of the Charactron, requiring the installation of magnetic-drum storage as a source of data, is early in November of this year. Charactron tubes are being purchased from Convair; the Laboratory is designing and building the necessary decoders and deflection circuits.

Since MTC will not have a magnetic-core memory at the time of the Charactron test, one register group (2048 registers) of a magnetic drum will be used to store the data for generating test displays. This initial drum system will be able to transfer a single word at a time between the Accumulator and any drum-storage register. The magnetic-drum memory will be parity checked with a 17th parity digit, in a manner similar to that used with magnetic-core memory.

Sometime after the Charactron test, the magnetic drum will have several register groups connected (up to a maximum of 12). Present plans are to treat drum registers as "internal memory", accessible in the same manner as the magnetic-core memory. This will require an extension of the bank-selection scheme planned to accommodate the new 4096-register core memory (see below).

The installation of the XD-1 prototype memory is scheduled for January, 1954. This will be composed of a magnetic-core array 64 x 64 x 17, providing 4096 registers of high-speed memory.

The 11-bit address section of an instruction word can specify only 2048 different addresses. In order to gain access to 64 registers of Panel Memory, 4096 registers of magnetic-core memory, and up to 24,576 registers of magnetic-drum memory, an address of 15 bits is required. To provide the additional 4 bits which cannot be specified in the address section of an instruction, it is tentatively proposed to provide two 4-bit group-selection registers which can be reset at any time by a group-selection instruction. One of the group selectors will specify from which

2.14 Memory Test Computer (Continued) (CONFIDENTIAL)

2048-register group of memory registers the instructions are to be taken; the second group selector will specify to which group of memory registers the address sections of instructions refer. If no more attractive solution to the memory-addressing problem is devised, this memory group-selection scheme will be implemented approximately at the same time the prototype 64 x 64 memory is installed.

The delivery date of a Ferranti Hi-Speed Tape Reader is quite uncertain (unofficially about Oct. 1). In anticipation of its arrival, however, a Tape Reader Control is being designed to connect the reader to the Computer. The control will be arranged so that the present mechanical (Flexowriter) reader can be easily substituted in case of emergency.

Low-Speed Flip-Flop

(Hal Boyd) (UNCLASSIFIED)

A low-speed flip-flop was designed to reliably drive the heavy loads (without cathode followers) that are anticipated in the drum logic. This flip-flop is superior in many ways to the IBM low-speed flip-flop: transition times are well within specs. For exceedingly heavier loads, no gate-tube noise problem is present and gate-tube suppressor-grid current capabilities are larger. The new flip-flop has the same degree of reliability at no load but doesn't decrease as much with load and can take a much poorer tube.

Angular Position Counter

(Hal Boyd) (UNCLASSIFIED)

Experiments indicated that the present MTC gate-tube circuits are not suited to the Mod. II High-Speed MTC Flip-Flop. As a result, a gate-tube circuit was designed to accompany the Mod. II High-Speed FF. The characteristics of the new gate-tube circuit were made sufficiently good so that buffer amplifiers could be done away with. A three - or four-stage mock-up counter should supply confidence in the compatibility of the two units.

Charactron Decoder

(W. Hosier) (UNCLASSIFIED)

The characters of the Charactron are cut into a small (1/4") metal plate in an 8 x 8 array; selecting them requires two 3-bit decoders,



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~~RESTRICTED~~2.14 Memory Test Computer (Continued)

which we have decided to drive from the last six digits of the MTC accumulator. The intent is to build this decoder somewhat on the lines of Walquist's experimental unit described in R-220, to provide outputs of about 100 volts in push-pull.

Air Conditioning

(R.E. Garrett) (UNCLASSIFIED)

A report on the status of equipment has been received from our consultants listing a number of minor items. It is expected that these items will be corrected shortly, and that the equipment will be in condition for final acceptance of the entire contract within the next biweekly period.

2.15 Equipment Design And SchedulesAN/FSQ-7 Standards

(Joseph Giordano) (Restricted)

Three meetings of the Drafting Subcommittee have been held in the past two weeks. As a result of these meetings, three more proposals are being drafted. These proposals are (1) a standard procedure for the interchange and handling of Engineering Change requests and notices; (2) a decalomania format for electrical drawings; (3) the adoption of electrical symbols for drafting standards.

New binders with all current circuit data for the AN/FSQ-7 have been delivered for our Lab from IBM. This manual will replace the circuit-application manual previously distributed.

AN/FSQ-7 Circuits

(W.H. Ayer) (Restricted)

Work is continuing on the etched-wiring technique both here and at IBM. The decision was made last week to use this system in the XD-1 and XD-2 equipments wherever possible. The latest FF, cathode-follower, and gate-tube circuits have been made up and are available for experiments to anyone who wants them. Preliminary work has also been started on one of the memory circuits.

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## 2.15 Equipment Design And Schedules

### In-Out Layout

(W.H. Ayer) (UNCLASSIFIED)

Information is being assembled as a preliminary to drawing up tentative floor plans and packaging layouts for the I/O equipment to be placed in Building A at Lexington. A three-dimensional model will be started within the next two weeks.

## 2.16 Transistors

### $\alpha$ vs $I_e$ Plotter

(D.J. Eckl) (UNCLASSIFIED)

Further development has been started on the  $\alpha$  vs.  $I_e$  plotter which was temporarily deferred. Several changes have been found necessary on the original unit designed by S. Valdez. The small signal frequency has been increased to 60 kc/sec and the  $I_e$  sweep has been dropped from 60 cps to a lower value which has not yet been standardized. A saw-tooth generator is now being used to sweep  $I_e$ . These changes should improve matters when the sweep is carried out to higher values of  $I_e$ . With the original setup, the initial sharp peak was not properly reproduced at high emitter currents. This unit will be useful in weeding out transistors which show an appreciable  $\alpha$  at negative emitter currents.

### Minority Carrier Storage

(N.T. Jones) (UNCLASSIFIED)

The point-diode samples have completed the third series of storage tests and the data is now being processed. D-c characteristics of the diodes are being measured for correlation purposes.

### Diode-Characteristics Curve Plotter

(N.T. Jones) (UNCLASSIFIED)

A static-characteristic curve plotter for diodes, of simpler design and wider range than the available IBM circuit, was designed and debugged. This unit will be used primarily to obtain the characteristics of the point and junction diodes in the storage work. The components of the curve tracer include 2 resistors, 2 potentiometers, 1 diode, 1 isolation transformer, and a Variac.

## 2.16 Transistors

### Junction Transistor Flip-Flop

(E.U. Cohler) (UNCLASSIFIED)

The past period has been spent in an attempted analysis of the junction-transistor flip-flop. So far nothing spectacular has been accomplished, although two expressions relating load resistance to feedback resistor have been developed. Further work on the N-curve is in progress. This is a more difficult problem than that encountered with a point-contact because of the feedback resistors necessary to give flip-flop action.

The marginal tests on the  $2^5$  counter have been completed and results will appear in an M-note on the counter. A simple gate for operation at 2 kc will be added to this counter, and reliability checks will be started.

Another tester has been built up which measures  $\alpha$  in junction transistors. It has two ranges 0.900-1.000 and 0.50-1.00. Provision is also made to measure  $I_{CO}$  at collector voltage of 5 volts. The  $\alpha$  measured is a large signal type from  $I_e = 0$  to  $I_e = 1$  ma.

### Transistor Core Drivers

(S. Oken) (UNCLASSIFIED)

The note on transistor core drivers is in the process of being written.

The parameters of the core driver already working were maximized for best response after a theoretical analysis of the circuit was undertaken.

The possible use of a delay line instead of a capacitor to control the pulse width is being investigated.

2.2 Group 63 (Magnetic Materials)

(D. R. Brown) (UNCLASSIFIED)

Enough cores for the second bank of magnetic memory for WWI have been obtained. A total of 93,800 cores has been received from General Ceramics. Tests to date have yielded 24,227 good cores, with an average yield of 58 percent.

The semiautomatic core tester has a daily output of little more than 1000 good cores per day. A new tester is being constructed which is expected to have a larger output. The IBM core handler is also being worked upon as part of an automatic core tester. Preliminary operation of the completely automatic tester was begun on August 28, and results are satisfactory.

Plane Testing for WWI

(J. H. McCusker) (UNCLASSIFIED)

Ferrite cores in eighteen planes for WWI were rechecked after installation of x and y windings. Approximately 10 cores in seventeen planes were rejected for being bad or disturb sensitive. One plane was entirely rejected due to disturb sensitivity.

Semiautomatic Tester

(R. F. Jenney & B. M. Gurley) (UNCLASSIFIED)

A new power supply and new core-handling logic have been added to the semiautomatic tester to increase reliability.

Some trouble has been found in the selection mechanism. A fair number of cores that test good are being rejected. Although there is no evidence that bad cores are being accepted because of the selection mechanism, it may be the reason that bad cores have been found in the Bank B memory planes. The mechanism is being redesigned by Pacl.

An enclosure is being built for the semiautomatic machine so that the cores can be tested at high temperature.

(R. A. Pacl) (UNCLASSIFIED)

A new semiautomatic core tester is being designed. It will replace the prototype now being used.

2.2 Group 63 (Continued)Automatic Tester

(R. F. Jenney &amp; B. M. Gurley) (UNCLASSIFIED)

After considerable time locating noise sources in the sense circuit, we have finally had the automatic core tester successfully operating. Over 500 cores accepted by the machine were visually monitored, and successful results were obtained. Before the machine can be put into active use, however, a number of details will have to be ironed out.

Trips to RCA

(P. K. Baltzer) (UNCLASSIFIED)

Two trips were made to RCA in Camden, New Jersey, pertaining to the pulse testing of ferrite cores. Blessing of IBM is in charge of testing at Camden and has installed a satisfactory test setup. Testing of experimental lots was initiated this last week. The first lot tested agrees with tentative specifications except for zero disturbed output and half-selected outputs. It therefore appears that if squareness can be improved RCA will have a material that is satisfactory for our purposes.

Pulse Response of Memory Cores

(P. K. Baltzer) (UNCLASSIFIED)

It was found that materials with a square hysteresis loop can have an output lacking the main second maximum that makes possible good selection ratios. It has been proposed that the location or existence of the second maximum is determined by the remanent state before being pulsed. A rough correlation was found between the remanent state for the maximum squareness loop and the pulse output waveform for a series of experimental materials. Experiments have also been made on a single ferrite material, switching the core from various remanent states. All of the results to date indicate that desirable output waveforms are associated with high remanent states.

Pilot Production of Ferrite Cores (R. A. Maglio) (UNCLASSIFIED)

Many trials have been made for improvement of the handling characteristics of MgO.MnO. Fe<sub>2</sub>O<sub>3</sub> oxide mixtures. This is a necessary prerequisite to smooth operation of an automatic press. Considerable progress has been achieved, and materials prepared here are now handling in a manner comparable to those received from industry.

Although we are not yet free from mechanical difficulties with the Stokes pressing operation, these difficulties are diminishing steadily if slowly as the control of tolerances and techniques is drawn tighter.

2.2 Group 63 (Continued)

Pilot Production of Ferrite Cores (Continued)

Production of several thousand cores both from materials supplied by industry and local preparations has been possible with satisfactory appearance. It remains to be seen whether suitable electrical characteristics will result from these cores after firing.

(J. Sacco) (UNCLASSIFIED)

During the past two weeks, most of the efforts of the laboratory staff have been devoted to the preparation of a 5-kg batch of material for use in the production of F-394 cores in the pilot room. However, two magnesium-manganese ferrite series (7-1/2% and 12-1/2% deficient in  $Fe_2O_3$ ) have been started and will be ready for firing within a week.

Thermal Analysis of Ferrites

(F. S. Maddocks) (UNCLASSIFIED)

A furnace is nearing completion for use in a thermal analysis of constituent materials for ferrite cores. This technique will be used to investigate thermochemical changes inherent in ferrite processing.

Ferrite Composition and B-H Loop Squareness

(F. E. Vinal, J. B. Goodenough) (UNCLASSIFIED)

B-H loop data and some pulse-test evaluations of cores prepared here have now been assembled for about 110 compositions in the  $MgO.MnO.Fe_2O_3$  oxide system. A plot of the best squareness ratio obtained from various preparation processes vs. the composition has provided information concerning the solubilities of the various constituents of the system and the optimum compositions for computer cores. A theoretical investigation of the exchange forces between the various cations has been initiated. A study of the influence of composition on the crystalline anisotropy will also be started. New insight into the mechanisms responsible for the switch-core characteristics of the  $MgO.MnO.Fe_2O_3$  oxide system have been obtained and appear to correlate favorably with the theoretical criteria for the loop squareness given in E-532 and E-545.

SECTION III - CENTRAL SERVICES

3.1 Publications

(J. B. Bennett) (UNCLASSIFIED)

M-2369 (21 August 1953) provides that copy for the Lincoln Quarterly Progress Report shall be handed in to this Section on 15 September. It is urgently requested that this due date be observed.

3.2 Purchasing and Stock

(H. B. Morley) (UNCLASSIFIED)

The Navy Cost Inspector examined procedures of this office on August 28.

In accordance with Lincoln Laboratory purchasing procedures, this office will adopt the use of three different purchase-order forms, each form keyed to the dollar value of the order.

Quotations are being requested from the new acceptable sources of supply shown on recently revised Standards sheets.

The most recent shipping report on the long-delayed Ferranti Readers indicates that one unit may be delivered within ten days, and the balance of two within thirty days. The three units are now six months behind promised delivery.

3.3 Construction

Production Control

(F. F. Manning) (UNCLASSIFIED)

There have been 32 Construction Requisitions totaling 397 items satisfied since August 14, 1953 and there are 26 Construction Requisitions totaling 193 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 187 outstanding items. Deliveries in the past biweekly period have totaled 711 items. Information on specific orders may be obtained from the writer (ext. 3476).

3.4 Component Analysis and Standards

3.43 Standards

(H. W. Hodgdon) (UNCLASSIFIED)

New or revised standards sheets issued this period:

<u>CLASS</u>	<u>SUBJECT</u>	<u>NEW OR REVISED</u>
6.011-1 thru 3	Metal Utility Cabinets	New
6.018-1 & 2	Chassis Mtg. Brackets	New
6.031-1	Choke, Filter	Revised
6.032-2	R. F. Chokes	Revised
6.032-3	R. F. Chokes (H. I. C.)	Revised
6.032-4	R. F. Chokes (Std Mtg)	Revised
6.032-6	R. F. Chokes (High Current)	Revised
6.061	Fuses, Instrument Type	Revised
6.062-1 & 2	Fuses, Radio Type	Revised
6.063	Fuses, High Voltage	Revised
6.076-1	Clamps, Plug-in Relay	New
6.076-8 thru 10	Camloc, Fasteners	New
6.082	Insulating, Tubing	Revised
6.085-1	" Material, Lam.	New
6.085-2 thru 4	" " Plastic	New
6.151-1 thru 3	Resistor (Fixed Carbon)	Revised
6.152-1 thru 2 Pg 2 of 2	Resistor (drawing only)	Revised
6.154-1 thru 3	Res. Fixed WW (Power Type)	Revised
6.173	Switches Rotary Selector	Revised
6.184-1 thru 4	Terminal Wire Solderless	Revised
6.211-5	Cable Radio Freq.	Revised
6.212-4	Wire Single Cond.	Revised
6.213	Cable, Multi-Cond.	Revised
6.214	Wire-Shielded	Revised

A summary of protective-coating methods for aluminum has been issued as Memorandum M-2378.

A compilation of the more generally accepted construction and wiring practices in the Lab is being prepared for issue as an interim Handbook of Standard Practice Instructions.

3.44 Vacuum Tubes

(H. B. Frost) (UNCLASSIFIED)

During the past several weeks considerable trouble has been experienced with 5696 thyratrons in indicator-light circuits. Initially these tubes were operated with low voltage on the heaters, so that the trouble could not definitely be assigned to the tubes. Within the past few weeks the heater voltage has been corrected and a new complement of tubes installed. However, the trouble has recurred. Analysis of the circuit has indicated that the tubes are being operated with an excess bias on the shield during conduction, as a



3.44 Vacuum Tubes (Continued)

(H. B. Frost) (Continued)

consequence of a misinterpretation of one of the tube ratings. This sort of operation could possibly be the source of the difficulty in the circuits, but this indication is by no means definite. The problem is being attacked along two lines--the circuit is being studied so that it can be redesigned to operate the tubes within ratings, and a small life test is now operating with the tubes in ratings to determine the early life performance. Results of these studies should be available early next week.

A production sample of TungSol 5998 tubes has been received. These tubes appear to have the same electrical characteristics as the Western Electric tubes previously received. An earlier pre-production sample of TungSol 5998 tubes was not electrically similar to the W-E tubes.

On August 21, Fallows, Youtz, Twicken, and Frost visited the Sylvania plant at Emporium in company with Geisler, Lewis, and Houck of IBM. Plans for the production of the SR1782A tube (7AK7 with octal base) were discussed. This tube will be used in quantity in the future. In addition, Sylvania's production facilities were examined. Although Sylvania facilities are not yet ideal, they have improved in many ways since the visit made last November. Curves on the 7AK7 in the major regions of interest have been run by both Sylvania and this Laboratory. These curves are in substantial agreement for plate and screen currents, but they do not agree on the suppressor current, Sylvania's measurements being higher. Tests on the same tube in both locations show some systematic difference. Tests made here used 5-microsecond pulses, while the Sylvania tests were made on a curve tracer under essentially static conditions. Tests will be made here to determine the nature of any transient in the suppressor current as soon as time permits, probably early in the week of 31 August.

On Wednesday, August 19, Mr. Scott Rose, RCA field engineer, visited the Laboratory. Problems concerning grid-grid leakage in the 6080, differences in characteristics between the 6080 and the 6080WA, and leakage in the A4676 were discussed. The 5696 problems mentioned above were discussed lightly, but the recent trouble after the mass replacement had not yet occurred. He was quite interested in our tube records, life results, and test procedures.

Thesis Studies

(H. B. Frost) (UNCLASSIFIED)

RT 409 was processed on schedule on August 15. It has since been tested and found to be satisfactory. The design appears to give electrical characteristics suitable for the projected tests.

Additional tests have been run which indicate that very valuable information can be obtained from V-I plots of cathode current and collector current taken independently against the grid voltage. Some very interesting and unusual pictures of high-speed poisoning have been obtained so far.

3.44 Vacuum Tubes (Continued)

(H. B. Frost) (Continued)

Continued analysis of the diffusion equation has resulted in a more compact form of this equation for calculation and study.

3.5 Test EquipmentWhittmore D-C Supplies

(R. Jahn) (UNCLASSIFIED)

I have made the following changes in the d-c supplies to improve reliability: (1) floating chassis have been grounded; (2) bare shielded wire has been tied down where it passes near exposed terminals; (3) 12AU7 tubes have been replaced when their cut-off voltage deviated too much from the mean, thus preventing the supply from going completely off when switched to standby; (4) faulty tube sockets having poor pin contact have been replaced in the regulator.

The supply voltages have been set at 0.5% to 1.0% above rated voltage to compensate for line drop.

If there are any complaints about a-c or d-c power, please let me know immediately.

3.6 DraftingDrafting Committee MIT-IBM

(A. M. Falcione) (RESTRICTED)

At the last meeting of the Drafting Committee held at Poughkeepsie, New York, it was decided to use the electrical-symbol stencils for electrical drawings for the AN/FSQ7 equipment. As a result twelve MIT stencils were delivered to IBM for use on electrical drawings. It is expected that the proposal for electronic symbols will be submitted to the Central Standards Committee on or about September 10, 1953.

AN/FSQ-7

(A. M. Falcione) (RESTRICTED)

In order to comply with the standards set forth for AN/FSQ-7 equipment, it will be necessary for a different drawing format to be used, with specific drawing numbers already assigned to the MIT group. The internal

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3.6 Drafting (Continued)

(A. M. Falcione) (RESTRICTED) (Continued)

procedure will be similar to the current one except for the format, drawing numbers, and new standards which have already been issued together with those which will be added to it from time to time. A memorandum is being prepared covering the details and procedures and will be issued in the near future.

Microfilming

(A. M. Falcione) (UNCLASSIFIED)

It has been decided that we will no longer microfilm WWI Drawings and Parts Lists as has been our procedure for the past six years. We will continue, however, to microfilm WWI Log Books. It is expected that this will be done in the very near future. If there are any other documents or records which should be microfilmed, it is requested that they be brought to my attention at the earliest possible date, so that we can add this work load to the Log Books which have not yet been microfilmed.

3.7 Administration and Personnel

New Non-Staff

(R. A. Osborne) (UNCLASSIFIED)

Edward Cottier is a new Laboratory Assistant in Group 61.

Barbara Fallon is a new Technical Assistant in Group 6345.

Terminated Non-Staff

(R. A. Osborne) (UNCLASSIFIED)

Arlyne Berkman  
Claire Coates  
John Coyne  
Robert Jeffrey  
Wilfred Klemperer  
Sophia Kostaras

Richard Onanian  
James Richards  
Celia Shay  
Gertrude Sanderson  
LeRoy Silva  
Alfred Switendick

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