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Memorandum M-1563

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Digital Computer Laboratory
Massachusetts Institute of Technology
Cambridge 39, Massachusetts

SUBJECT: GROUP 61, BI-WEEKLY REPORT, July 18, 1952

CLASSIFICATION CHANGED TO:
Auth: <i>DD 254</i>
By: <i>R. R. Everett</i>
Date: <i>2-1-60</i>

1.0 GENERAL

(C. R. Wieser)

Latest word (from AFCRC) is that the MEW will remain in its present location for at least a year. (This is a reversal of a recent decision by AFCRC mentioned in our last bi-weekly.)

I wrote to ERA to assure them that the magnetic drums are urgently needed and that we are preparing for the installation so that the installation can begin immediately after delivery. ERA answered and assured us that they will expedite the drum delivery. Construction is now running on schedule at ERA.

As the number of flight tests has increased, operations in Room 224 have become progressively more difficult. The problem is not so much one of space as the problem of having in one room both operations and a large amount of equipment to maintain. Operations now take so much time that the lights cannot be left on long enough for maintenance and modification of equipment. As a result, we will move all dark-room operations into Room 222 as soon as possible. Mercer has already started the necessary work in Room 222, and it should be possible to make the transfer while the computer is shut down. In addition, the extra space in Room 222 will allow for expansion as we build up a bigger display system and begin to experiment with air defense center operations.

2.0 EQUIPMENT ENGINEERING

(E. S. Rich)

Engineering Report E-466 describing the operation of the In-Out Element has been completed and sent to the print room. This is the first of a series of E-notes which will comprise a detailed description of the new WWI terminal equipment system. J. Forgie is working on some of these reports.

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Memorandum M-1551 by F. Heart subject, INITIAL OPERATION OF WWI TERMINAL EQUIPMENT WITH THE NEW IN-OUT SYSTEM has been published. It was written for the benefit of programmers of Group 61 but should be of value to anyone concerned with the installation or use of the new IO System in September.

(J. W. Forgie)

A series of reports on the operation of WWI Input-Output equipment is being prepared. Individual reports on Display Scopes, Paper Tape Units, Magnetic Tape Units, the Auxiliary Drum, and the Buffer Drum will appear in that order. The reports will serve as detailed supplements to E-466, The Operation of the In-Out Element, by E. S. Rich. They will supply all information, including approximate timing, necessary to the programmer, as well as a detailed logical and rough physical description of the operation of the equipment. The first report, on Display Scopes, should appear within the next two weeks.

(B. Morriss)

The following drawings on the In-Out System have been prepared and are available.

- D-37320 - Block Diagram, In-Out Control, 410, WWI
- E-37318 - Block Diagram, Auxiliary Storage Drum, 1000, WWI
- C-37311 - Block Diagram, 510 Display Scopes and Control, WWI
- D-37319 - Block Diagram, 52 Magnetic Tape Units and Control, WWI
- B-37314 - Block Diagram, IOS Magnetic Tape Matrix, 420, WWI
- B-37316 - Block Diagram, IOS Paper Tape Unit Matrix, 420, WWI
- B-37317 - Block Diagram, IOS Display Matrix, 420, WWI

These drawings with

- C-50820 - Block Diagram, 403 DC In-Out Register, WWI
- D-51868 - Line Diagram, Paper Tape Recorders and Printers, WWI
- SC-51149 - Block Diagram, 530, Printers and Paper Tape Units

prepared by P. W. Stephen bring the drawings almost up to date. Revisions and additions to the drawings of the Buffer Drum and a drawing of IOS remain to be done.

CPO units have been assigned for the in-out orders and with Bob Gould a method of connecting units has been almost completed. The installation of the in-out orders will affect many of the CPO units now being used for other orders and it would be appreciated if I was notified of changes in CPO connections until all of the in-out orders are installed. As soon as completed, the plan for connections will be distributed to interested parties.

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2.0 EQUIPMENT ENGINEERING (Continued)

(J. H. Newitt)

An air conditioning specification has been written and drawings are being prepared to accompany same. It is expected that requests for formal bids will be requested of a number of air conditioning firms in the next week or two.

Considerable work has been done in regard to the scheduling of work for the new equipment. Several fundamental things have been discovered which are likely to delay progress. These are now under consideration and study, and a liaison report will be issued soon to cover the subject and to show the schedule revisions that are required.

During this period I attended several meetings relating to the planning of the installation for the new equipment.

(F. Sandy)

It is proposed to use circuit breakers instead of fuses for protection of the power circuits coming into Room 156. These breakers will have back contacts to provide the "power bay blown fuse" interlock and indication.

Aluminum has been ordered for the wireways for Room 156.

Construction Requisition #1900 has been assigned for general construction to be done in Room 156.

The wire necessary for power distribution has been ordered for Room 156.

Construction Requisition #1889 has been assigned to cover the construction of the power supply control for Room 156. The relays necessary for the power supply control have been ordered.

(H. J. Kirshner)

Completion of the re-arrangement of flight test operational equipment in Room 224 has been delayed by the accelerated flight test program of Group 61. Since it has now been decided to establish an operations center in Room 222, the delay was a fortunate one.

The equipment in Room 224 is in nearly full time operation and as a result, necessary maintenance, repair, and installation cannot be accomplished with any degree of speed. It is anticipated that this condition will exist until computer operation are suspended in August. At this time, all operational gear will be removed to Room 222.

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2.0 EQUIPMENT ENGINEERING (Continued)

(H. J. Kirshner) (Continued)

Last week's test with AAA indicated that VHF communication between Bedford and the AAA site was unsatisfactory. The next test will use local telephone service as the communications medium. Telephones will be used until adequate radio links can be provided.

Recent difficulties with power failures at Bedford, causing the loss of ground/air communications, have pointed up the long felt need for standby VHF facilities to be located here. A standby station is to be installed at the Whittemore Building during the next two weeks. Remote operation will be provided from the Barta Building.

Switching facilities and suitable amplifiers have been provided so that any data input in Room 224 may be recorded on either track of the Ampex recorder. A test point, selection panel, for use in tuning up the Rockport SDV receiver has also been installed.

In the light of the experience gained with the two-track Ampex recorder, new specifications will be written for a 14 track machine.

(A.V. Shortell, Jr.)

Installation of the video mapper and its alignment circuits has been delayed due to lack of technician time. This installation will require a switch and mixer panel (to be constructed), one Burroughs Coincidence Detector, and about twenty (20) video cables. It is hoped that this installation will be completed during the next bi-weekly period.

An error in the pin connections of the 5819 photomultiplier tube, used in the video mapping equipment, was discovered and corrected during the past week. The proper connections have shown a tremendous increase in the sensitivity of the phototube and I am now modifying the mapper circuitry so that it may be used with a Burroughs Gate Panel thus eliminating most of the electronic circuits presently used with the mapper.

(C. W. Watt)

Bids from about half the vendors quoting on the Plug-In Unit assemblies have been received. Prices vary over a wide range. A selection will be made by August 1. A number of the new prospective vendors have been visited and their facilities inspected.

Final total quantities have not been determined, although a tentative total has been set for component ordering purposes.

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3.0 BEDFORD EXPERIMENT

(D. R. Israel)

The latest and, it is hoped the final, news is that the MEW will not be moved from the Bedford site for at least a year. With this understanding, investigations are now underway to see if we can use Grenier Air Force Base as the takeoff field for some of our flight tests. The question of communication with Grenier has always been a troublesome one (see below) and it is hoped that some arrangements can be made.

The unexplained difficulties experienced in our recent flight tests have finally been traced to improper operation of part of the DRR. It appears that improper resetting of the azimuth counter was sending us azimuth information which was in error. Following the correction of this difficulty, our flight tests on Friday, July 18, were very good. We are now in the process of reviewing and studying the Magnecorder data taken in the past month. Of particular interest is the quality of the radar data on jet aircraft. It is thought that poor receiver sensitivity coupled with the difficulty mentioned above was the reason that we experienced limited success in the tracking of the jets.

During recent weeks, experiments with height-finders, beacons, and takeoff initiations have been somewhat unsatisfactory. The reasons seem to be: a) lack of calibration of the height-finder, b) unavailability of aircraft with the beacon, and c) lack of proper communication with Grenier. During the past few weeks, however, the general availability of the aircraft has been extremely good. It does appear that the flight test group could profitably secure the services of one or two aircraft carrying relatively recent AI equipment.

In connection with final phase guidance tests, measurements have been made of the length of time required for various aircraft to make definite turning rates. This data seems to indicate that a period of from eight to ten seconds following acknowledgment of our turning instructions is experienced before the pilot has banked his aircraft and commences turning. Following this ten-second period, a linear relationship exists between the length of turn and time of turn.

A visitor demonstration was given on July 11. Approximately one and one-half working days were expended in preparation for and execution of this demonstration.

(A. P. Hill)

The following is a breakdown of flight test time, from July 7 through July 18:

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3.0 BEDFORD EXPERIMENT (Continued)

(A. P. Hill)

DATE	Schedule Test	Actual Test Held	Reason for Change in Schedule
July 7	1000 - 1200 (a) Final Phase Guidance (b) Height Finder		Height Finder Inoperative
July 9	1000 - 1200 "Two on One" Interception	Two A/C Interception	A/C not available
July 10	1300 - 1500 Beacon Coverage	One hour only	A/C returned to base acct. weather
July 11	1000 - 1200 Anti-Aircraft Test	One hour calibrating Radar	Unable to conduct AAA Test — Power failure at Bedford
July 14	1000 - 1200 Height Finder	Two A/C Interception	Height Finder Inoperative
July 15	1730 - 2000 Ground Observer Test	As Scheduled	
July 16	1000 - 1200 AI Radar Tests	B-17 Calibrated Height Finder	A/C with AI Radar not available
July 17	1300 - 1500 Takeoff Initiation from Grenier	Cancelled	Due to A/C mechanical trouble
July 18	1000 - 1200 Evasive Intercepts Automatic Pilot Takeoff Initiation	Two A/C Interception	Automatic Pilot not available

Report on flight tests.

July 7. 1000 - 1200 — Final Phase Guidance
See report by C. A. Zraket.

July 9. 1000 - 1200 — Two A/C interception.

Two runs were made using a B-29 as the target, and an F-51 as the interceptor.

Run #1

The fighter came within two miles of the target — results poor due to substandard radar returns.

Run #2

Radar still substandard but by frequent re-initiation interception was completed. Final separation 1/2 mile.

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3.0 BEDFORD EXPERIMENT (Continued)

(A. P. Hill) (Continued)

- July 10. 1300 - 1400 Beacon coverage -- heavy clouds, no decent radar returns. A/C returned to base at 1400 due to weather.
- July 11. 1200 - 1300 One hour calibrating MEW then returned to base -- power failure at Bedford.
- July 14. 1000 - 1200 Two A/C interception using a B-17 as the target and an F-51 as the interceptor, ~~four~~ runs were made -- results were:
- Run #1 Failed to track either A/C
- Run #2 Unsuccessful due to arithmetic alarm suppressed, etc. restarted then inactivity alarm in reg. #103 (ex 34)
- Run #3 Failed to track
- Run #4 Best run with final separation one mile.
- July 15. 1730 - 2000 Ground Observer Test -- A B-29 flew from Newburyport up the coast of Maine, over to Concord, N.H. and back to Newburyport. Two runs were made with observer reports going to Manchester and then relayed to Barta Building.
- July 16. 1000 - 1200 Calibration Rockport (MPS #4) Rockport seemed to have no difficulty finding the target, however, the height reported was consistently lower than the true height reported by the A/C.
- July 17. 1300 - 1500 Takeoff initiation cancelled due to A/C mechanical trouble.
- July 18. 1000 - 1200 Two A/C interception. Using a B-17 as the target, and an F-51 as the interceptor six (6) runs were made.
- Run #1 A good interception with final separation 100 yards
- Run #2 Same as run one final separation 200 yards
- Run #3 Final separation 3/4 mile
- Run #4 and 5 No interception -- computer trouble
- Run #6 No interception -- radar failure

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3.0 BEDFORD EXPERIMENT (Continued)

(M. Brand)

Beacon Response

Beacon Response Program T-1083-2 written by F. Heart was run. This program has the effect of displaying a separate radial line for each of the the multiple returns from a beacon carrying aircraft. My new Beacon Response Program, T-1257-1, in conjunction with T-176-6 was run successfully. This program displays a radial line only to the centermost of the multiple returns of a Beacon — carrying aircraft. A parameter T-1257-1 parameter 1 has been written which modifies the display so that the single beacons are displayed on the "S" scope and the multiple beacons are displayed on the "F" scope.

All Bedford flight tests have been attended to familiarize myself with the running of the group's operational programs.

(J. J. Cahill, Jr.)

Approximately 10 hours were spent in the computer room during the past two weeks assisting at flight tests. About 10 hours were spent at the AAA installation at Nahant, preparing for and supervising an AAA Guidance flight test during the first week. This visit has been reported on separately.

The AAA Guidance program, converting target positions to Georef co-ordinates is now available both combined with T-1000 (Interception Display) as T-1382 and combined with T-1298 (Basic 2-A/C Track.) as par. #2. A second AAA Guidance program, displaying azimuth and range in thousand yards is also available, as T-1100, par. #2.

A modification of T-1100 to cause it to display height-finder information with respect to Rockport, giving the range in miles rather than in thousand yards, has been written, but has not been run successfully as yet. A sub-program to display this same information with T-1298 has been prepared. This will be worked into the main program after conference with P. O. Cioffi, now in the process of re-writing T-1298.

A memo will be forthcoming during the next two weeks giving the results of the preliminary study of methods of automatic target and battery evaluation. It seems that the method suggested by the University of Penn for such evaluation will receive prior consideration, being fairly simple and well suited for WWI use.

(P. O. Cioffi)

The balance of time outside of Flight Test activities was spent in working with the "ad hoc" committee including P. Bagley and B. Lone. I have been engaged primarily with the writing of a few memos on Coding Techniques and Computer Operation directed mainly for new programmers.

3.0 BEDFORD EXPERIMENT (Continued)

(C. H. Gaudette)

A large portion of the past bi-weekly period was spent investigating Sue Knapp's Sixteen Aircraft Tracking Program. One major error was discovered and corrected. We will continue the investigation to determine if the program is now error free.

C. Zraket and I have started work on a Final Phase Interception Program. A detailed flow diagram is now being written.

(S. Knapp)

One error has been discovered in the Multiple Aircraft Tracking Program. However, the correction of this error did not cause the program to operate completely satisfactorily. Work is continuing on this problem with the help of C. Gaudette.

Non-linear smoothing and wind data have been inserted into the "2 on 1" Interception Program, but due to a tape preparation error this program has not been checked out.

(C. A. Zraket)

A Final-Phase Guidance Test conducted on July 7 resulted in two successful runs. The first run attempted was inconclusive due to faulty data and computer trouble. An analysis of printed data and plots of the last two runs showed that the "offset" point was being calculated correctly. In view of this, the pertinent final-phase sub-programs have been assembled with the intention of incorporating them in a 2 a/c tracking and interception program. As soon as C. Gaudette and I find some common time, this will be done.

Study of the buffer drum system is continuing in preparation for a thesis proposal. Something tangible will have to be done along this line in the next four weeks.

Some time has been spent both in Flight Test activities and in assisting with the Indoctrination Program.

4.0 DATA SCREENING

(W. S. Attridge, Jr.)

Plans to work with two radars with overlapping coverage have been temporarily abandoned until either the Scituate or Rockport radars are calibrated properly.

Without my knowledge and due to some inadvertent action, MF-129 was destroyed before further work on this data could be done. In the future any such action to destroy any records of any sort should be made known to any parties who could be concerned with those records.

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4.0 DATA SCREENING (Continued)

(W. S. Attridge, Jr.)

As a poor substitute for MT-129 some data has been compiled from MT-145. The Monadnock region was blanked out but some clouds gave some trouble. One cloud front gave about a dozen returns in a line and these were initiated upon and carried as three separate high-velocity tracks. Originally we had thought that we could eliminate clouds by detecting their relatively low velocities, but, as we have seen with some of the data previously taken, whenever a fair amount of data appears in a line the tendency of the tracking program is to start a high-velocity track along the line. This is mainly due to the averaging process used.

(J. Ishihara)

Detailed analysis of data processed by Muldar Tracking Program #1 (T-1288) has been made, primarily to study methods of handling this phase of our work. To expedite this tedious job, a scheme using color-coded printed data and photographs of displays of processed data is being worked out.

Since we have only MEW data, time requirements, coverage, overlap, etc. estimates are unobtainable; however, methods for obtaining this information are also being studied.

Further analysis has not turned up anything contrary to that already reported.

(P. R. Bagley)

Filtered Data Recording. The filtered data recording program, T-909, and the associated display program, T-910, exhibited unexplainable troubles which were finally traced to the generation of spurious digits from the photo-electric tape reader during rd orders. The group of programs T908, T909, and T910 for building clutter tables, recording filtered data, and reading back and displaying are now fully checked out. They will be replaced shortly with a new series of programs involving a different technique of clutter rejection.

Stationary Clutter Rejection. Clutter Rejection For a Single Radar (T-1334) has been typed and is ready to be tried on the computer.

A memorandum is being written which summarizes the work to date on programmed clutter rejection.

(W. A. Clark)

Studies of the coverage in the Muldar system have been continued in an attempt to establish criteria for the evaluation of possible radar distributions. In particular, the effect of maximizing individual radar range-gates for various orderings of the sets has

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4.0 DATA SCREENING (Continued)

(W. A. Clark) (Continued)

been examined and a program will be written which will carry out this process. This will also necessitate a revision of the overlap-measurement program so that it can handle a set of annuli of differing inner radii.

Some time has also been spent in advising the indoctrination group and in reading problem-sets.

(D. Goldenberg)

Work is continuing on the problem of determining the variation of search area size with speed of target and number of misses.

A data tape for the indoctrination problem has been completed and submitted to the tape room. As was decided at a meeting with those conducting the indoctrination course, I have been sharing with W. Clark the responsibility of supervising the trainees in their work on the solutions to the set of indoctrination problems submitted by R. Walquist.

Four days of this bi-weekly period were spent on vacation.

(N. S. Potter)

The test program for the differential correction method of heading angle computation was completed. An error was discovered shortly before it was to be run on the computer, delaying its trial. It has since been corrected and will be tried very shortly.

A forward reading magnetic tape routine has been written which should be entirely finished, including tests, by the middle of the week.

A tape was made for the indoctrination program, but an error in the placing of the storage of the print program will require a new one. This too has been corrected.

5.0 TRACKING AND CONTROL

(J. Arnow)

An attempt was made to calibrate the radars at Rockport and Scituate on July 10 using an L-13. The test was unsuccessful due to a number of failures. Rockport was unable to see the aircraft due to the low ceiling and this eliminated Rockport from the proceedings. The azimuth calibration at Scituate became misaligned due to an arithmetic error on my part, and since computer time ran out before the test was completed, the radar was left in worse condition than when the test started.

5.0 TRACKING AND CONTROL (Continued)

(J. Arnow) (Continued)

Another test to check the azimuth readings on July 17 was not held due to mechanical trouble in the L-13.

A coverage test was held with Scituate on July 14 using a T-11. The results indicated that the low altitude coverage at Scituate was not down to expected altitude. Maximum range at 2000 ft. on the T-11 on this date was approximately 16 miles.

Another test held with Rockport produced relatively useless results due to a large amount of clutter that was present the date of the test (July 7).

(M. Frazier)

The new simulated data program mentioned in the past biweekly has so far shown no fundamental difficulties, although there are a few minor ones. It should start producing results in the next week.

Little work is being done on the live data programs at present, pending more data on best methods of smoothing.

(W. Lone)

The TRASACT FF (first fit) program with the non-linear smoothing parameter 2β is now operating and several data tapes of various flights have been run.

Additional data tapes have been run on the TRASACT, times and positions averaged program with good results.

A TRASACT program which chooses the radar that will be closest to the tracked aircraft for correlation has been written and awaits testing.

An attempt is being made to run all the working programs and assemble all the data therein for evaluation in August.

(A. Mathiasen)

A modification of the tracking program for Rockport which computes scan times has proved successful.

As noted in the previous bi-weekly, polysmooth methods were assigned to individual members of this group. I wrote a program which used the method of prediction for each radar, regarding them as one radar in correlation by having only a single running search circle.

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5.0 TRACKING AND CONTROL (Continued)

(B. Stahl)

The Rockport azimuth examiner (north-marker indicator) program is now working.

Work has begun on a two-radar single-aircraft tracking program making use of the lesser of the deviations of the two reported positions from the predicted position of the aircraft for each scan. Also, two of Mathiasen's programs are being modified to have constant smoothing intervals of thirteen seconds, instead of smoothing after the second radar search sector.

6.0 AIR DEFENSE CENTER OPERATIONS

(D. R. Israel)

The memo discussed in the previous bi-weekly is still in preparation; the part of it dealing with the 16 aircraft tracking program now exists in rough draft form.

A definite proposal for the reorganization of parts of Rm. 224 has been made (See Drawing SB-51895). This reorganization is now being carried out. It is expected that Rm. 224 will be used for flight test operations for only three more weeks, following which time such operations will be transferred to Rm. 222. The first phases of the work of transforming Rm. 222 into an air defense center are now underway. The room will be cleaned up and painted, windows and skylights will be blocked in, and a temporary floor will be constructed in the back part of the room which will be the operations section of the center.

The first test involving the recording of radar data on an aircraft whose track was also reported by ground observers was held on July 15. The observer reports were forwarded to us by means of the direct phone line from the Manchester Filter Center. This test was held the day after "Operation Skywatch", the 24-hour-a-day activation of the Ground Observer Corps, was put into effect. Approximately 20 reports were received during the 2-hour flight of the B-29 aircraft. The data accumulated in the test is presently being analyzed and statements of the results will be forthcoming. The cooperation of Major Hurlburt of the Manchester Filter Center is noted.

Our first AAA test was scheduled for July 11, but was delayed several hours because of visitors and finally had to be cancelled because of operational difficulties. In particular, our radio communications were very poor and a power failure at the MEW was experienced. It is now apparent that radio communications with the sites will, at best, be marginal, and we are now undertaking to establish communication with the sites over existing telephone company lines.

Consideration is being made of a general method by which overlap information from adjacent radar stations, Ground Observer Corps

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6.0 AIR DEFENSE CENTER OPERATIONS (Continued)

(D. R. Israel) (Continued)

information, and flight plan information can be introduced into the computer, and this data compared with the radar tracks. It appears that the input device which has been built for Ground Observer Corps information can be used for all three types of information.

(M. Brand)

GOC

The GOC Data Analysis Program, T-1327-8, has worked successfully. Initial tests were run with an eight-track data type. Later tests were run with a twenty-track data tape. A parameter has been written and tested which modifies this program to use live data in conjunction with the GOC input box and computer clock. With the exception of a few minor bugs this program works successfully.

I am still working on the GOC Single-Aircraft Tracking Program.

Charles Gaudette and I visited the Manchester, N. H. Filter Center to observe a combined GOC-radar test. GOC information on the test was phoned to Barta by us over the new Manchester-Barta phone link.

(C. H. Gaudette)

On July 15, a flight test was held in conjunction with the Manchester GOC Filter Center. The GOC reports received by the Filter Center on our aircraft were relayed to the Barta Building via the direct telephone line for correlation with the Magnecorder record of the test.

(F. A. Webster)

1510.

1) Forms have been drawn showing the observer posts in the central Manchester area (6 2/3 miles to the inch) according to:

- a. positions as decoded by the method of M-1542 (Gaudette)
- b. positions as represented at the Manchester Filter in "Georef" coordinates.

2) Data on the flight test of July 15, when plotted on one of the above forms, showed that Ground Observer reports were closely enough spaced for successful tracking only between Newburyport and Portsmouth (four successive posts). The test plane was apparently only detected at a few other scattered locations (notably at two posts near Portland).

3) A preliminary draft of a flow diagram designed to analyze the theoretical nature of GOC tracking is nearly finished, together

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6.0 AIR DEFENSE CENTER OPERATIONS (Continued)

(F. A. Webster) (Continued)

with the report on the statistics of the White Plains exercise of December 1.

7.0 ASSOCIATED STUDIES

(W. Linvill)

During the last two bi-weekly report periods the group has essentially completed work on establishing limits of error on interceptions. There are two significances of the results. (1) They establish an upper limit to the accuracy of such interceptions when the radar data are quantized and sampled. (2) They illustrate a very good method for assessing effects of errors in a control system. The results of this work will be described in a forthcoming report by Wells and Sittler.

In our general work two activities are being started: a survey is being made on the Mark 65 reports and two reports are being started on a design procedure of sampled-data servos using the root-locus method.

(P. R. Bagley)

Indoctrination course. Some time was spent in assisting with the Group 61 indoctrination course.

Program forms. Sample forms for serial and block programming have been prepared and presented to various members of the group for comment and suggestions.

New In-Out System. I have begun to familiarize myself with the operation of the new input-output system which will be available about September 1.

(G. Cooper)

Work is continuing on the thesis study, but there has been little progress during the past period. Plans are being made to write up a formal thesis proposal.

(J. W. Craig, Jr.)

During the past two weeks, I have been reading the report, "Gunfire Control System Mark 65".

(W. Lone)

The demands of my time in section 5.0, Tracking and Control, during the past bi-weekly period caused me to postpone consideration of the problems of the Programming Procedures Committee, and activities were confined to the routine problems of indoctrination.

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7.0 ASSOCIATED STUDIES (Continued)

(I. Mann)

A program was written which will read into the computer a paper tape conveying a list of specific addresses and corresponding constants. The program transfers the constants to the associated addresses. Addresses and constants are in octal form. It is quite short (36 registers) and no other read-in or conversion program is necessary.

(R. W. Sittler)

Preparation of a report on the analysis of quantization error effects on the interception system is in progress.

In addition, work has been started on the organization of topics on the analysis of sampled-data feedback control mechanisms contributed by W. K. Linvill and myself with a view toward their eventual publication as an R-report.

(W. I. Wells)

The past two-week period has been spent summarizing the material which has been derived throughout the last several weeks. This material is a complete mathematical analysis of an interception system. The object of the development is to give the results that could be expected from an ideal system and thus to set the limits on the performance of the interception system now in use. This material will be presented in the near future as a comprehensive report. The contributions will be made by both Robert Sittler and myself so as to present a unified picture of the entire process.

8.0 COMPUTER OPERATIONS

(J. Arnow)

Radar and Relay Link	5.00 hours	
Data Screening	7.00	
Tracking and Smoothing	15.25	
Aircraft Control	5.25	
Miscellaneous	12.00	
Total Analysis Programs		44.50 hours
Flight Tests		8.00
Visitors		2.50
Calibration		1.00
Lost due to system troubles		3.25
Lost due to tape errors		0.75
Not used		<u>11.5</u>
Total		71.25 hours

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9.0 PUBLICATIONS

(M.R. Susskind)

The following material has been received in the Library, Whittemore Building, and is available to Laboratory personnel:

LABORATORY REPORTS

1. "Decoding GOC Post Locations," C. Gaudette, M-1542, July 1, 1952, pp. 1-10. RESTRICTED
2. "Group 61, Bi-Weekly Report, July 3, 1952," M-1553, pp. 1-19. CONFIDENTIAL
3. "Revised Numerical Index for Group 61 Programs," D.R. Israel, M-1554, July 10, 1952, pp. 1-2. CONFIDENTIAL
4. "Project Lincoln Second Quarterly Progress Report," J.N. Ulman, Jr., M-1556, July 18, 1952, pp. 1-2. RESTRICTED

TECHNICAL REPORTS

1. "Analytical Determination of Miss Distances for Linear Homing Navigation Systems," R.R. Bennett, W.E. Mathews, Guided Missile Laboratories, Research and Development Laboratories, Hughes Aircraft Company, Culver City, California, March 31, 1952, Lib. No. 257/S. SECRET
2. "Demand Bibliography," Selected Listing of CADO Holdings, Subject: Electronics, Central Air Documents Office, February 12, 1952, Part II of BTI 1898, Lib. No. 1926 RESTRICTED
3. "Demand Bibliography," same as above, Part I of BTI 1898, Lib. No. 1927. CONFIDENTIAL
4. "Signal-to-Noise Improvement in the Barrier Grid Storage Tube," Rogers, Harrington, Ames, Dumanian, Air Force Cambridge Research Laboratories, September 1950, Lib. No. 1929. RESTRICTED