

TECHNOLOGY

Automation's Impact

All Americans are caught in a cyclone of change which is tearing the roots out of the way we have been accustomed to living—By Walter Wingo

(First in a series of five)

► THE ANCIENT ATHENIANS had the time and energy to enjoy thought, art, drama and love; they had slaves to do their dull, strenuous and tedious tasks.

Now man's old dream of devoting all his hours to the grander affairs of life—or simply lounging in leisure—is about to be fulfilled again. So say the optimists. They foresee new mechanical slaves for us all, provided by the awakening giant, automation.

On the other hand, some see automation as the smasher of dreams of the good life, the precursor of chaos.

All agree, however, that automation is a fact, and that it is bringing big changes. It is expected to influence increasingly many familiar things—the daily routine, status symbols, the family circle, educational standards, the crime rate, the Government, the position of the United States among nations.

What Is Automation?

But as for what automation is—even those deeply involved in the business have a difficult time defining it exactly.

The Ford Motor Company coined the word "automation" in 1946 to describe its engine assembly process. The following year Ford began appointing "automation engineers," whose jobs were to find ways machines could do things men had been doing—or never had been able to do.

Automation since has come to mean a trend more than a process. It sometimes is described as an unorganized movement toward assigning all conceivable tasks, human and superhuman, to machines.

Machines are designed to replace, or at least to supplement, human minds as well as human muscles. Machines are even being built to reproduce themselves. And that, it is argued, is about as far as a machine should go.

How did automation get started? Some say it is simply an extension of the "industrial revolution." Others say it started when the first Neanderthal picked up a stick and clubbed a meal for himself.

At no time during automation's history has it moved as fast and forcefully as it has in recent years.

The advents of the steam turbine, the diesel train and even the automobile were minor developments compared to the technical and social changes wrought by the debut of the electronic computer.

Automation already has changed the labor picture. Workers wonder what they must do to ride the crest of booming mechanization and avoid drowning in its onrush. President Kennedy plans to form a commission to study that problem and recom-

mend means of softening automation's calamitous impact.

Labor Secretary W. Willard Wirtz, speaking recently on automation, said the "most serious portent of the future" is that most people are ignorant of the forces that are beginning to take control of their lives.

Consider the electronic digital computer, the heart and symbol of automation. To most people it is an awesome imponderable. Yet, its principle is as simple as adding one to one. Its basic yes-no "binary language" adapts itself nicely to on and off switches in electrical circuitry.

The production of electronic trimmings for the basic computer principle has resulted in a whole new technology and industry.

In efforts to cut time, waste and payrolls, more and more manufacturers are calling upon electronic brains to keep the books, make management decisions and guide vast, giant complexes of machines.

Despite the many advantages, not everything is in automation's favor. It is, for one thing, highly expensive to abandon conventional equipment and install automated equipment. An electronic computer alone costs from \$25,000 to more than \$10 million.

No matter how expensive, no automated equipment has matched the flexibility of the human worker. The automated factory runs the risk of losing much more money

than the unautomated plant should the consumer's wants change and force an alteration in the product.

There are currently other drawbacks to automation. But history has shown that man eventually uses his flexibility to embrace the new—and that he benefits by it.

• Science News Letter, 84:278 Nov. 2, 1963

METALLURGY

Metals Shrink, Stretch As Magnetic Field Varies

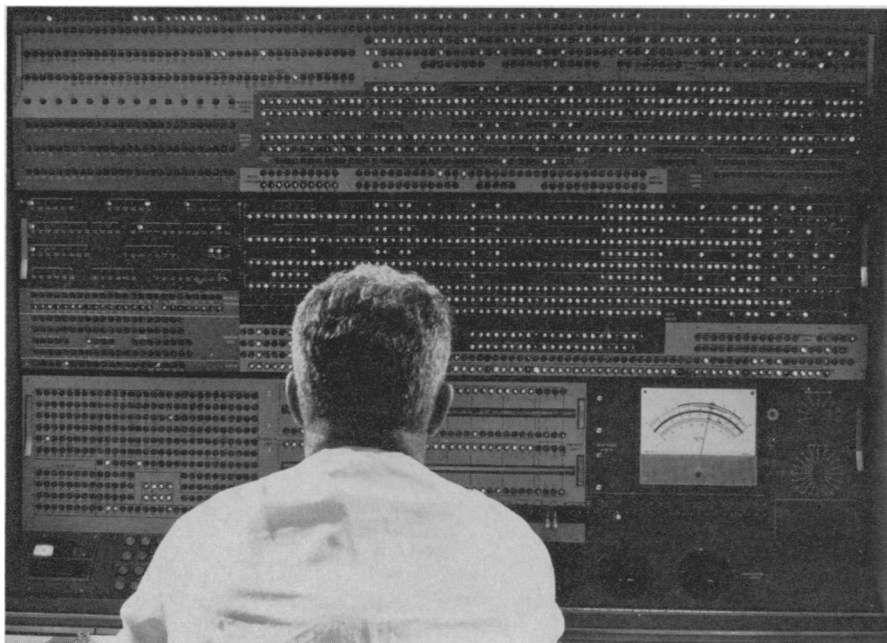
► METALS will alternately shrink and stretch at very low temperatures, as a nearby magnetic field is smoothly varied, two physicists at Western Reserve University reported in Cleveland.

This discovery aids scientists in learning how the electrons move among the atoms in metals. The result was predicted by one of the physicists, Dr. B. S. Chandrasekhar, who experimented with a single crystal of bismuth maintained at the very low temperature of liquid helium to prove his theory.

He and his colleague, Dr. Ben A. Green Jr., assistant professor of physics, measured the changes in the length of the bismuth crystal as the magnetic field, supplied by a superconducting magnet, was varied. The metal oscillated as predicted. At ordinary temperatures most metals change their length smoothly as the field is varied.

The electrons of a metal may be thought of as a gas enclosed in a box, the surface of the metal crystal being the box. As the magnetic field which it sees is smoothly varied, the pressure of the "gas" increases and decreases, expanding and contracting the "box" or metal surface. This phenomenon is known as oscillatory magnetostriction.

• Science News Letter, 84:278 Nov. 2, 1963



International Business Machines

TITAN OF TECHNOLOGY—Seated at the main maintenance console of **STRETCH**, one of the world's most powerful computers, an engineer monitors the electronic process taking place within. The system is part of the Los Alamos Scientific Laboratory in New Mexico.