

would be written down using ordinary English sentences (e.g.: At this point I want signal number one to turn on the orange light whilst keeping on the red light. Then I want both the red and orange lights to go off and the green light to come on). Clearly, these sentences are not in a form any computer could understand so they need to be converted into a program. He uses a programming language such as BASIC. A language of this kind allows logically arranged thoughts (in English) to be rewritten in a way that the BASIC interpreter can understand. The BASIC interpreter is itself a program which converts the original program (written in BASIC) into the form understood by the computer's central processing unit (CPU). Software in this form is called 'machine language' or 'machine code'.

The software you actually buy to use with your computer will always be in machine language and it is stored in a form readily accessible to the computer. Sometimes the software is stored in ROM memory inside the computer. More commonly it is supplied on cassette or on floppy disk. These objects are not the software itself, simply the 'media' in which the software is supplied. To be used by the computer, the software has to be transferred from the cassette (or floppy disk or ROM) into the computer. Once these instructions have been loaded (as the process of transferring the software is called) the program can start to operate.

## Buying Software

With a couple of thousand pounds in the bank, you might possibly say to yourself "I think I'll buy a car". It's most unlikely anyone would say "I think I'll buy a machine" because the obvious question would be "What kind of machine? What's it supposed to do?"

It's the same with software. A computer by itself is inert, but the software you buy to use with the computer is capable of turning it into a home arcade game, an automated typewriter or an in-house accountant. So the first thing to decide is what you want your computer to do for you.

Start with the problem and then find the software that provides the solutions. In the search for the right piece of software, there will naturally be a refining process as you analyse your actual needs. If the starting point is how to entertain the kids on a Sunday afternoon, the next stage is to find out what kind of programs are likely to provide that entertainment. Computer games range from arcade-style slaughter of aliens to complex and challenging fantasy simulations (see page 32). If an arcade-style game is what you want the computer to provide, the next question is whether or not it's available for your machine.

Since the differences between computers are more than skin deep (each computer has its own electronics inside and requires individually written software) there is virtually no compatibility between models. A program that works on the

To make your computer work, it needs to be 'fed' with software (a set of electronic instructions). The devices pictured here are the 'media' on which those instructions can be stored. They represent the four commonest ways in which software is supplied. Each has its own special advantages. Software is tailored for each make of computer — a program written for one make will not necessarily work on another

## Handle Words



## Word Processing

With word processing software, your computer takes you one stage beyond the typewriter. Even good typists make mistakes, but with a word processor you can have perfectly printed letters every time and increased productivity too.

The computer keyboard takes the place of the keys on the typewriter, the television screen substitutes for the paper in the typewriter. The words you type appear instantly on the screen, just as they do on the paper in a typewriter. But there the similarities end, and the power of the computer takes over.

Mistakes can be corrected instantly — on the screen. Words can be retyped or made to disappear. Even whole paragraphs can be deleted. Word processors do more than just delete words, though. If your thoughts could be expressed better by rearranging sentences, you can do exactly that, right there on the screen. The words or sentences you want to move around the 'page' are temporarily deleted (the word processor program takes them off the screen and stores them inside the computer's memory). They can then be inserted exactly where you want them.

When the document has been written exactly the way you want, it can be printed using the computer printer, or it can be stored on cassette or floppy disk for later use.

## FIRMWARE

The origin of the term 'hardware' is obvious: it's the physical and electronic part of the computer — the power supply connections, keyboard, silicon chips and so on. In contrast, software takes its name from its intangible nature, since it consists simply of a set of instructions. Computer experts also talk about 'firmware'. In the early days of computing, 20 to 30 years ago, software was coded and stored on punched paper tape of the kind familiar to telex operators. Then cassettes and magnetic disks took the place of paper tape. In the 1970s a new technique for storing software in ROMs (purpose-designed) chips — see page 4) was invented. ROM chips have the software instructions built into them during the manufacturing stage. It is this combination of 'intangible' software and 'concrete' hardware that is called firmware.