New "Electric Brain" Figures 12,000 Times Faster Than Humans

Its "Mercury Memory" Stores 15,360 Digits; Northrop to Use It in Designing Aircraft

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PHILADELPHIA—Imagine several million zeros and ones chasing each other over wires and in and out of vacuum tubes to solve mathematical problems 12,000 times faster than a human brain could do them.

That gives you a little idea of what goes on inside "Binac," a new automatic all-electronic calculator.

In its longest test run, Binac operated 42 consecutive hours without a single error. It worked out some tough equations and came up with the right answers.

The new computer, for instance, showed its mettle by accurately solving 'Poisson's equation,' an engineering problem, in a little more than two hours. A man running a conventional calculating machine would need many months to complete the job, according to Binac's inventors.

Binac was built to order for Northrop Aircraft, Inc., of Hawthorne, Calif. It is the brainchild of Dr. John W. Mauchly and J Presper Eckert, Jr., who several years ago came up with "Eniac," the first all-electronic computer, built at the University of Pennsylvania for the Army.

Binac is tiny compared with the 30-ton Eniac. It is about the size of a filing cabinet—five feet high, four feet deep and one foot wide. It weighs only three-quarters of a ton, though it is really two machines—each checking the other for accuracy. Its light weight permits it to be moved by plane from one plant to another whenever it is needed to calculate problems for aircraft manufacture. The new "electric brain" cost around $250,000 to build, or about half the cost of the Eniac. Its inventors, who head up the Eckert-Mauchly Computer Corp. here, believe that with increased production the cost can be lowered.

When Binac is pondering some matter of square roots, electrical impulses, representing numbers and instructions, shoot through it at a rate of 4 million per second. A "mercury memory" retains the numbers until they are ready to be used, it replaces about 17,000 vacuum tubes and can store 15,360 digits. The contraption operates on the binary rather than the usual decimal system. In the binary system only two characters are employed—zero and one—and from these any required numbers are built up.

That's how Binac gets its full and formal moniker: the Binary Automatic Computer. Of what benefit will the formidable little machine be to Northrop Aircraft? John K. Northrop, president of the company, explains:

"In designing today's advanced military aircraft and guided missiles we constantly encounter mathematical problems which cannot be solved in any reasonable period of time by humans working with pencil and paper or ordinary calculating machines. Binac will be of extraordinary value in reducing preliminary design and test time on most research and development projects.

"In the past we have carried our analysis of a given design only to a certain point, after which costly and 'often destructive physical tests were necessary. With this new computer, calculations formerly impossible or impractical can be completed rapidly with possible savings of millions of dollars in time and money."

For the past month Eckert-Mauchly has operated a training school for computer operators, attended by Northrop engineers and mathematicians who will operate the calculator. A typical computer staff consists of several operators and service engineers, one or two mathematicians and typists to prepare magnetic instruction tapes.