computer

Encyclopædia Britannica Article

History of computing ➡ Early history ➡ Computer precursors ➡ The Jacquard loom

Calculators such as the Arithmometer remained a fascination after 1820, and their potential for commercial use was well understood. Many other mechanical devices built during the 19th century also performed repetitive functions more or less automatically, but few had any application to computing. There was one major exception: the Jacquard loom, invented in 1804–05 by a French weaver, Joseph-Marie Jacquard.

Jacquard loom, engraving, 1874
The Bettmann Archive

The Jacquard loom was a marvel of the Industrial Revolution. A textile-weaving loom, it could also be called the first practical information-processing device. The loom worked by tugging various-coloured threads into patterns by means of an array of rods. By inserting a card punched with holes, an operator could control the motion of the rods and thereby alter the pattern of the weave. Moreover, the loom was equipped with a card-reading device that slipped a new card from a prepunched deck into place every time the shuttle was thrown so that complex weaving patterns could be automated. (*See* photograph.)

What was extraordinary about the device was that it transferred the design process from a labour-intensive weaving stage to a card-punching stage. Once the cards had been punched and assembled, the design was complete, and the loom implemented the design automatically. The Jacquard loom, therefore, could be said to be programmed for different patterns by these decks of punched cards.

For those intent on mechanizing calculations, the Jacquard loom provided important lessons: the sequence of operations that a machine performs could be controlled to make the machine do something quite different; a punched card could be used as a medium for directing the machine; and, most important, a device could be directed to perform different tasks by feeding it instructions in a sort of language—i.e., making the machine programmable.

It is not too great a stretch to say that, in the Jacquard loom, programming was invented before the computer. The close relationship between the device and the program became apparent some 20 years later, with Charles Babbage's invention of the first computer.