Overview

You may be wondering, "When do we get to the programming?" But before you can successfully write a program, you must understand the machine you are programming. A programmer is like a coach of a team, a director of a movie, or a conductor of a symphony. A good coach knows the abilities of the team members, the movie director knows what cameras, lights, and props are available, and the conductor understands the instruments in the orchestra. In the same way, the successful programmer understands the machine being programmed.

This chapter begins with the history of computers and how they evolved into today's powerful desktop computers. Then we will take a look at the components that you see when you look at a typical microcomputer. Next, you will learn how a computer operates internally. You will see how the microprocessor is the center of all activity inside the computer and how the other parts help it do its job.

The History of Computers

People have almost always looked for tools to aid in calculations. The human hand was probably the first tool used to help people count. And although the fingers are still used as counting tools, devices have been invented to make the job easier and to keep people from taking off their shoes when counting to twenty. Calculating tools evolved from manually-operated devices, to more complex mechanical devices, to electro-mechanical devices, and finally to electronic computers.

MANUALLY-OPERATED DEVICES

The abacus, shown in Figure 1-1, may have existed as early as the third century A.D. However, the Chinese perfected it in the 12th century.

MECHANICAL DEVICES

In 1642, Blaise Pascal designed the first gear-driven counting machine. He was eighteen years old at the time. Blaise designed the machine in an attempt to make his father's work as a tax collector easier. The machine could add and subtract by using a series of interlocking wheels and gears. The wheels were marked with the numbers 0 through 9, and there was a wheel for the ones, tens, hundreds, and so on. Pascal named the machine the Pascaline, and he developed more than 50 versions of it. The principle behind the Pascaline was used in adding machines for the next 300 years.

In the early 1670's, the German mathematician Gottfried Wilhelm Leibniz invented a mechanical calculator that improved greatly on Pascal's design.
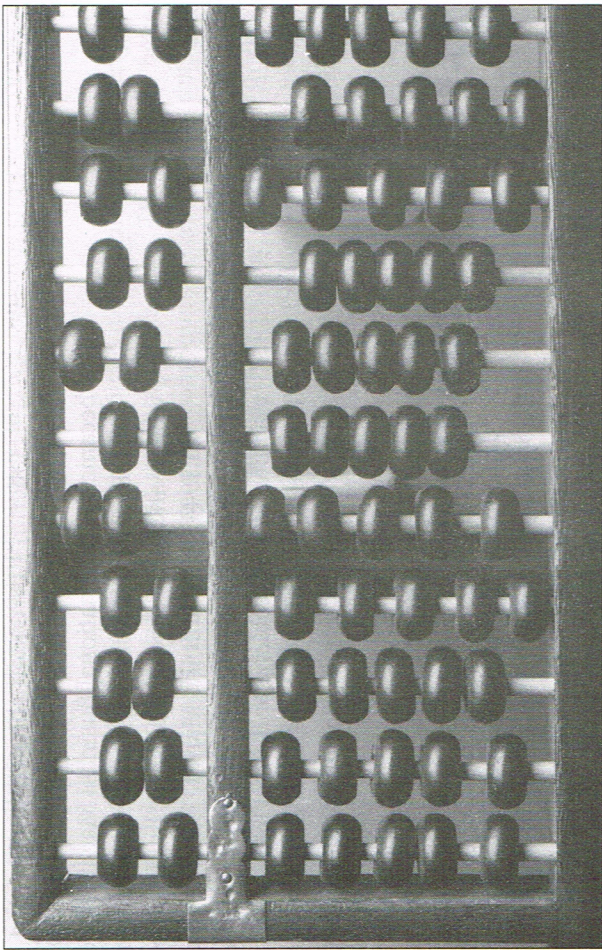
The abacus is a manually-operated device used to aid in counting. The abacus is still in use in some parts of the world.

Leibniz's calculator employed a crank on the side that simplified the repetitive operations necessary to multiply and divide.

Do These Names Sound Familiar?

The names of these inventors may be familiar. Blaise Pascal became a world-renowned mathematician and philosopher. The programming language Pascal, used today, is named in his honor. Gottfried Wilhelm Leibniz invented calculus.

In 1834, an English mathematician named Charles Babbage proposed the construction of an "Analytical Engine." Babbage's design was unique and could be characterized as the first general-purpose programmable computer.

If Babbage's Analytical Engine had been built, it would have included the use of punched cards to feed instructions to the machine. It also would have had the capability to calculate and store numbers. Punched cards and the capability to calculate and store numbers became standard features of many computers to follow.

ELECTRO-MECHANICAL DEVICES

Do you believe that necessity is the mother of invention? Well, if it had not been for a need that the United States Census Bureau had, the world of computing might have developed quite differently.

Tabulating the 1880 census took seven and a half years. The United States Census Bureau became convinced that a better way to tabulate the census had to be found. An employee of the census office in Washington D.C., named Herman Hollerith, spent the 1880's working on a machine that would tabulate census figures using punched cards. Hollerith had perfected his machine by 1890—and just in time. By 1890, the population of the U.S. had grown by 25% since 1880 to over 62 million people. Hollerith's machine performed a simple count of the population in only six weeks, and full statistical analysis in two and a half years.