

Appendix I

The Art of the possible

The newcomer to computing frequently starts by establishing some points of reference that will help give an impression of the computer's capabilities and limitations. This section sets out to give a broad guide as to what happens and why.

Zap the wotsit!

Even if the only reason you bought your CPC464 was to take advantage of the sophisticated computer games available to run on the 'hardware', you may still probably be wondering about several aspects of the computer that come under the heading of 'hardware'.

The hardware is what you can pick up and carry around: the main computer keyboard, the monitor, the connecting leads etc. In fact, it's about everything that isn't specifically the software - programs, manuals, and cassette based information.

Certain features of the way the computer behaves are produced by courtesy of the hardware - things like the coloured display on the TV set (or monitor) - and then it's up to the software to make use of this hardware capability to produce specifically designed characters and shapes on the screen.

The hardware actually directs the beam of electrons at the electro luminescent surface on the inside of the screen of the TV tube to make it 'light up' - the software adds order and intelligence by telling the hardware when and how to perform. It adds timing, control and sequencing to produce the effect of a spaceship taking off, or something more mundane like a letter appearing when you type at the keyboard.

Q So what makes one computer better than another ?

Hardware without software is worthless. Software without hardware is equally worthless - the value of the computer begins when the two come together to perform various tasks. There are some very basic considerations that can be used to grade performance of both hardware and software.

The generally accepted reference points for personal computers are now:

1. The screen resolution - the smallest discernible item on the display.

This is a combination of factors, including the number of different colours available to the programmer, the number of different areas that can be resolved on the display - the pixels, and the number of text characters that can be displayed on a single screen area.

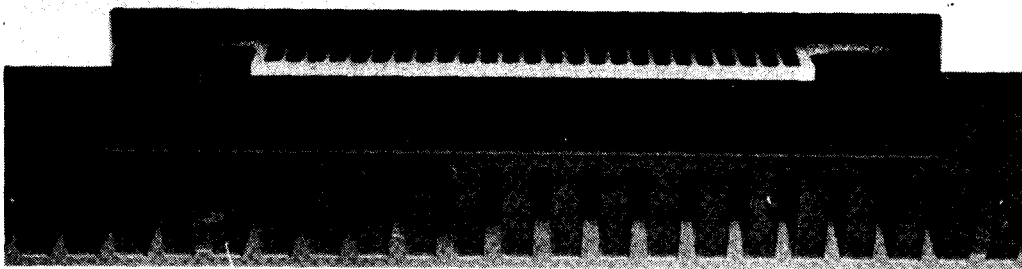
You will find that your CPC464 compares very favourably with any similarly priced machine in all these respects.

2. The BASIC interpreter

Virtually every home computer includes with it a BASIC interpreter that allows the user to start creating programs to use the hardware features. The built in programming language (BASIC) that comes supplied with your machine is itself a program - an immensely complicated and intricate program that has been evolved over a million man-years of experience since BASIC was 'invented' in the USA. The 'Beginners All-purpose Symbolic Instruction Code' is easily the most widely used computer language in the world, and like any language, it comes in a variety of local 'dialects'.

The version in the CPC464 is one of the most widely compatible dialects of BASIC, and will run many of the common BASIC programmes written for operation under the CP/M disk operating system. It is a very fast implementation of BASIC - in other words it performs its calculations quickly - and whilst you may not be too concerned that one computer may take 0.05 of a second to multiply 3 by 5, and display the answer whereas another may take 0.075 second to do the same - where a program that draws graphics patterns on the screen may call for many thousands of simple repetitive calculations, the difference between 0.05 second and 0.075 of a second adds up to a considerable difference in performance.

You will frequently hear the term 'machine code' being used. Machine code is the raw form of instruction code that can be passed to the processor. It takes less time to work out what it's been asked to, and gets on with producing the result some 5 to 15 times faster than an equivalent operation being passed along through the BASIC interpreter. But it can take 5 to 50 times longer to write an equivalent program in machine code when compared to performing the same overall task using BASIC. The BASIC in your Amstrad computer is amongst the fastest and most fully featured to be found in any home computer system, and incorporates many features that help the experienced BASIC programmer overcome some of the inherent sluggishness of a 'high level language' interpreter to perform surprisingly dynamic visual and musical effects.



3. Expandability

Most computers pay attention to the need to 'add on' additional items of hardware: printers, joysticks, disk drives. Paradoxically, some of the most successful home computers require the addition of add-on units known as 'expansion interfaces' before even a simple printer or joystick controller can be installed.

The purchaser does not always think ahead to his needs in the future, otherwise a machine that incorporates a properly supported parallel printer (Centronics compatible) and a games joystick may actually be cheaper in the long run.

The CPC464 computer features a built-in Centronics printer port, facilities for up to two joysticks, a stereo sound output - and a comprehensive expansion bus that can be used to attach disk drive controllers, additional expansion ROMs, serial (**RS232**) interfaces etc.

A ROM (Read Only Memory) is an integrated circuit memory device that contains stored program information. The BASIC that is supplied with your computer is stored in one such ROM, and it is possible for other programs to be supplied either to supplement the built-in ROM, or replace its function completely.

TV games consoles use 'cartridge' software. The cartridge is basically an ROM (Read Only Memory - a form of integrated circuit that stores program information) supplied in a neat plastic housing with a suitable form of reusable connector that allows it to be taken in and out very easily. Thus a ROM provides the same function as a cassette for supplying program information. However, it loads the information into the computer virtually instantaneously as compared to the several minutes that it takes to load a large program from cassette, and so its major advantage is one of sheer convenience.

A ROM cannot be used to store information to be taken out and stored or transported to another computer in the same way that the cassette Datacorder does.

Expansion is the means to ensure that your computer can make the most of future developments in software and peripherals. The CPC464 system has a very complete and fully documented expansion capability.

4. Sound

The sound features of a computer determine whether or not it sounds like a bluebottle in a empty cocoa tin - or if it can produce an acceptable representation of an electronic musical instrument.

The CPC464 computer uses a 3 channel 8 octave sound generator, which can produce a very acceptable musical quality, with full control of the amplitude and tone envelopes. Furthermore, the sound is divided into a stereo configuration, where one channel provides the left output and one channel provides the right output- and the third channel sits in the middle.

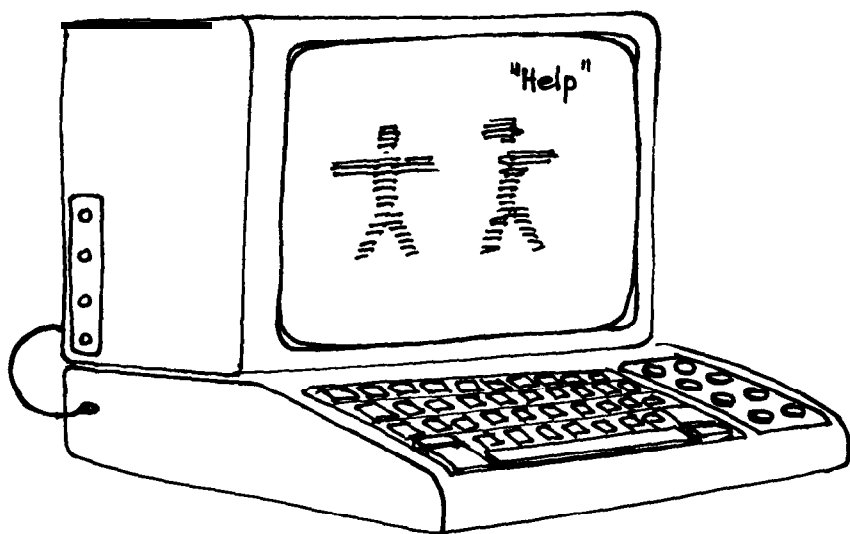
This provides considerable scope for writing programs that track the sound effects across the screen to follow the motion of an arcade-style game.

Ultimately, you will make your own mind up about which of these features is most important to you. We hope that you will try them all to make the most of your computer.

Why can't ?

With all the power of modern technology, users frequently wonder why even a machine as advanced as the CPC464 is apparently unable to display the sort the type of pictures seen on any TV set.

Q Why, for instance, can't a computer animate a picture of someone walking across the screen in a natural fashion - why do all computers represent movement with 'matchstick' figures ?



The answer is simple yet complex. The simple answer is that you must not be beguiled into believing that the screen of your computer has anything of the subtlety of the screen of a TV set. A television set operates using linear information that can describe a virtually infinite range of resolution between the extremes of light and dark across all the colours of the spectrum. This process means that in computer terms, the display 'memory' of a full TV picture is some 20 times more than the converted equivalent of a home computer video display.

That's only part of the problem, since to animate this picture requires that this enormous amount of memory must be processed at high speed (around 50 times each second). It can be done - but only by machines that cost a few thousand times more than a home computer at least, for the time being!

Until the cost of high speed memory falls dramatically (it will eventually), small computers have to make do with a relatively small amount of memory available to control the screen display - which results in lower resolution, and jerkier movements. Thoughtful hardware design and good programming can go a long way to making the best of this situation, but we are still a way from cheap computers that can reproduce flowing motion and lifelike pictures in the **same way** that even a moderate animated cartoon can produce.

Q Why can't you simply walk up to the computer and type a page of simple text into the machine ?

Don't be misled by the fact that the computer looks like a typewriter with an electronic display. The screen is not a piece of electronic paper - it's a command console - jargon which means that it simply provides you with the means of communicating with the programming language (and the programs) in the machine memory.

Until you tell it to the contrary, the computer will try and interpret all the characters that you type at the keyboard as being program instructions. When you press the [ENTER] key, the computer will look through what has been typed and if it doesn't make sense to the built in BASIC, it will reject the input with the comment:

Syntax error

However, it may just happen that the program presently residing in your computer is a Word Processor system, in which case you will be able to type random words, press [ENTER] and carry on typing as if the system were operating an electronic piece of paper in an electronic typewriter.

But to do this, you must first have loaded a wordprocessor program into the machine's memory using the datacassette input.

A computer 'seems' to combine several items of equipment that have become familiar around the home and office - the TV-like screen, the keyboard, the cassette recorder - you must remember that the similarities are generally strictly superficial, and that the computer is a combination of familiar looking hardware that has an entirely different personality of its own.

