

Memorandum M-2889

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Division 6 - Lincoln Laboratory
Massachusetts Institute of Technology
Lexington 73, Massachusetts

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SUBJECT: BIWEEKLY REPORT FOR JULY 2, 1954

To: Jay W. Forrester

From: Division 6 Staff

CLASSIFICATION CHANGED TO:
Auth: DD 254
By: R. R. EVERETT
Date: 2-1-60

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SECTION I - CAPE COD SYSTEM

1.1 Group 61

1.10 General

(R.J. Horn, Jr.) (CONFIDENTIAL)

A major portion of the group effort continues to be spent on preparations for the 1954 Cape Cod System.

The estimates for intercept calculation times with XD-1 have been expanded to include switch interpretation, display make-up, and data-link programs. The resulting estimates are 10 milliseconds for final-turn intercepts and 7 milliseconds per interceptor without final-turn.

A program to analyze track-while-scan data and plot curves of some of the TWS counts as a function of time has been written.

The block diagrams for the manned-interception simulation program have been completed.

A new series of raid-size tests has been started at South Truro.

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1.12 Data Screening

(R.L. Walquist) (CONFIDENTIAL)

I have prepared a first proposal for evaluating the radar mappers in the 1954 CCS. I have contributed several ideas to the other groups working on the 1954 System program.

A new analysis program for use with data collected near the end of the 1953 System operations is written and has passed initial tests. The program plots curves of some of the TWS counts as a function of time.

(D.L. Bailey, J. Ishihara, H. Seward) (CONFIDENTIAL)

A supplement to the "Tentative Tracking Proposal - 1954 CCS" has been submitted. This includes sections on program alarms, use of simulated data, use of air-movement data, and automatic initiation.

We are continuing to work on flow diagrams and a final proposal for tracking in the 1954 System.

(H. Frachtman, H. Peterson) (CONFIDENTIAL)

We have spent the last two weeks in revising the proposal for a monitoring program for the 1954 Cape Cod System.

(J. Levenson) (CONFIDENTIAL)

Programming of analysis routines for all the track data recorded during operation of the 1953 Cape Cod System is now in progress. A program to analyze automatic initiation has been completed, and a combined program to show the frequency distribution of track life and the frequency distribution of sequences of misses categorized by what follows the misses is almost complete.

An inter-office memo with proposals for the evaluation of Track Monitors in the 1954 Cape Cod System has been written and distributed.

(E.W. Wolf) (CONFIDENTIAL)

A new proposal for the radar-data-input section of the 1954 Cape Cod System has been completed.

Work on the editing and completion of the report on co-ordinate systems for radar networks is progressing.

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1.13 Tracking and Control

(H.D. Houser, H.D. Neumann) (CONFIDENTIAL)

All block diagrams for the manned-interception simulation program are ready now, and coding can be started.

Nine subroutines have been coded for MTC and will be tested as soon as MTC is operative. These include scale factoring, division sine cosine, arctangent, square root, radius vector, and print subroutines.

1.14 Weapons Direction

(D.R. Israel) (CONFIDENTIAL)

Memos describing the results of flight-test operations between 1 March and 15 June are presently in various stages of preparation. They should all be completed by the end of this month. The memo on the results of AA exercises is now being prepared for distribution.

The first of the raid-size tests, the nature of which is discussed in M-2869, "Raid Size Assessment Tests" (J. Cahill, R. Davis, A. Favret, C. Grandy), was conducted on 18 June. It was only partially successful. Facilities and procedures are being improved for the next test on 9 July. The possibility of photographing the various displays presented to the operators is being investigated. It is currently hoped that the height finder and FPS-3 can be operated during the forthcoming nationwide ADC exercises to be conducted during July.

On 25 June a meeting was held to discuss the nature of the interception program for the 1954 Cape Cod System. Responsibilities of various members of the Section, the solution of the intercept equations, and the general nature of the operation of the intercept program were discussed. The significant changes made to the 1953 program will be issued in a forthcoming memo by Nolan and Zraket. At this meeting it was also decided that a comprehensive program of work to evaluate the use of ground-to-air voice and data-link operation in the 1953-54 Cape Cod System will be undertaken. Proposals for this activity are being prepared by R. Davis.

At a meeting on 30 June, developments and plans regarding the ID section for the 1954 Cape Cod System were discussed. As a result of this meeting, Steve Hauser will prepare a memo describing the present status and utility of GOC, Navy early warning, and cross-telling information. At this meeting and at a subsequent meeting with Major J.F. Burns, plans for obtaining crosstopping data from Brunswick, Montauk, and North Truro were discussed. The possibility of stationing one man at North Truro to obtain all of this information is being investigated.

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(D.R. Israel) (CONFIDENTIAL) (Continued)

Progress on the preparation of the 1954 Cape Cod Program continues. At the present time individual programs have been delineated, the order of these programs tentatively set, and drum storage allocated. The operational specifications for the programs are discussed in an inter-office memo, dated 24 June, by Benington and Zraket. Copies of this memo are available from Jane Aldenberg. The present activity is the preparation of program specifications describing in detail the storage requirements, the subprograms and communications between various programs. Separate specifications will contain detailed proposals for the make-up of track-data storage and fighter-data storage. It is now planned that the actual programming itself will begin the week of 12 July. The programming should take a much shorter time than it did in the 1953 System, inasmuch as a large bulk of the work is represented by the material in the operational and program specifications.

During the past month two groups of visitors have come to the Laboratory to discuss matters relating to air-traffic control. One group from the CAA and Air Navigation Development Board spent ten days here and proposed close co-ordination between Lincoln and the CAA. The possibility of beginning some air traffic control work within Group 61 is currently being investigated. Another group of visitors included Ben Green of AFCRC and Colonel L. O'Connor from Wright Field. With this group, future co-ordination with return-to-base systems was discussed. The possibility of tests in the 1954 Cape Cod System with the Boston Volscan installation will be investigated later this summer.

(H.D. Benington) (CONFIDENTIAL)

During the past four weeks, attention has centered wholly on preparations for the 1954 Cape Cod System.

I. Hazel and myself issued Memorandum M-2851, "Specifications of Scope Displays for the 1954 Cape Cod Direction Center," 10 June 1954. This note gives all display categories, si addresses, matrix pairs and console toggle-switch assignments that will be used in the 1954 System by both the Tracking and Weapons Direction Sections. Equipment summaries have been included primarily for Group 64 engineers. The allocations leave little extra space for future additions; on the other hand, they are very flexible and should accommodate the Group's requirements.

C. Zraket and myself have issued an inter-office memo, "Revised Operational Specifications for the Weapons Direction Section of the 1954 Cape Cod System." This memo, which was prepared by all members of the Weapons Direction Section, will be the basis of parallel program specifications to be issued during the coming biweekly period. The above inter-office memo gives the only unified set of minutes held by the Tracking and Weapons Direction Sections for the purpose of co-ordinating 1954 System activity.

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1.14 Weapons Direction (Continued)

(H.D. Benington) (CONFIDENTIAL) (Continued)

Responsibilities have been set for the Master Makeup and Display Program: O.T. Conant will program the cycle program, the height, AA and ID switch interpretation and the track-number assignment program. I.B. Hazel will program the Track Situation Display; the situation-alarm display (for all stations), and the Intercept Director alarm makeup. I will program the WD and IND switch interpretation and the WD weapons availability makeup. The three of us will decide the DID makeup and display program responsibilities during the coming biweekly period.

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

A memo describing the results of operation of the AA-guidance section of the Cape Cod System has been prepared and is being considered by D.R. Israel.

Some time has been spent in preparation for the first of the new series of raid-size-assessment flight tests. On 14 June, the site at S. Truro was visited to inspect facilities for the tests. On 16 June, a briefing session was held for pilots of the 6520th Flight Test Squadron and 6520th Air Defense Squadron (Experimental). On 17 June some time was spent rearranging equipment at S. Truro. On 18 June, I supervised the initial test at S. Truro.

One day was spent guiding visitors around the Direction Center.

Some time was spent discussing the 1954 height-finder priority program with Benington, Favret, Grandy, Israel, and Zraket.

The first raid-size-estimation test was unsuccessful because of equipment troubles at S. Truro. Information was gained regarding aircraft performance and PPI estimation capabilities. Group 22 has co-operated to insure better equipment reliability for future tests. M-2869, "Raid-Size Assessment Tests," has been issued, describing the test series, outlining responsibilities, etc.

M-2885, "Results of Operation of the Antiaircraft Section of the 1953 Cape Cod System: March 1, 1954-June 15, 1954," has been issued.

Considerable time has been spent preparing a logical description of the 1954 AAA programs and in assisting in the preparation of a logical description of the 1954 height-finding program. Considerable time was also spent preparing program specifications for the 1954 AAA program with A. Favret.

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1.14 Weapons Direction (Continued)

(O.T. Conant) (CONFIDENTIAL)

The master makeup and display (MMD) program and allied subjects have been the center of effort for the last period and will continue to be for some time. Some time has been spent on the Digital Display section and assisting Benington and I. Hazel with certain aspects of the situation display, track-data storage, and communication registers. Major concern has been with interpretation programs for certain AA, HF, and ID switches and the "track cycling" feature of MMD. Program specifications for the latter sections should be finished (along with all MMD specs.) early in the next period, and final flow diagramming and coding will start immediately thereafter.

(F. Garth, S. Hauser) (CONFIDENTIAL)

After discussion of programming details and operational procedures, we have brought to a final form a memo on operational specifications of the Identification Section of the 1954 Cape Cod System. We have further studied the ID programs to make estimates of program specifications for a memo soon to be issued. We expect to commence programming within the next biweekly period.

We spent a few short intervals of the past month exchanging information with representatives of CAA who were guests of the Laboratory for about a week. Their observations are contained in an interesting memo, classified Secret, for limited distribution.

A memo will soon be published on the results of operation of the ID Section of the 1953 Cape Cod System: 1 March 1954 - 18 June 1954.

(S. Knapp) (CONFIDENTIAL)

Several test-storage master-control programs have been written in order that we may choose the best one for operation with the 1954 Cape Cod System. A rough draft of the specifications of this and associated programs is now being prepared.

Operational specifications for the Test and Battle Simulation (TBS) station were prepared and issued.

Much time has been spent in studying the problem of "association" in simulation; that is, of being able to designate all simulated tracks as such for the benefit of the Height and Weapons Direction stations and being able to drop simulated tracks when they begin to interfere with the detection or handling of real tracks. This last is more important for XD-1 than for 1954 CCS: the feature as it is written for Whirlwind will be an attempt to simulate XD-1.

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1.14 Weapons Direction (Continued)

(W.Z. Lemnios) (CONFIDENTIAL)

In order to perform command tracking, the TWS Section must know the interceptor's ground speed and heading. For level flight, the ground speed is known explicitly. While climbing, however, the ground speed is not known explicitly and varies quite widely since climbs are made with given throttle settings. An analysis which has been carried out has indicated that it is possible to approximate the varying speed with a constant one such that the resulting positional errors fall within certain acceptable limits. These constant ground speeds for each aircraft type and each throttle setting have been obtained.

The previous analysis done on the estimated computing time required by the AN/FSQ-7 for the intercept calculations has been expanded to include the switch interpretation, DID makeup, data-link programs. It is concluded that with final-turn about 10 milliseconds per interceptor and without final-turn about 7 milliseconds per interceptor will be required. An M-note has been written and will soon be published on the subject.

An inter-office memo containing all the analytical approximations of the aircraft characteristics has been written and will be distributed.

Some time was spent devising a simpler method of height extrapolation for the intercept calculations of the 1954 Cape Cod System.

Program specifications for the WA-IND programs of the 1954 Cape Cod System have been prepared with J. Nolan and C. Zraket.

At a conference with D. Israel, J. Nolan, and C. Zraket, various features relating to the intercept calculations were discussed.

(G. Rawling) (CONFIDENTIAL)

M-2854, "Assignment of Light Gun Connections, Intervention, and Activate Registers and Digits," has been distributed. A supplement containing title changes, wiring modifications, and additional specifications will be issued when the necessary information is made available.

Records of Cape Cod 1954 wiring and equipment changes by F. Irish and R. Gould at Barta are being kept by me. A master "catalog" of the consoles, panels, buttons, switches, and their identification and all available information is being kept up to date.

Checkout programs of the special auxiliary input-output equipment of the 1954 System are being modified from the 1953 System.

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1.14 Weapons Direction (Continued)

(G. Rawling) (CONFIDENTIAL) (Continued)

A memorandum concerning programming for the indicator lights and alarms has been commenced.

(F.A. Webster) (CONFIDENTIAL)

Several methods have been tried for programming the loading of interception-display data onto the drum. A simplified version should be ready for testing within the next couple of weeks.

(C.A. Zraket) (CONFIDENTIAL)

The Cape Cod Direction Center operations have ceased until the 1954 Cape Cod System is put into operation this fall. A series of memos describing the results of the flight-test program from 1 March to 18 June is in preparation by members of the Group.

Planning for the 1954 Cape Cod System has been intensified during the past month. The operational specifications written by members of the Group from the Weapons Direction Section have been issued in an inter-office memo by Benington and Zraket to D.R. Israel. Program specifications are currently being written, and it is expected that program checkout will start about the middle of July.

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1.15 Direction Center Operations
(W. Vecchia) (CONFIDENTIAL)
5 June - 18 June

Total Assigned Time	84 hr
Weapons Direction	1 hr 40 min
Data Screening	2 hr 50 min
(Combined Operations	
Data Screening &	10 hr 25 min
Weapons Direction	
Tracking & Control	29 hr 30 min
Equipment Check	2 hr
	<hr/>
Total	46 hr 25 min
Time Given to Math Group	10 hr 55 min
Time Given to Ck - Out	1 hr 30 min
Time Lost to Computer	15 hr 20 min
Time Given to Systems	7 hr
Time Given to American	
Machinery and Foundry Problem	2 hr 50 min
	<hr/>
Total	37 hr 35 min
	46 hr 25 min
	37 hr 35 min
	<hr/>
Grand Total	84 hr 00 min

19 June - 2 July

Total Assigned Time	68 hr
Data Screening	4 hr 25 min
Tracking and Control	34 hr 30 min
Equipment Check	1 hr 45 min
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	40 hr 40 min
Time Given to Math Group	17 hr 35 min
Time Given to Ck-Out	2 hr
Time Given to In-Out	60 min
Time Given to Systems	3 hr

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1.15 Direction Center Operations (Continued)

(W. Vecchia) (CONFIDENTIAL) (Continued)

Time Lost to Computer		70 min
Unassigned Time	2 hr	35 min
		<hr/>
	Total	27 hr 20 min
		40 hr 40 min
		27 hr 20 min
		<hr/>
	Grand Total	68 hr

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

(D.R. Israel) (CONFIDENTIAL)

Items of interest over the past four weeks are as follows:

1. Requirements for telephone lines terminating at situation consoles were reviewed with Howard Kirshner. The present plans for the phone systems seem quite adequate, and in most instances the maximum requirement appears to be for about eight pushbuttons per situation console. In accordance with a decision made at a meeting on display consoles (see below), telephone switches will be mounted on the sloping face of the situation consoles, while the dial will be mounted on the shelf.
2. Meetings concerned with approval of the console design and display system specifications were attended. Only several minor comments and changes were suggested as a result of Group 61 requirements. These were made in form of an interoffice memo.
3. The allocation of consoles, switching units, DID's, and switch panels has been reviewed in detail, and Rawling and I have prepared M-2720-2, "Equipment Allocation for XD-1 Operating Positions." This memo, which supersedes M-2720 and M-2720-1, shows the current ideas of the equipment allocation, and it is not expected that a further revision will be required for several months. Contained in the memo are the number of panels to be used in switching units and auxiliary consoles. This tabulation indicates that the minimum width of a situation console should be 9-3/4" and the minimum width of an auxiliary console 14-3/4". It is recommended that the actual equipment be at least 3/4 of an inch wider to provide space for future changes.
4. On the basis of information in M-2720-2, an inter-office memo has been prepared proposing several changes in the equipment lists for XD-1. Revised totals of situation consoles, auxiliary consoles, switching units

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

(D.R. Israel) (CONFIDENTIAL) (Continued)

and DID's are given; figures for the numbers of various switch panels and label panels are also given.

5. M-2857, "Comments on ADC Requirements for Transition System Display," has now been distributed. This memo discusses the nature of displays used by supervisory personnel in the Subsector Command Post (Direction Center) and in the Combat Center.

6. During the past several weeks, various proposals relating to the Duplex Central have been reviewed. Comments on IM-91, "Draft of Proposal for AN/FSQ-7 Duplex Central", have been forwarded to Ben Morriss. Additional consideration has been given to a number of questions prepared by B. Morriss and H. Rising. The subject presently under active consideration is that of the indications and facilities to be available in notifying both the computer and operating personnel of the status of the various pieces of equipment.

7. An inter-office memo to H. Rising from R. Walquist and D. Israel on 11 June describes Group 61's present thinking regarding the order code for the 'Duplex Central'. In general it does not appear that we can at the present time properly recommend any changes which might increase the utility or operating speed of the machine without an exorbitant cost in equipment.

8. W. Lemnios and I are preparing an M-note estimating the times to be required by the AN/FSQ-7 for intercept calculations and related programs. This memo is based on experience with the 1953 Cape Cod System and limited programing with XD-1. The results of the memo are in substantial agreement with the much earlier estimates of TM-20.

(H. D. Benington) (CONFIDENTIAL)

R.S. Fallows, C. Corderman, B. Gurley, and myself discussed XD-1 display driving requirements in detail. The results of these meetings formed the basis of an appendix in the forthcoming display specifications.

I attended the joint IBM-MIT meetings on display specifications.

(J. H. Newitt) (CONFIDENTIAL)

The past period was spent in tying down design details on the situation-display console. Two wooden prototypes which accurately resemble the final model are now under constructions, and one will be sent to Lexington shortly for our use.

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

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

An EDO-SO concurrence meeting on the console was held and the spec has been modified according to these decisions. The revised spec and the new mockup will be available very shortly, and final details can then be tied down.

Work has started on the detailed design of the auxiliary console. Tentatively it is to be 20" wide (maximum is 22") and will otherwise have the same configuration as the situation console.

Several days were spent on the air-conditioning considerations for the Cape Cod System. We are in some trouble here because of delays in producing a spec for the new equipment. A number of errors in the spec were found, and the delay was compounded. It is now necessary to resort to makeshift measures to cool the Cape Cod System because of the above delays -- causing installation to be delayed until late July or early August. It is not certain yet that I will be able to adequately cool this area by makeshift measures, but I am going to try.

(G. Rawling) (CONFIDENTIAL)

Floor plans for the Defense Center are being revised in conjunction with D. Israel and E. D. Reardon.

M-2720-2, "Equipment Allocation for XD-1 Operating Positions," by D. R. Israel and G. Rawling, has been completed. This memorandum supersedes the two previous ones and contains revisions and amplification of information about the number and location of situation and auxiliary consoles and switching units; estimates of numbers, types, and mountings of switch panels, and required intervention bits.

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1.2 Group 64

(K. McVicar) (UNCLASSIFIED)

Computer reliability increased during the past biweekly period. This was, no doubt, partially because of additional precautionary measures being taken by those installing and changing terminal equipment to make sure that interference with WWI operation is minimized.

A program is under way to simplify and standardize maintenance and trouble-shooting routines for the computer and terminal equipment. An aim of this undertaking is the elimination of the need for highly-specialized personnel in the diagnosis of the majority of failure types. Efforts are being concentrated on marginal-checking techniques and programs which simplify trouble location. Twice weekly classes are being held to increase the dissemination of system logic and circuitry among the system technicians. It is felt that an educational program for the terminal equipment is especially desirable since this field has been in the past the exclusive province of a few.

1.21 WWI System Operation

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

During the past biweekly period the computer dependability was excellent.

We have renewed our efforts to standardize the circuitry of the arithmetic-element control. The step-counter output panel has been eliminated. The step counter now uses the bus-driver circuits in A row. The add-to-step-counter circuitry was modified and resulted in a considerable improvement in the step-counter panel's margins. Timing checks have been recorded for the division operation. The divide-control panel will be extensively modified. Included in the changes will be the exclusion of approximately 11 tubes of the panel's pulse-distribution section.

A considerable amount of the installation-day work has been dedicated to the revision of the marginal-checking logic of the in-out-control system. The work will require about 6 more installation days. These changes, in addition to the recent introduction of several new IOC marginal-checking-program routines, will simplify the detection and analysis of troubles with this section of the computer.

(R. H. Gould) (UNCLASSIFIED)

The timing register on real-time clock has been made more versatile. Another source of pulses (which must be synchronized with the computer "START DELAY" pulses) may be substituted for the 60 pps by feeding the pulses into J1-1 on the remote-video-switch panel (RVSP) in E7

1.21 WWI System Operation (Continued)

(R. H. Gould) (UNCLASSIFIED)

and throwing ON the toggle switch on this panel labeled "EXTRAORDINARY INPUT." The first two flip-flops of the counter which cannot be read out may be bypassed to give a time count with a 1/60-second increment or to count all of the pulses fed into J1-1 of the RVSP. This is done by throwing ON the toggle switch on the RVSP labeled "BY-PASS 2nd PRECOUNTER". Each switch has an indicator light in test control which is lit when the switch is ON. In normal operation the switches are OFF and the lights are OUT.

Typewriter and Paper Tape

(L. H. Norcott) (UNCLASSIFIED)

Two new Flexowriters for Group 61 have been sent to the Flexo shop for modification. One punch proved defective and was returned to the manufacturer for repair or replacement. The necessary parts for modifying these machines have been ordered, and these Flexos should be available for use about 1 August.

Flexowriter 1101 has been returned to the factory to be fitted with a 20-inch carriage and pinfeed platen.

1.22 Terminal Equipment

(T. Sandy) (UNCLASSIFIED)

The in-out equipment which has been used in conjunction with Room 222 has been taken out of service in order to isolate Room 222 from the computer during the modifications in that room.

A program has been written which should tell us whether we can automatically program-marginal-check the intervention registers. We plan to try this program as soon as all of the intervention registers are placed back into service.

The extinguishing tubes for the indicator-light registers are being overworked. Work is continuing on a solution of this problem.

MITE

(A. Werlin) (CONFIDENTIAL)

All of the old demodulator panels have been removed from the system, and the new demodulators equipped to handle the new-type transmission system have been installed in their place. Also, six of the new demodulators have been installed to receive the new three-line input coming from the two large sets.

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1.22 Terminal Equipment (Continued)

(A. Werlin) (CONFIDENTIAL) (Continued)

The Mark X MITE which had been located in Rack L5, Room 156, has been dismantled and removed from the system. It will be replaced in the near future by a fine-grain-data system.

The design of the block schematic of the fine-grain-data MITE has been frozen, and its layout will be completed early in the week of 5 July. It will occupy one rack space and have provision for the possible addition of more equipment to permit the display of the fine-grain data.

Magnetic Drums

(H. L. Ziegler) (UNCLASSIFIED)

Changeover of the auxiliary drum to electronic head switching for writing is now complete. The change-group delay will soon be reduced to a few microseconds, the exact value to be determined by tests now being conducted. If anyone has reasons for wanting the present 32-msec. delay retained temporarily, he should contact Ken McVicar or Bob Gould immediately.

Plans for the drum-chassis test setup are essentially complete, and the sheet-metal portion of the job should be nearly finished by 9 July.

Magnetic Drums

(L. D. Healy) (UNCLASSIFIED)

The dual heads for Group 1 of the buffer drum have been checked. Circuits are being constructed for Groups 2 and 3 of the buffer drum.

Data Link

(R. B. Paddock) (UNCLASSIFIED)

Block diagrams and schematics for the new output coder have been drawn and initially approved; equipment requirements have been estimated closely, and orders have been placed for anticipated short items.

Layout and assembly diagrams should be completed during the next biweekly period, and it is expected that wiring of PIUMP's should begin late in the period.

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1.22 Terminal Equipment (Continued)

Data Inputs

(H. J. Kirshner) (UNCLASSIFIED)

In order to simplify maintenance and improve operation of the radio remoting equipment used in the 1954 Cape Cod system, a program of modification of this equipment has been instituted. The program will be completed prior to the resumption of flight-testing activity.

The new CRT mappers are being checked out as operating units with their associated azimuth-drive amplifiers.

Azimuth-Drive Units

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

Six units have been received and checked out. A modification has been completed which provides greater stability and eliminates parasitic oscillation in the amplifier. These units will be installed in Room 156 and checked out with the new CRT filters the week of 5 July.

Pathfinder Modification

(N. N. Alperin) (UNCLASSIFIED)

Work is progressing satisfactorily on the mapping scopes. Four scopes have been checked out with two more to be ready during the week of 5 July. Since only six azimuth-drive amplifiers are available, only six scopes will be readied for operation by 13 July. A memo describing the operating features and controls is being typed.

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 18 June - 1 July 1954:

Number of assigned hours	146
Usable percentage of assigned time	96
Usable percentage of assigned time since March 1951	87
Usable percentage of assigned time since September 1953	92
Number of transient errors	4
Number of steady-state errors	3
Number of intermittent errors	3

1.23 Records of Operation (Continued)

Component Failure in WWI

(L. O. Leighton) (UNCLASSIFIED)

The following failures of electrical components have been reported since 18 June 1954:

<u>Component</u>	<u>No. of Failures</u>	<u>Hours of Operation</u>	<u>Reasons for Failure</u>
<u>Capacitor</u>			
4.0- μ f 450-v electrolytic decoupling	1	4000 - 5000	Low capacity
<u>Crystals</u>			
1N34A	1	7000 - 8000	Low R_b
D-358	1	25000 - 26000	Low R_b
<u>Switch</u>			
SPST	1	24000 - 25000	Intermittent
<u>Tubes</u>			
5651	1	4000 - 5000	Broken pin
5881	1	3000 - 4000	Low I_b
6136	2	2000 - 3000	Short
6080	1	1000 - 2000	No I_b
6080WA	3	5000 - 6000	1 high grid cut-off; 1 open element; 1 low I_b
7AK7	1	0 - 1000	Broken envelope
	1	3000 - 4000	Low I_b
2D21	1	0 - 1000	High firing point
6AN5	2	2000 - 3000	1 leakage; 1 broken pin
6L6	1	5000 - 6000	Low I_b
6SH7	1	2000 - 3000	Low I_b

1.23 Records of Operation (Continued)

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

<u>Component</u>	<u>No. of Failures</u>	<u>Hours of Operation</u>	<u>Reasons for Failure</u>
6X5GT	1	6000 - 7000	Short
	1	9000 - 10000	Short
6145	1	0 - 1000	Short
	3	2000 - 3000	Short

1.24 Power

D-c Power Supplies

(S. T. Coffin) (UNCLASSIFIED)

Construction has been completed on the WWI -300-v, 15-amp d-c supply. Tests will be conducted on dynamic response, prior to installation in WWI.

General

(D. M. Fisher) (UNCLASSIFIED)

Work is continuing on the simplification of the complete line diagram of WWI's power-supply-control system. After the diagram is completed, a program will be inaugurated to list, in a convenient form, the physical locations of all the associated components in the system. When this project is completed, trouble-shooting the system will be a minor task.

1.25 AN/FSQ-7

AN/FSQ-7 Schedules

(T. R. Parkins) (UNCLASSIFIED)

Pages 8 and 9 of the Manual Inputs schedule have arrived unposted from IBM; distribution will be delayed until progress can be recorded during the week of 5 July. On 28 June, I visited Mr. R. G. Mork at IBM Vestal Laboratory; progress of the display-console project was recorded and a report written for the Project High Progress Report for June.

Mr. J. W. Hunton of the High Street Laboratory has informed me that because the Central Computer frames are in release and assembly stages, only the summary schedule will be posted and sent to MIT. Release and assembly are covered in the Central Computer Summary Schedule.

1.3 Group 651.31 Activities of Group 65

(P. Youtz) (UNCLASSIFIED)

I made a trip to the west coast with members of Groups 25 and 65 and IBM to study the progress of the Charactron and Typotron tubes. We visited Convair on 21 and 22 June 1954. Convair's new tube plant is progressing satisfactorily. Special equipment necessary to fabricate prototype and production tubes has been completed. Special techniques necessary for the construction of the final tubes are being refined, and personnel are being trained in the use of these techniques. MIT recommended an electron optical system for the three prototype tubes to be delivered to IBM 15 August 1954.

The new 19-inch Charactron bulbs from Corning Glass Works will be in Barta Building on 6 July 1954. It will be necessary to get an early evaluation of the Charactron electron optics and post accelerator in these final tubes.

Larry Steinhardt, who is in charge of the tube-production facilities at Convair, will visit us the week of 12 July 1954 to study our methods of applying helical dag, phosphor settling, aluminizing, and tube processing. Progress has been made by Convair in planning a test program and in designing test equipment to evaluate and inspect the production tubes. This work will be reviewed at our next joint meeting.

We visited Hughes Aircraft on 23 and 24 June 1954. There were discussions on a number of the Typotron specifications and the Typotron electron optics. Some of these points were not resolved at the meeting but must await further testing at Hughes Aircraft and MIT. We inspected the new Hughes tube-production facilities. These facilities were to be ready for occupancy on or about 1 July 1954.

On 24 June 1954, we visited Resitron in West Los Angeles. Members of the Resitron group had processed some of the early Charactron tubes and are interested in making display tubes for AN/FSQ-7. They want to make a dark-trace tube which could be used with the Charactron optics. This could be competitive with the Typotron tube.

We spent one day at the Willys Laboratory in Berkeley, California, discussing with Ross Aiken his new flat cathode-ray tube. This tube is only 3" thick. Aiken proposed combining this tube with the Charactron optics to make a flat Charactron only 3" thick. This proposal for a large Charactron tube and the possibility of a two- or three-color Charactron tube makes this family of tubes an attractive possibility.

IBM has been submitting tube specifications and scopes of work to tube companies to develop second sources for the Z-2177, SR-1782A, and Charactron tubes. One day was spent at Poughkeepsie on that program.

1.31 Activities of Group 65 (Continued)

(P. Youtz) (UNCLASSIFIED) (Continued)

Sylvania is still facing difficulties in producing any of the tubes in the 7AK7 family. There have been intensive investigations both at MIT and at Sylvania on this problem. These investigations will continue during the next period.

1.33 Research and Development

(P. C. Tandy) (UNCLASSIFIED)

One helical-dag tube, Cht-37, and one double-band tube, Cht-41, are being life tested. The cathode image shows that 50 per cent of the area on the helical-dag tube and 25 per cent of the area on the double-band tube had poor emission after 190 hours life test at 1-ma cathode current. The grid drive needed for the 1-ma cathode current has increased 13.5 per cent with the helical-dag tube, while it has remained about the same with the double-band tube.

Another helical-dag tube, Cht-36, completed 88 hours on life test with the cathode condition about 30 per cent poor at that time. Cht-36 was taken off life to make room for the deflection-sensitivity measurements of the double-band tube. The helical-dag tube appears to have about an 8-per cent advantage over the double-band tube in deflection sensitivity.

The 10-kv supply necessary for life testing more than two tubes at a time is being constructed.

(H. B. Frost) (UNCLASSIFIED)

During the past two weeks Al Zacharias and I have been studying intensively the SR-1782A tube. Sylvania has been having a great deal of trouble in producing this tube so far. We have studied both tubes believed to be defective and tubes believed to be good. Sylvania had believed that their trouble was caused by cathode poisoning from G₂.

We analyzed a lot of five defective tubes after life test. These tubes were characterized by low plate current and high, though not abnormal, screen currents. Examination of these tubes under pulsed conditions with both normal and low heater voltages revealed that the cathodes were fairly normal, with satisfactory emission. However, two of the tubes had screen grids somewhat misaligned, and three tubes had very high work functions for G₃, hence, a high contact potential on G₃. This abnormal contact potential for G₃ apparently was the cause of the high ratio of screen current to plate current. There is a residual reduction in plate current over normal tubes; this residue has not yet been accounted for.

1.33 Research and Development (Continued)

(H. B. Frost) (UNCLASSIFIED) (Continued)

Electrical analysis of new "good" SR-1782A tubes showed that the cathodes were somewhat unstable, a situation not unusual for new tubes. Some of these tubes are now being placed on life to see if the cathodes will stabilize and at what level they stabilize (if they do).

Thesis Research

During the past two weeks I have continued some experimental work to fill gaps in data previously obtained. I have continued to prepare drawings for drafting.

As a result of meeting with my thesis committee on Friday, 2 July, my experimental work has been accepted for writeup. I expect to finish the writeup within about a month.

(L. B. Martin) (UNCLASSIFIED)

The following is a list of Typotron tubes and their hours of operation in life test:

<u>Tube No.</u>	<u>Hours</u>
265	2826.6
280	2018.7
335	1201.7
366	499.9
390	499.9
392	499.9
389	416.1

These tubes are in satisfactory condition except for No. 265 which does not store information in the center. The area of poor storage is about 0.5" in diameter; the rest of the surface is still usable.

Convergence-coil currents were measured. For the six 11600T32 coils the currents ranged from 42.2 to 46.2 milliamperes. The seventh coil with no identification carried 70.0 milliamperes.

Leakage tests have been made on No. 268, and the results are included in a report on leakage for all tubes. This report should be completed by 9 July 1954. Comparing similar leakage tests of 17 June 1954 and 1 July 1954 on No. 268, currents were of the same order of magnitude for all elements except D₂, D₃, and D₁₁. The first two had increased and the latter decreased. Chronologically, D₂ varied from 0 to 9 microamperes,

1.33 Research and Development (Continued)

(L. B. Martin) (UNCLASSIFIED) (Continued)

D_3 from 0 to 11 microamperes, and D_{11} from 10 microamperes to 0.

Major leakages between high- and low-voltage electrodes were between HHK WG and HHK FG and HHK WG and D_2 (at 3.3 kilovolts). Major leakage among high-voltage electrodes was between WHHK and WG_1 (at 1 kilovolt). Major leakage among low-voltage electrodes was distributed from FG_1 to rest of low-voltage elements. Collector to contrast at 250 volts was 2.1 microamperes. Viewing screen to contrast at 3.3 kilovolts was about 1 microampere.

Work is progressing on the life-test expansion. The test equipment required by new logic has been received.

(S. Twicken) (UNCLASSIFIED)

For some time Sylvania has been having trouble producing the SR-1782A (improved 7AK7). After several hundred hours of life, the d-c plate current is quite low. The consensus was that the cathodes were being poisoned by some gas probably being evolved from the screen grid. A rather comprehensive series of tests conducted here indicates that the cathodes themselves are in fairly good condition and that the trouble may well lie elsewhere. The contact potential of the suppressor grid was found to be about 2 volts more negative than it should be, markedly reducing plate current on the d-c test where the suppressor-grid applied voltage is zero. The effect of this increased G_3 contact potential is much less at an applied suppressor voltage of + 10³ volts (the pulse-test point and where actual circuit operation will be in XD-1) because of the curvature of the transfer characteristic of plate current vs. suppressor-grid voltage in this part of the positive region. For XD-1 operation, inability to meet the d-c test-spec limits is of no consequence if the pulse currents are up to par. Pulse currents in these tubes are somewhat low apparently because of a lower perveance, but this is easily rectified. Sylvania has been informed of our findings and has been working on this new approach to the problem. A meeting is scheduled at Emporium for 7 July to compare data and to determine whether our findings are peculiar to the small sample of tubes we had. If this shift in contact potential of the suppressor grid is the fundamental problem, the large stock of tubes now being held by Sylvania could become immediately available for XD-1.

Part of the Tube-Shop facilities have been moved to Building D in Lexington under the supervision of T. F. Clough. These facilities will service MTC and test equipment at that site.

1.33 Research and Development (Continued)

(A. Zacharias) (UNCLASSIFIED)

The last period was spent finishing the report on the multiplier 7AK7's. Also, five tubes of current production SR-1782A were obtained from Sylvania. Extensive tests were performed on these tubes with H. B. Frost. It was found that the cathodes are not the cause for the plate-current decrease with life; instead a change in G_3 contact potential seems responsible. To check certain d-c droops in cathode current at $E_H = 5.0$ volts, five K3P production SR-1782A's were put on life. These five tubes were observed to have long-time constant cathode current changes, whereas the present E4P SR-1782A's and J3P 7AK7's had relatively short-time constant changes. However, the E4P (current production) and the J3P 7AK7's had at least 300 hours of d-c continuous life on them while the K3P 1782A's had no life. To determine whether cathode aging will shorten the observed time constant, five of these tubes were put on life.

(T. F. Clough) (UNCLASSIFIED)

The commercial Vacuum-Tube Section of Group 65 moved a portion of its facilities to Lexington on 25 June 1954. This laboratory, which can be reached on Lexington extension 835, is set up and prepared to handle Division 6 tube requirements at Lexington. Barta tube requirements will be handled as they were previously at 211 Massachusetts Avenue.

On 23 June 1954, I attended the Conference on Electron Tube Research at the University of Maine for a discussion of new tubes and new tube techniques. Results were reported to P. Youtz.

SECTION II - AN/FSQ-7

2.1 Group 622.12 Magnetic-Core Memories"Worst" Patterns

(J. L. Mitchell, W. J. Canty) (UNCLASSIFIED)

In the past we have not been able to generate a true "worst" pattern for the memory; that is, the "complemented pairs -- checkerboard" pattern is not a true worst pattern. In the last week we have been able to generate a pattern which is closer to the theoretical worst output for ZERO's. The new pattern presents a signal which is about half the true worst core; in other words, we have the worst pattern on the row but not on the column. The peak value of the signal is about 1/3 the size of a ONE; however, in the neighborhood of optimum strobe time the signal is very small and does not cause the margins to differ very much from those obtained with the complemented pairs-checkerboard patterns. In the next few weeks the problem of generating a true worst pattern will be investigated further.

XD-1 Effort

(J. L. Mitchell, W. J. Canty) (UNCLASSIFIED)

The IBM memory-array tester has been moved from High Street to Plant #2 and is now back in operation. Last week time delays in the memory-gate-generator and sensing-amplifier circuits of the array tester were measured to get data for writing an inter-office memo to W. N. Papiian on "Magnetic Core Memory XD-1, Input and Output Pulse Timing."

Memory Test Setup VI

(E. A. Guditz) (UNCLASSIFIED)

Air conditioning has been added to the memory-array tester, and temperature control is now possible.

Four of seven XD-1 memory planes made at IBM have been tested. Three look good, and one was rejected because the sense winding missed a core.

2.12 Magnetic-Core Memories (Continued)

Sense-Winding Geometry

(J. Raffel) (UNCLASSIFIED)

Tests on a plane with the new sense winding, which does not zig-zag through the cores, show that this winding does not differ materially from the old type with respect to air-flux pickup. The 128 x 128 plane is being wound with the new winding.

Some interesting effects with respect to "worst" patterns have been noticed on this new winding, and the general problem of testing for such patterns is being reconsidered.

64-Position Core Switch

(G. Davidson, A. Hughes) (UNCLASSIFIED)

Construction of the 64-position switch is complete. Difficulties in the operation of the bias and set-reset current drivers are being ironed out, and drawings for construction of 12 bias drivers (by the shop) are almost complete.

A test set up for gathering preliminary data from the switch is being constructed. The complete electronic driving system for one 64-position switch as it would drive one co-ordinate of the memory will be complete by the time the bias drivers are ready.

Magnetic-Core Memory with External Selection

(S. Bradspies) (UNCLASSIFIED)

Some interesting results have been observed using various switch cores in conjunction with the MF 1326B F-394 memory core.

It has been found that if the switch core consists of three memory-type cores (three MF 1326B cores wrapped together), the apparatus fails to work. This is because the flux stored in the three small cores is not enough to switch one small core back and forth.

However, contrary to the last Biweekly Report, if the switch core is one MF 1312 F-304 (which is equivalent to about eight of the small cores, fluxwise), the memory works very well, and its operation depends very greatly upon the amount of resistance placed in the loop joining the switch and memory cores.

It has been found that if no resistance is used ($R=0$), information is not quite destroyed, but its quality deteriorates in the presence on disturbances, and furthermore, the speed of operation is low

2.12 Magnetic-Core Memories (Continued)

(S. Bradspies) (UNCLASSIFIED) (Continued)

(relatively). With $R=1$, information is not destroyed at all, although outputs are lowered; cycle time can be materially reduced. As R is increased, outputs are lowered, and results become less impressive.

2.13 Vacuum Tube Circuits

Phone-Line Demodulator

(E. B. Glover) (UNCLASSIFIED)

In the course of checking the timing output it was discovered that the modulator output was not correctly proportioned. This necessitated some circuit changes which have been made and recorded.

The last two nonstandard transformers in the circuit have been replaced with the margins staying the same. All nonstandard components have now been replaced.

It has been discovered that the instability from one timing pulse to the next may be greater than allowable. This will be checked further as soon as the equipment is set up again.

Constant Current Source

(H. J. Platt) (UNCLASSIFIED)

A constant current source using three stages of amplification has been designed and tried. As reported previously, the regulation is good for the mid-range of current. At the extremes, it becomes poorer.

Investigation shows that the nominal coil impedance, 1500 ohms, does not allow the 7AK7 to operate on a desirable path.

Video Probe

(E. Anfenger) (UNCLASSIFIED)

A successful circuit has been made with over-all attenuation of $1/25$, 10:1 attenuation in the probe and 2.5:1 attenuation in the cathode follower. The cathode follower is a triode connected 7AK7 which operates from d-c levels from -40 volts to +20 volts.

2.13 Vacuum Tube Circuits (Continued)

D-c Triggering Mod. C Flip-Flop

(E. Anfenger) (UNCLASSIFIED)

Data has been taken for various level changes and fall times for triggering a Mod. C flip-flop. The setup is with d-c triggering and pulse resetting; the flip flop is wired on etched cards as for a plugable unit.

Memory Circuits

(D. Shansky) (UNCLASSIFIED)

A trip was made to IBM (Poughkeepsie) for the purpose of discussing existing memory circuitry and proposed new circuitry. Instability in the digit-plane driver (XD-1) caused by layout was rectified.

A note outlining the proposed changes in memory for future machines has been written and will be issued shortly.

2.14 Memory Test Computer

A-Frame and Console

(J. Crane, R. Hughes) (UNCLASSIFIED)

Installations of A-frame panels and inter-digit connections between these panels are now complete. Marginal-checking lines, video cables, and d-c connections are being added at this time.

Control

(W. A. Hosier) (UNCLASSIFIED)

Substantially all of the cables internal to control have been installed and are now being checked; external cables have been nearly all measured and partly installed.

The marginal-checking system has been completely laid out on paper, and it too is now being installed.

All panels, including new ones, are in place.

Alex Vanderburgh has completed a major portion of his useful cross-index to MTC control, enabling one to ascertain quickly the logical function of a unit from its physical location.

2.114 Memory Test Computer (Continued)

(W. A. Hosier) (UNCLASSIFIED) (Continued)

The intention is to put power on control and have it checked out for CPO pulse timing by the end of the next biweekly period.

Display Scope for Camera

(L. Sutro) (UNCLASSIFIED)

A second 12 1/2-inch display scope like that new in the console will be built for use with the Fairchild camera. This scope is being selected in preference to the 16-inch display scope obtained from Whirlwind because of the greater speed possible with its electrostatic-deflection system. Estimated times to deflect a full diameter are 6 microseconds for the 12 1/2-inch scope versus 100 microseconds for the 16-inch scope.

Alternator Power Supply

(R. Jahn) (UNCLASSIFIED)

The MTC alternator has been completely wired. The motor and generator have been run and satisfactorily tested for vibration. System tests will begin in the next biweekly period.

2.2 Group 63 (Magnetic Materials)

2.21 Magnetic Cores

Curie-Point Measurements

(P. K. Baltzer) (UNCLASSIFIED)

The Curie points of Ferroxcube 170T025A402 and General Ceramics 1326B or S-1 have been measured as 227 C and 316 C respectively. This means that the large temperature sensitivity of the pulse response of the Ferroxcube ferrite cannot be explained as caused by a low Curie point.

Data Processing for Magnetic Materials

(P. K. Baltzer) (UNCLASSIFIED)

The large amount of data on magnetic materials and the filing system employed at present definitely preclude easy crosscorrelation of the data. Therefore, with consideration of the volume of future work, a system utilizing 6 1/2" x 7 1/2" punched cards has been designed.

All pertinent data for a given material, such as its composition, electrical measurements, and B-H loops, will be recorded on the two sides of a card. Important data will be coded along the edges of a card for selective sifting, thus allowing large-scale correlation of data.

Core Specifications

(J. R. Freeman, J. H. McCusker) (UNCLASSIFIED)

A meeting on 29 June with IBM engineers resulted in a tentative specification for S-1 memory-core selective testing. The current mode for individual core tests will be 740 milliamperes with 470-ma write-disturbing pulses. The cores will be selected for disturbed-ZERO and undisturbed-ONE characteristics. Five tests are to be used for lot evaluation. All specific details of these tests are not yet determined.

(J. R. Freeman, E. L. Dobbyn) (UNCLASSIFIED)

The test lots of S-1 memory cores on loan from General Ceramics were tested with the new specifications as outlined at the 29 June meeting. Results indicate the specifications are satisfactory.

2.21 Magnetic Cores (Continued)

(E. J. Stevens) (UNCLASSIFIED)

This biweekly period was consumed with moving co-ordination. Packing of equipment and logic racks has been started and will be completed on a priority basis by our scheduled date of moving, 13 July 1954.

D-C Conductivity Measurements

(N. Menyuk) (UNCLASSIFIED)

A d-c conductivity measurement was taken of a magnetite single crystal at low temperatures. A ten-fold transition of the conductivity was observed in the neighborhood of 120° Kelvin, but this is considerably below the 100-fold transition observed by Calhoun using the same crystal. In addition, the conductivity was found to be a function of voltage, indicating an apparent deviation from Ohm's law. This deviation is undoubtedly caused by the Schottky effect at the metal to semiconductor boundary. In view of these discrepancies, it is apparent that the two-probe system presently in use is unable to yield the accuracy desired. The sample-holder unit will therefore have to be redesigned for a four-probe measuring system.

D-C Hysteresigraph

(R. A. Pacl) (UNCLASSIFIED)

The d-c hysteresigraph has been completed for experimental use. Minor loops have been drawn using the X-Y recorder. Parasitic oscillation in the audio range has been temporarily suppressed. A complete circuit analysis may reveal a more satisfactory circuit arrangement.

Covalence in Spinels

(A. L. Loeb, J. B. Goodenough) (UNCLASSIFIED)

Antiferromagnetic coupling of tetrahedral- and octahedral-ion spins is clarified by the semicovalence model. Semicovalence is defined as a bond due to the coupling of a single anion electron to the net spin of a cation. When the two electrons of an oxygen p orbital both bond semicovalently with the spins of two cations on either side of the oxygen, the spins of the cations are coupled indirectly. Each of the bonding electrons couples its spin parallel to that of the cation. Since the two electrons in a p orbital have antiparallel spins, the cation spins are coupled antiparallel.

2.21 Magnetic Cores (Continued)

(A. L. Loeb, J. B. Goodenough) (UNCLASSIFIED) (Continued)

It has been observed that spinels containing square-bond forming cations need a certain minimum concentration of such ions in octahedral sites for tetragonal distortion. This concentration has been calculated to be at least 25 per cent of all octahedral sites. This explains why $MgIn_2O_4$, which is an inverse spinel, is cubic and why the distortion to tetragonality of $CuFe_2O_4$, which is a mixed spinel, occurs only for $\lambda = 0.26$.

Testing of Memory Cores

(P. A. Fergus) (UNCLASSIFIED)

Two new lots, XF756 and XF757, were received from RCA. These lots were to be duplicates of XF634, the best lot of RCA to date. B-H loop tests and pulse tests indicated, however, that these new lots were not as good as Lot XF634.

Measurement of Relaxation Frequency Λ

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

The relaxation frequency, Λ , which is a fundamental parameter in the equations of motion for a Bloch wall, has previously been measured by microwave resonance experiments. This week it was observed that with the short switching times obtainable with the millimicrosecond-rise-time equipment, the inertia of the Bloch walls is measurable.

If one assumes a plane wall and negligible eddy currents, an assumption which should be valid for ferrite picture frames, the equation of motion of the Bloch wall is

$$\ddot{z} + 4\pi\Lambda \dot{z} = 2(H - H_0)I_S/m$$

which, for $4\pi\Lambda\tau \gg 1$, has the solution $(H - H_0) = S_w/\tau^1$ where $\tau^1 = \tau - 1/4\pi\Lambda$. The correction, at high driving fields, to the extrapolated S_w measurement $(H - H_0) = S_w/\tau$ gives a direct measure of Λ . The equation of motion for cylindrical walls in a polycrystalline material has not yet been solved.

Memory-Core Pulse-Response Margins

(J. D. Childress) (UNCLASSIFIED)

An investigation has been started on the variation of maximum non-select current pulse (disturb sensitivity) vs. temperature.

2.22 Transistors

High-Speed-Carry Gate

(S. Oken) (UNCLASSIFIED)

The transistor, vacuum-tube, magnetic-core high-speed-carry gate was tested and found to have a maximum prf of about 350 kilocycles. This prf is mainly limited by the transistor gate since it sets the core up in about 1 microsecond. The vacuum-tube driver, which drives the cores in the different digits in series, switches the core in about 0.2 microsecond.

An output voltage of 30-v amplitude has been obtained across a 1000-ohm load resistor. This is the equivalent of the load which the gate must drive. An M-note on this subject is being written.

(E. U. Cohler) (UNCLASSIFIED)

Most of the past two weeks was spent in preparation for and attendance at the ACM meeting. The results will appear in a trip report.

Technitrol's representative brought us a pulse generator which provides pulses of variable duration (0.2 - 5.0 microseconds), variable gain (0 - 45 volts across 500 ohms), and variable frequency (external trigger 0 - 2 megacycles).

Diode and Transistor Storage

(N. T. Jones) (UNCLASSIFIED)

A considerable effort was made to complete all writing on the thesis on "Minority Carrier Storage in Diodes and Transistors" before going on leave. However, this wasn't accomplished, and the remaining parts will have to be completed and sent back by mail. Three chapters are also being prepared as M-notes and should be published soon.

Transistor Gates

(C. T. Kirk, Jr.) (UNCLASSIFIED)

This biweekly period was spent taking data on experimental transistor gates.

SECTION III - CENTRAL SERVICES

3.1 Material Requirements & Stock

(H. B. Morley) (UNCLASSIFIED)

Both the Material Requirements Section and the Stock Room have accomplished the move to Lexington and are set up and operating. The Material Requirements Section is located at D-213, ext. 816. The Stock Room is located at D-025, ext. 858.

In addition to supplying the needs of Division 6, the Stock Room has been getting requests from other Divisions, showing that a stock room in this location is helpful to the laboratory in general.

A complete physical inventory of components is in progress but will not interfere with regular procedures.

All Division 6 requisitions will be processed by this department, and all incoming shipments will be distributed by Division 6 Stock Room.

The work load on this department has greatly increased, partly because of the move and partly because of the unfortunate accident and illness which have reduced our clerical staff. Temporary clerical help has been obtained and is being trained.

3.2 Construction

Production Control

(F. F. Manning) (UNCLASSIFIED)

There have been 17 Construction Requisitions totaling 219 items satisfied since 18 June 1954, and there are 23 Construction Requisitions totaling 1484 items under construction by the Group 60 Electronic Shops.

For further information please call the Division 6 Production Control Office (ext. 861).

Outside Vendor

(J. V. Mazza) (UNCLASSIFIED)

There is 1 order now open with vendors totaling 20 items. Deliveries in the past biweekly period have totaled 70 items. Information on specific orders may be obtained from the writer (ext. 863).

3.5 Drafting

WWI Drawings and Change Notices

(A. M. Falcione) (UNCLASSIFIED)

The new location of the Drafting Room at Lexington will by necessity inconvenience the many engineers involved in the drafting work connected with WWI. New drawings which require engineers' signatures and WWI Change Notices which require Section Leaders' approvals and signatures necessitate that the engineers involved travel to Lexington to sign and approve drawings. I am planning to discuss the matter with E. Rich and L. Holmes in an attempt to work out a new procedure to eliminate as much travel as possible.

Division 6 Document Room

(A. M. Falcione) (UNCLASSIFIED)

The Division 6 library no longer exists but has been merged with Lincoln. However, the Document Room is operating and is located in C-129.

The present arrangement and layout of the Division 6 Document Room is inadequate for proper and efficient operation. Much has been added to the Document Room in the past several months for which no plans had been made in our present layout. I have submitted a proposal which would solve this problem and also effectively increase the efficiency of the Drafting Department of Division 6 at the same time.

Reproduction Room

(A. M. Falcione) (UNCLASSIFIED)

For those who desire to reproduce inter-office memorandums on Ditto, Division 6 has now acquired a ditto reproduction machine which will be located in the Reproduction Room and will be available on or about 6 July. For the present, arrangements have been made to reproduce ditto masters on the Division 7 ditto machine.

3.6 Administration and Personnel

New Staff

(J. C. Proctor) (UNCLASSIFIED)

Victor Ellins is working as a DDL Staff Member in Group 62. He received his BS from MIT in June of this year.

3.6 Administration and Personnel (Continued)

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

Melvin Feldstein is working as a DDL Staff Member in Group 62. Until recently he was a Teaching Fellow and Research Assistant at Harvard.

Pauline Reimers is working as a DDL Staff Member in Group 63. She received her AB in Chemistry from Mt. Holyoke in June of this year.

Daniel Lynch is working as a DDL Staff Member in Group 65. He received his BS from Northeastern in June of this year and has done co-op work with this Division.

Arthur Goddard is working as a DIC Staff Member in Group 6345.

Staff Terminations

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

Sylvio Desjardins
Christopher Laspina
Hubert Henegar
Edward Kopley
Basil Remis
Guy Young

New Non-Staff

(R. A. Osborne) (UNCLASSIFIED) (Continued)

Ruth Braid is a new messenger girl at the Barta Building.

Earl Hilar and George Perloff are two MIT students who will work part time in Group 65.

Transferred Non-Staff

(R. A. Osborne) (UNCLASSIFIED)

Jean Friberg has been transferred to the Travel Office of Division 1.

Nora McNeil has been transferred to Buildings and Power.

Mary Sexton has been transferred to the Director's Office, where she is working in the Library.

3.6 Administration and Personnel (Continued)

Terminated Non-Staff

(R. A. Osborne) (UNCLASSIFIED)

Louise Anders
Jean Garbarino
John Pierce

Open Non-Staff Requisitions

(R. A. Osborne) (UNCLASSIFIED)

1	Clerk (Punch Card Operator)	for	Group 61
1	Electrical Detailer	for	Group 60
2	Secretaries	for	Group 62
1	Secretary	for	Group 60