computer is to translate the instructions into machine code. On home computers this is done by the interpreter which is stored permanently in the computer's ROM.

The interpreter is a sophisticated machine code program, executed directly by the microprocessor. When RUN is typed the interpreter starts examining the user's program, character by character. It looks up all the phrases it finds against its own dictionary. If it comes across a character which it doesn't understand (which may simply be because you made a typing mistake) it will stop trying to interpret the program and print a message on the screen such as SYNTAX ERROR.

If the word is in the interpreter's dictionary (e.g. PRINT) this immediately passes to the part of the interpreter which knows how to deal with that function. In this case the routine will now examine what comes after the word PRINT in the user's program and prepare this data as a stream of characters to display.

This is where the next level comes into operation. Somewhere else in the computer's memory is a routine which can accept a stream of characters, store them in another area of memory reserved for the screen, and arrange for them to be converted into the kind of signals needed by the television screen or monitor. This is something that has to be done continuously even while the program itself is purely engaged in calculation.

The same is true at the other end of the computer — the keyboard. A specially written program routine within the computer has to scan the keyboard to find out whether any keys have been pressed, and if so place the appropriate codes in another area of memory for use as the input to the user's program. And because you might want to halt the operation of the program at any time using the BREAK key, the keyboard must be scanned continuously — even while the program is running.

In fact the microprocessor found in most home computers can only do one job at a time so it effectively has to share its time between interpreting the user's program and its own

internal functions, such as checking the keyboard and controlling the screen. One method is 'interrupt-driven' where a special electronic circuit interrupts the microprocessor perhaps 50 times every second and 'reminds' it to perform its housekeeping tasks and other functions on the screen and keyboard, before resuming what it was doing.

So even when your program has been typed in, many levels of processing have to be carried out by the computer before the results are produced. Though the process may seem a complex one most of it is looked after by the computer.

Nowadays the trend is moving towards user-friendliness, with the computer doing as much of the routine work as possible. The next generation of computers will be able to write the whole program themselves from a plain English specification.

The Hidden Software
In any computer, there is a complex hidden software hierarchy continually working. Among its many tasks, it monitors and checks when and which key is being pressed, what is on the screen, what instructions are being given to the peripheral, and the status and content of the RAM memory. All these functions are continually in progress while the operator is simply concerned with the next function of his program. The principle of the hidden software hierarchy remains the same, in both sophisticated business computers (as pictured here) and in reasonably-priced home computers
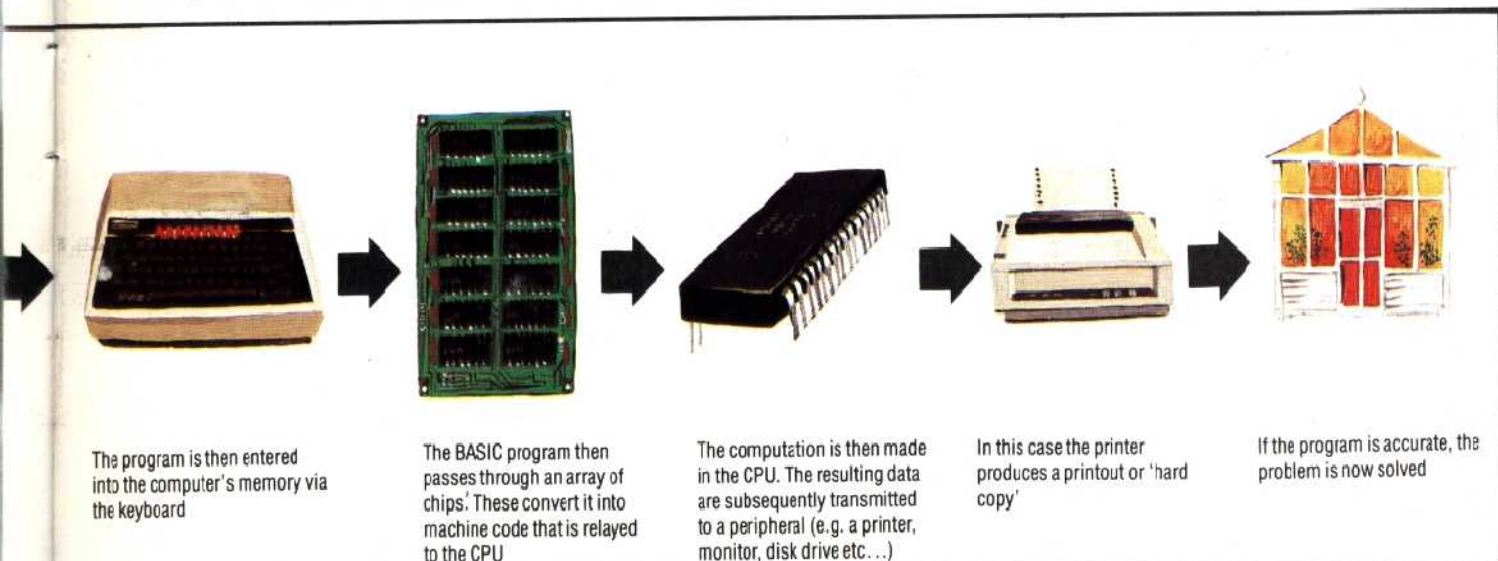
The program is then entered into the computer's memory via the keyboard

The BASIC program then passes through an array of chips: These convert it into machine code that is relayed to the CPU

The computation is then made in the CPU. The resulting data are subsequently transmitted to a peripheral (e.g. a printer, monitor, disk drive etc...)

In this case the printer produces a printout or 'hard copy'

If the program is accurate, the problem is now solved