

# Model system

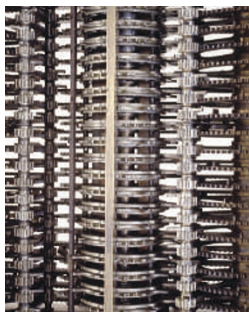
These objects, held in London's Science Museum, have some significant purpose — or curiosity value — in the history of physics. Can you guess what they are?



**GAS, LIQUID OR SOLID? THEY'RE MADE OF WOOD, BUT THEY REPRESENTED ALL THREE PHASES. ANSWER NEXT MONTH.**

This was the first fully automated calculating machine. British computing pioneer Charles Babbage had first conceived the idea of a machine to calculate and print mathematical tables in 1812. This machine, conceived by Babbage in 1834, was designed to evaluate any mathematical formula and to have even higher powers of analysis than his original difference engine of the 1820s.

The designs for the analytical engine include almost all of the essential logical features of a modern electronic digital computer. The analytical engine would have been programmed using punched cards. It had a 'store' where numbers and intermediate results could be held, and a separate 'mill' where the arithmetic processing was



**Last month:**  
Babbage's analytical engine



performed. The separation of the store (memory) and mill (central processor) is still a fundamental feature in modern computers. Babbage also planned that the machine would be able to perform several calculations at once — parallel processing.

Babbage hoped to fund his analytical engine by writing a novel, or even by creating a machine to play 'noughts and crosses' for money. Lord Byron's daughter, Ada Lovelace, was one of Babbage's strongest supporters and she understood the power of the analytical engine. A mathematician as well as a celebrity, she wrote eloquently about the engine's potential and drew comparisons on the use of punched cards to program the machine and to

control the pattern of woven fabrics in the textile industry. She wrote that "the analytical engine weaves algebraic patterns just as the Jacquard loom weaves flowers and leaves".

Only part of the machine was complete before Babbage's death in 1871. The portion shown here is the mill, with a printing mechanism. If Babbage had finished the analytical engine, it would have been over four metres tall and six metres long, and would probably have been powered by steam.

**TILLY BLYTH**

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