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# DIGITAL COMPUTER NEWSLETTER

The purpose of this newsletter is to provide a medium for the interchange, among interested persons, of information concerning recent developments in various digital computer projects

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**OFFICE OF NAVAL RESEARCH • MATHEMATICAL SCIENCES DIVISION**

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## TABLE OF CONTENTS

1. The Aberdeen Proving Ground Computers
2. The Institute for Advanced Study Computer
3. SEAC (Formerly called NBS Interim Computer)
4. Institute for Numerical Analysis Computer (SWAC)
5. Project Whirlwind
6. MADDIDA
7. Raytheon Computers
8. The EDSAC, Cambridge University, England

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### THE ABERDEEN PROVING GROUND COMPUTERS

The ENIAC has recently been used to solve very extensive problems involving three variables. Despite the complexity and the novelty of these programs a technical operating efficiency of 80% and an over-all operating efficiency of 55% are being maintained.

The University of Illinois is now engaged in the construction of the final Williams tube memory system and the control for the arithmetic organ of the Ordvac.

### THE INSTITUTE FOR ADVANCED STUDY COMPUTER

The fabrication of the memory organ for the Institute for Advanced Study computer is completed and tests of this assembly are nearing completion. Life tests of 10 and 20 tubes were satisfactorily made and attention is now centering around similar tests for the complete 40 tube unit. The results of these tests will be reported on in the next Newsletter.

Designs have been completed for the remaining components of the arithmetic organ and the control. The construction of these units is progressing and will be reported upon in more detail in the next Newsletter.

### SEAC (Formerly called NBS Interim Computer)

On 20 June 1950, the National Bureau of Standards Eastern Automatic Computer, called SEAC, was formally dedicated as an operating and productive computer. Prior to its dedication, SEAC had solved several mathematical exercises which were tried out for the purpose of testing the machine (such as the determination of prime numbers, the computation of sine-cosine tables, and the solution of diophantine equations) and also had solved several significant problems (such as calculations of heat flow in a chemically reactive material, and an initial linear programming problem for Project SCOOP for the Office of the Air Comptroller, Department of the Air Force).

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3

At present the machine is being used both to solve scientific problems and to evaluate the effectiveness and reliability of computer components. General engineering tests are being run, and work is in progress on several scientific problems (such as the calculation of the exponential integral  $E_1(Z)$  and the Jacobi elliptic functions, and a check of the "neutron capture" theory of the relative abundance of the elements). Work is continuing on the linear programming problem for the Office of the Air Comptroller.

The machine as at present operating has punched paper tape input, typewriter output, and a 512-word acoustic memory. The magnetic input-output and electrostatic memory are nearing completion.

#### INSTITUTE FOR NUMERICAL ANALYSIS COMPUTER (SWAC)

The fabrication of all the units of the computer has been completed, and all chassis have been individually checked and operated satisfactorily. Checking and testing of the computer as a whole is being done at present; and simple routines, making use of the entire system, have been run on the machine.

The magnetic drum, constructed by the University of California at Berkeley under the direction of Professor Paul Morton, has been delivered. The design and construction of the chassis needed to integrate the drum into the computer system is now underway.

Plans have been made to dedicate this computer, now officially named the National Bureau of Standards Western Automatic Computer, in August, 1950.

#### PROJECT WHIRLWIND

The first bank of 16 electrostatic storage tubes was connected into the computer at the end of June. The rest of the computer including the arithmetic element, central control, and test storage had been in satisfactory operation for some months.

Early tests using electrostatic storage were gratifying. Problems which had previously been run with the 32 registers of test storage were repeated with electrostatic storage. Error-free operation for over an hour was obtained using some groups of the available 256 registers; others were not as reliable. Reliability will be improved during July and August. Sixteen spare storage tubes are on hand.

Recording and reading have been performed with the Eastman film units, but operation is not yet sufficiently reliable to permit permanent integration with the computer. Punched paper tape will be available in August as an interim input-output medium. Work on control of magnetic tape will start during the summer.

An expanded program of courses in Automatic Computation and Numerical Analysis will be offered by the M.I.T. Electrical Engineering Department in 1950-51. Information on prerequisites and admission to the graduate school can be found in the M.I.T. 1950-51 catalog. The fall term includes Numerical Analysis and a Seminar in Numerical Analysis by Professor Kopal, Introduction to Digital Computer Coding and Logic by Mr. Welchman, and Control Systems Employing Two-Valued Elements by Mr. A. E. Ritchie of Bell Telephone Laboratories. The spring term includes Numerical Analysis and Laboratory in Numerical Analysis by Professor Kopal, Machine Computation by Professor Caldwell, and Electronic Computation Laboratory by Mr. Verzuh.

#### MADDIDA

Northrop Aircraft, Inc. is now in the process of building a new model of the MADDIDA having the capacity of a 44 integrator differential analyzer and a 29 binary digit accuracy. The computer will be filled by use of binary keys and information read out visually in the octal number system on a standard oscilloscope. A 12-channel input for arbitrary functions and a 12-channel output are also being provided. It is expected that the total number of vacuum tubes will be less than 100. The first of these computers will be delivered in about two months and additional copies can be made in about 4 months.

## RAYTHEON COMPUTERS

Central control, memory, external memory, and hunting circuits have progressed to the stage where they will soon be undergoing system tests. Design of other major components is continuing.

Tape handling mechanisms are now in production and are scheduled for completion at a rate of approximately one per week, starting in August. Magnetic recording head production has been increased to approximately five heads per day.

## THE EDSAC, Cambridge University, England

In order to simplify the preparation of programs for the EDSAC and to reduce errors in programming, a large library of subroutines has been built up. These are incorporated into the program of a complicated problem by modifying some of the orders according to their location in the main program at the time the routines are taken into the machine.

Some of the problems of scientific interest solved were concerned with the following topics:

Tabulation of the function,

$$\frac{1}{\Gamma(x+iy)} \quad x = -.50(.01) .50$$

$$y = 0(.01) 1.00,$$

oscillation of a pendulum in a submarine (gravity survey), ray tracing in electron lens, solution of a potential equation by the Liebmann process, serial correlation, group and phase velocity of electromagnetic waves in the ionosphere, a matrix problem connected with the wave theory of a molecule, and solution of a differential equation arising in the theory of the constitution of a star.

Comments, letters to the editor,  
and additional contributions for inclusion in the Newsletter should be addressed to:

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