

6673
Memorandum M-2069

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Electronic Computer Division
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1. ANALYSIS
(W. G. Welchman)

The International Congress of Mathematicians at Harvard provided an opportunity for interesting discussions with M. V. Wilkes, Director of the Cambridge University Mathematical Lab in England, and J. Todd, head of the National Bureau of Standards, Computation Lab in Washington, D. C. Some thought has been given to our own problem of recruiting staff for an expansion of applications studies and interviewing of prospective candidates has begun. The training problem is being considered in relation to course 6.535 which is due to start on Sept. 19. Notes for this course are being prepared with an eye on their possible usefulness for internal training.

Brand Saxenian will join the project on September 18, and his early training will be supervised by J. Arnow. E. Samario has left the project for work in Building 32.

(D. R. Israel)

Meetings of the Mathematical Congress at Harvard and the conference of the Association for Computing Machinery in Washington, D. C. were attended in the past two-week period. A note describing the latter meeting is being written in conjunction with C. W. Adams.

Following the initial reading of the proofs of Summary Report 5 several weeks ago, the proofs were returned to Jackson and Moreland. The corrected versions of these proofs have been reread and were again returned to Jackson and Moreland on Friday, September 15, prior to printing.

In accordance with the discussion in the last Bi-Weekly report, the requirements of a shorter manual intervention program were reviewed with Arnow and he has proceeded to write several shorter versions.

Early Friday morning, between midnight and 3 AM, the computer was used in conjunction with the terminal equipment in Room 13B for the read-in of radar data recorded on tape. The computer program

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1. ANALYSIS - continued

(D. R. Israel) - continued

used 24 registers of test storage and displayed the data on rectangular coordinates, r vs θ . (Bob Nelson has pointed out that the accepted term for such a display is "B-scan". This term will be used in future references to this form of display.)

Initially the vertical decoder of the display scope was not operating properly, and the computer program was altered so that the azimuth and range data were separated and each was stored in a separate flip-flop register. When used with a radar test pattern on Magnecord tape, this arrangement had the effect of counting in each flip-flop register. This was sufficient for the correction of several errors in the feed-in system.

Following temporary repair of the vertical decoder the B-scan was used. Radar test pattern data and later the actual radar data were displayed. Very noticeable were errors (both random and steady) in both displays. The origin of these errors has not been definitely determined, however it is felt that they exist on the magnetic tape. The source of these errors as well as the strange operation of the display in that it apparently worked backwards and swept from right to left rather than from left to right must be investigated in the next use of the computer.

As far as the programming aspect of this use of the computer was concerned this early morning experiment was very successful. The valuable assistance of C. W. Adams aided and expedited the work. It is apparent that resumption of the use of the computer is an extremely important aid in this phase of our work in that it indicates problems that should be considered and solved at this time.

Some time in the past Bi-Weekly period has been spent in assisting W. G. Welchman for his fall course of lectures.

(R. L. Walquist)

The final draft of the single target tracking program has been completed. A flow diagram showing the logical steps of this program has also been completed and at present is in the process of being typed. Some thought has been given to the problem of multiple target tracking without exceeding the available electrostatic storage. Primary effort during the past Bi-Weekly period has been on the completion of a Thesis Proposal for designing an analog voltage to digital coder. This proposal will be issued as an M-series report shortly.

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1. ANALYSIS - continued

(J. Arnow)

In order to increase the available storage, two shorter programs for manual intervention, requiring only 18 and 20 registers, were written.

Further study was given to the problem of tracking box size and the determination of stationary targets. The work on the former is being held in abeyance until more definite information is obtained on errors in azimuth quantization.

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2. ENGINEERING

(C. R. Wieser)

The terminal equipment in Room 138 has been connected to WWI, and a magnetically recorded test pattern read into the computer. Visual examination of the WWI indicator lights shows that the data were read into the computer satisfactorily. A display program was used, but marginal operation of the vertical decoder caused a poor display. In spite of frequent errors, the plot of range vs. azimuth was recognizable as the curve called for by the test pattern.

The recorded test pattern (recorded about six weeks ago) has some errors, which were observed on the incoming data during recording. It is hoped that operation of the Bedford radar will be resumed soon so that a better pattern can be obtained for test work.

The read-in gate of the vertical decoder will be increased in amplitude, since this was found to be the cause of the faulty display.

Addition of the crystals for the of order for the two-scope display is scheduled for September 16. Following this (and modification of the vertical decoder) the system will be tested again with both scopes and the joy-stick.

The work on the final display scopes is progressing. Arrangements have been made with AFCL to have their Radar Laboratory design and build deflection yokes for our magnetic tubes. We will deal directly with Mr. Mabee and Mr. Cahalan of the Radar Laboratory and any administrative problems will be handled by Bob Rader of AFCL.

Very little information is available on the Dumont 30-inch tube, which has not yet been released for sale. However, this tube has a maximum total deflection angle of 90 degrees. This not only increases the difficulty of building deflection yokes and amplifiers, but increases distortion and deflection defocusing. At present, delivery is uncertain.

It has been decided that an available tube with a smaller deflection angle will be used. A sixteen-inch tube with about 55 degrees deflection is a good compromise. These tubes (with a P7 screen) are readily available since they are now being supplied to Raytheon.

The deflection amplifier design has been accepted as a thesis subject for R. Best, and preliminary design work has been started.

Room 224 has been assigned as a darkroom for the interim 5-inch display scopes.

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2. ENGINEERING - continued

(D. A. Buck)

An amplifier was constructed to prepare the synchronized start again pulse from the intensification gate unit to the in-out control interlock. Connections to the latter will be made via J 6-5 of SA 9.

The joy-stick was moved to the darkroom (Room 224) and four video cables to this room for the scopes were installed and designated as:

- 102 - 1 Horizontal Deflection
- 102 - 2 Vertical Deflection
- 102 - 3 QD "Z" Intensification
- 102 - 4 QF "Z" Intensification

A chassis is under construction which will amplify the read-in gate for the vertical decoder as operations on 9/15/50 indicated this to be of insufficient amplitude for reliable operation.

The scope on test control was modified for M-scope operation as follows:

1. Z - axis input routed through right half of V9 to scope grid for intensification.
2. Cathode Resistor for 6AS7 driver-mixer mounted in Z input lead within scope as line termination.
3. BMC connectors added to X, Y, Z inputs.

(L. S. Bensky)

M-2068, "Conversion of Radar Data to WWI Pulses", has been written and is being prepared for distribution.

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