MATHEMATICS-ENGINEERING

# From Now On: Computers

**Electronic computers, mechanical brains, will push forward man's knowledge in the future. Their use will range from college laboratory to factory.**

By WATSON DAVIS

*Twenty-first in a series of glances forward in science.*

➤ MOST of those who have struggled with arithmetic, algebra, and geometry in school welcome the idea of machines that do mathematics.

Actually mechanical aids to computation are an everyday story so far as simple addition, subtraction, multiplication and division are concerned. Adding machines go back to 1642 and a commercial multiplying machine was built as early as 1820 in France.

"Mechanical brain" development has been a top-priority undertaking since the war. The spur to the urgent interest in high speed automatic digital computing machines has come from their need in research, particularly for devices that would make us strong in case of war.

Take the problem of an attacking supersonic rocket or airplane. Quick as a wink it must be located by radar. Following its superfast path, a computing device must be linked to the complex machines for launching and guiding a countering missile to bring it down. Only a device faster than human figuring could do this. Thousands of other problems cry for similar speedy solutions.

Private industry, as well as the federal government, is investing considerable sums of money in the giant computing machines which largely stem from the famous ENIAC machine completed in 1945. Such devices differ from the ordinary computing machines you see in offices.

They are electronic in their action, for the most part. Tubes and circuits do the arithmetic. Then they must have a memory within themselves that stores up numbers and issues them on demand. A control portion keeps track and manages the whole operation. Then, of course, there must be a way to put information and orders into the machine and get the answers out of it, usually magnetic tape or punched cards.

The machines now building are very fast. They can make an addition in ten-millionths of a second. One trouble is that the best of them have a limited memory, the inner memory of ENIAC being only 20 numbers or orders.

Proud as the scientists are of these man-made "brains" they are quick to admit that in some respects they do not come within a million times of being the equal of the human brain. Our central nervous system has individual nerve cells that turn either on or off.

These are similar to what are called "flip-flop" circuits in the computers, which represent numbers in effect by saying "yes" or "no." The human nervous system has ten thousand million such elements, while the most complicated computer so far built has only about ten thousand.

Built on the principles of present computers, the vacuum tubes of an electronic brain the equal of a human one would take the power of Niagara to light its tubes and Niagara's water flow to cool its tubes.

Always, human brains control the mechanical ones.

For the future, if the expectations of experts are fulfilled, you may find:

A. Giant computers in every college and industrial research laboratory, working on almost all the problems in science's future.

B. Improvements in the memory systems and in the reliability or "accuracy" of the machines, which do make mistakes when they blow a tube, for instance.

C. Use of new devices to replace the electronic tubes, and thus make the computers more reliable and durable. There may be used semi-conductors like the transistor, magnetic devices that do not require power, or electro-chemical elements.

D. Use of computers as a part of complex manufacturing processes that will be operated with a minimum of human labor.

Science News Letter, August 19, 1950

GENERAL SCIENCE

# Danger in Mobilization

*The following editorial reprinted from the Washington Daily News for Aug. 7 comments upon a Science Service article, "Use of Scientific Ability," that "reports a very real danger" (See SNL, July 29, p. 69 for the article.)*

➤ THE country's scientific research and applied sciences might be crippled by the present partial mobilization.

In our technological civilization, the importance of this danger can hardly be overemphasized. In fact, the problem probably is broader than the specific scientific areas discussed in the story.

An Army command naturally wants smart soldiers, because smart soldiers kill more of the enemy than dumb soldiers. This is an oversimplification, of course, of the military attitude, but it helps to accent the point; indiscriminate war use of men with comparatively rare talents could so denude a whole generation of its most intelligent members that a nation would seriously lag in the post-war peaceful competition in technological fields.

At present, manpower experts are trying to work out a stopgap program which would prevent blind drafting of specialists in science into the general Army pool.

It is a hard thing to say, and a hard thing to face, but it is certainly a misuse of manpower to send men trained in valuable special skills, men with special intelligence, into situations which could just as well be filled by men not having those qualities. A nation that romantically squanders its most intelligent and valuable members is undoubtedly handicapping itself in a race with a nation that refuses to use up its most intelligent members in such fashion.

Most men do not relish being thought ot as hiders behind special technical ability in order to avoid their share of danger. But wars are getting more and more total, civilian populations get bombed as well as armies. Dangers are everywhere, and the onus on a man in a civilian job grows more imaginary than real with each succeeding war. Dangers increase everywhere. Besides, the onus on the individual can be removed by having certain governmental powers to allocate such men to special work, in and out of the services. If a man can best serve his country in a special job for which his intelligence and training especially fit him, his country will gain in the long run by having him stay there.

The problem is pressing, and we hope that some fair and sensible plan can be devised by the National Security Resources Board, the Defense Department and the draft boards, before too much damage is done to the nation's pool of technically qualified men.

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INVENTION

## Device Picks and Shells Corn

➤ SHELLED corn, not ears of corn, are delivered by an improved harvester that cuts the stalks, husks out the ears and shells them as the machine passes up and down the rows in the field.

It is a two-row tractor-mounted corn picker. The cut stalks pass through it. Snapping action separates ears from stalks to drop into the sheller. The shelled corn passes by conveyor to a truck in the rear.

Inventor is Edward R. Gerber, Stockton, Calif. The patent number is 2,518,302. Rights have passed to the International Harvester Company, Chicago.

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