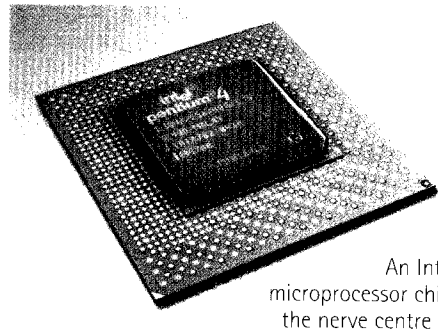
8 Processing

A The processor



An Intel microprocessor chip, the nerve centre of many PCs

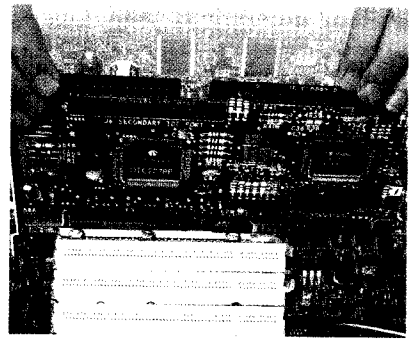
The **processor**, also called the **CPU** or central processing unit, is the brain of your computer. In PCs, it is built into a single **chip** – a small piece of silicon with a complex electrical circuit, called an integrated circuit – that executes instructions and coordinates the activities of all the other units.

Three typical parts are:

- the **control unit**, which examines instructions from memory and executes them;
- the **arithmetic and logic unit** (**ALU**), which performs arithmetic and logical operations;
- the **registers**, high-speed units of memory used to store and control data.

The speed of a processor is measured in **gigahertz** (GHz). Thus, a CPU running at 4 GHz can make about four thousand million calculations a second. An internal **clock** sends out signals at fixed intervals to measure and synchronize the flow of data.

The main circuit board is known as the **motherboard**. This contains the CPU, the memory chips, expansion slots and controllers for peripherals, connected by internal **buses**, or paths, that carry electronic signals. For example, the **front side bus** carries all data that passes from the CPU to other devices.



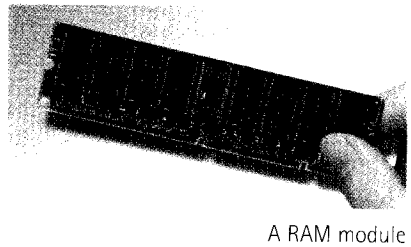
Fitting an expansion card

Expansion slots allow you to install **expansion cards** which provide extra functions, e.g. a video card or a modem. Laptops have PC cards, the size of a credit card, which add features like sound, memory and network capabilities.

B RAM and ROM

When you run a program, the CPU looks for it on the hard disk and transfers a copy into the **RAM**. **RAM** (**random access memory**) is temporary or volatile, that is, it holds data while your PC is working on it, but loses this data when the power is switched off.

However, **ROM** (**read only memory**) is permanent and contains instructions needed by the CPU; the **BIOS** (basic input/output system) uses ROM to control communication with peripherals, e.g. disk drives.

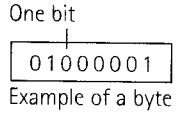


A RAM module

The amount of RAM determines the number of programs you can run simultaneously and how fast they operate. It can be **expanded** by adding extra RAM chips.

C Units of memory

The electronic circuits in computers detect the difference between two states: ON (the current passes through) or OFF (the current doesn't); they represent these states as 1 or 0. Each 1 or 0 is called a **binary digit** or **bit**.



Example of a byte

Bits are grouped into eight-digit codes that typically represent characters (letters, numbers and symbols). Eight bits together are called a **byte**. For example, 01000001 is used for the character A. Computers use a standard code called ASCII for the binary representation of characters.

In order to avoid complex calculations of bytes, we use bigger units. A **kilobyte** (KB) is 1,024 bytes; a **megabyte** (MB) is 1,024 kilobytes; a **gigabyte** (GB) is 1,024 megabytes; a **terabyte** (TB) is 1,024 gigabytes. We use these units to describe the RAM memory, the operating capacity of disks and the size of a program or document.