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Computers in psychiatry

An introductory course

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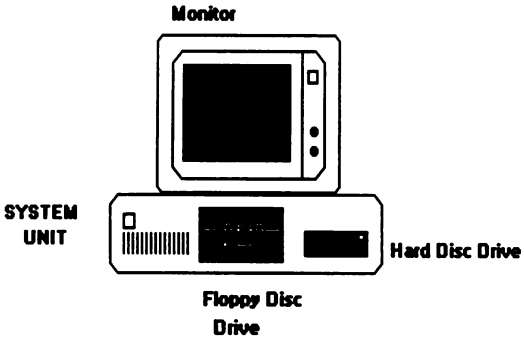
This series of articles is based on a course of five seminars which formed part of the Postgraduate Teaching Programme at the Crichton Royal Hospital. It aims to provide an introduction to computer terminology and to the most commonly used software applications for those with little or no previous knowledge of computers. The emphasis throughout is on what the personal computer can do rather than how to use specific applications. The articles refer mainly to the more common 'IBM-Compatible' computers.

1. Hardware



The monitor

The screen which sits on the top of the box known as the **system unit** is called **the monitor**. Like a TV screen, this produces images composed of large numbers of small dots (pixels). There are several different types of monitor with different resolutions and producing images of different quality.

SVGA/VGA – (Video Graphics Adaptor). The highest and fastest resolution and the sharpest images, some capable of near-photographic quality sharpness. Now the industry-standard, and supported by most software, in fact required by some. Monochrome or colour.

EGA – (Enhanced Graphics Adaptor). Somewhat grainy image with a slower screen refresh time than VGA, but cheaper and can cope with most software. Monochrome or colour.

CGA – (Colour Graphics Adaptor). Another early and very low resolution monitor, still survives in LCD form on some low budget laptops.

Hercules – Text-only monitor which cannot display true graphics. Some software gets round this by using patterns instead of colours/shades. Still widely available for those who are only going to do word-processing or those on an extremely tight budget.

The keyboard

Another piece of 'peripheral' equipment, necessary for entering text and giving commands. Looks like a standard qwerty typewriter keyboard, but with the addition of 'function' keys and a numeric keypad. The two main types are:

(a) Standard IBM
(b) AT style – introduced with the 286 machines and now the industry standard. Like the standard IBM but has more keys with 'special' functions, making it easier to use.

The mouse

A small hand-held device with button(s) on the upper surface. The underside has a cavity into which a small rubber ball is fitted. As the mouse is moved around the desk surface, the ball is rotated causing changes in the position of a small arrow (cursor) on the monitor screen. By pressing the button on the mouse when the cursor is over certain areas of the screen display, commands can be given.

The printer

Another way of seeing the results of your efforts other than having them displayed on a screen is to obtain 'hard-copy' on a printer. The printer connects to the system unit via a cable, and receives both the content of your file plus 'formatting' instructions from your software. It is necessary, therefore, to ensure that your software 'supports' your printer (i.e. knows what your printer is capable of, and in what language to send the instructions). There are several different types.

Daisy-wheel. Like a daisy-wheel typewriter, except that the wheel is sent instructions from the software rather than the keyboard. Noisy and slow, and incapable of producing even the most simple of graphics, but produces good quality text print.

Dot matrix. Produce text and graphics by making large numbers of small dots on the page through an inked ribbon with small pins. Two types; 9 pin and 24 pin. The 24 pin have higher resolution but both are capable of 'draft' printing (where the dots are visible) or 'NLQ' (Near Letter Quality) where at least two sets of dots are merged and less obvious. Cheap and very popular, but there is a trade-off between speed and end result quality, since NLQ printing is much slower than draft.

Ink-jet/bubble-jet. Also produce text and graphics comprised of large numbers of small dots but the dots are produced with a fine spray of ink on to the paper. Much higher quality ouput than dot matrix printers, and much quieter. Limited paper capacity, not very fast, and expensive to run.

Laser. The laser printer is similar in operation to a high quality photocopier, except that instead of scanning a sheet of paper it receives instructions from the software and uses them to build up a picture in its integral memory of what the entire printed sheet will look like.

It is virtually silent, very fast (up to 15 ppm), can have a huge paper capacity and most importantly produces printed output of high clarity. The main disadvantage is the cost of the purchase.

The system unit

The plastic or metal box upon which the monitor sits is known as the **system unit**. This houses the main circuit board (motherboard), mounted on which is the central processing unit (or **CPU**) and the memory (**RAM**) chips. The system unit also houses the mains power supply unit and usually one or more **floppy disk drives** plus a **hard disk**. The system unit has a number of sockets each attached to its own circuit board for interfacing with peripheral devices such as printer, keyboard and monitor.

Memory

Memory in computer terms is measured in **bytes**. (Each byte actually comprises 8 bits, which are on/off switches, the combination of which can represent a letter, number or simple command). The normal units of memory are **kilobytes** (K) e.g 640 K; or **megabytes** (Mb) e.g. 30 Mb.

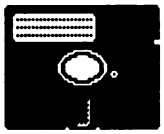
One kilobyte equals approximately 1000 bytes (actually 1024).

One megabyte equals approximately 1000 K.

These days it is not unusual to hear references to **gigabytes.**

RAM – (Random Access Memory). RAM is where the computer does its work, the computer equivalent to the mind. RAM is very fast, since it involves only the transfer of electric current around the CPU and memory chips. The more RAM the computer has, therefore, the faster it will be able to work since it will have to spend less time swapping data to and from the **disk drives**. When you switch the computer off, everything in RAM, (all your hard work), disappears as soon as the current is turned off *unless* you have stored it on disk first.

Storage memory. This comes in many forms but essentially provides a way of storing both your software programs and your work while the computer is switched off. Ticker tape with holes in it was the earliest form of this type of memory, but now data is stored on disks of **magnetic media**. The portable **floppy disks** come in two sizes: $5\frac{1}{4}''$ (as high as 1.2 Mb capacity) or $3\frac{1}{2}''$ (as high as 1.44 Mb capacity). The bigger the disk capacity the better, as a rule. The $3\frac{1}{2}''$ disks are also more reliable.



The system unit will contain **disk drives** for reading/writing to these disks. The system unit may also contain a large internal disk drive with a fixed capacity disk called the **hard disk**. Hard disks are not only much faster than floppy disk drives, but they also have much larger capacities, typically 30 to 100 Mb. (As programs increase in size, hard disks with capacities of 500 Mb to 1 Gb are appearing.) The hard disk therefore will normally hold all your program software, (most of which these days is too large to be run from floppy disks), and when you run an application, the program is transferred from the hard disk into RAM ready to do work.

ROM – (Read Only Memory). Pure storage memory with no facility for writing data to the disk. Compact disk drives (CD-ROM) are an example, holding massive amounts of data, e.g. world atlas, encyclopaedia, index medicus, but for consultation only.

Extended/Expanded Memory. RAM memory above the IBM 640 K limit, which needs special software to make use of it. Much modern software can make use of additional memory.

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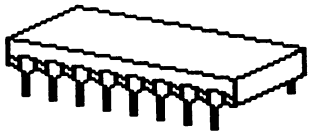
The Central Processing Unit (CPU)



This is the silicon microchip at the heart of the computer and is where all the calculating, processing and directing of information involved in the work you are doing in RAM takes place. There are several types, differing not only in speed, but also in the amount of RAM they can address and the complexity and number of tasks they can carry out at any one time.

8086/8088 – the original IBM XT chip. Not seen around much in new machines these days. Only capable of addressing 640 K of RAM, since in 1982 RAM was very expensive. Also (by modern standards) tediously slow, i.e 4–8 MHz. You need something better than this for anything other than the most basic programs now.

286 – Faster in operation than its predecessor (8–12 MHz), but more importantly able to perform more complex operations (16 bit processing) and able to address up to 8 Mb of RAM. Now the minimum required to run modern software.

386 – Extremely fast (25–33 MHz), able to address more than 48 Mb of RAM, and capable of extremely complex operation (32 bit processing). More and more software now being written to take advantage of the 386 chip's bit capability. Still expensive.

386SX – scaled down version of the 386 chip, capable of running 32 bit software written for the 386 chip, but not as fast (16–20 MHz). A lot cheaper than the full 386 chip, therefore extremely popular and has now become the standard.

486 – the latest and most advanced processor. Basically an extremely fast 386-like processor (50 MHz) together with a **maths co-processor** and a **cache** (for extra speed) all on the same chip. Highly expensive but phenomenally powerful.

486SX – very new. Scaled down version of the 486 without the maths co-processor but still a lot faster than the 386SX and a lot cheaper than the 486 and 386. Could become the new standard very quickly.

Maths Co-processors – each of the above CPUs has an optional equivalent additional chip which can be added to the motherboard to handle and speed up mathematical funtions, especially those involving floating decimal points. Examples include the 8087, 287, 387, 387SX and 487SX. (The 486 has its own maths co-processor built in).

The Disk Operating System (DOS)

The **operating system** of a personal computer is **software** but is as essential to its function as any of the hardware components. Basically the operating system facilitates interaction between you (or your application software) and your computer, enabling you to give commands which the computer can understand, and allowing the computer to present its information to you. It is the operating system that coordinates the operation of the various peripherals, e.g. monitor, disk drives, keyboard, and the CPU. The software you run on the computer, e.g. word processing, database, and spreadsheet, also needs the operating system in order to communicate with and use the CPU, disk drives and so on. The most commonly used operating system with IBM compatible machines is **MS-DOS**. When you switch on a computer, after it runs through the procedure called 'booting-up', the C:> prompt you see in the top left of the screen is actually the DOS, waiting for your commands.

And here is your first problem: if you do not know how to give DOS commands then you cannot proceed from this point without learning some. More than a few people find this a bit tedious. So, various programs have been written which load themselves at start-up and present you with a simple menu of commands from which you select what you want to do. The programme then issues the relevant DOS command without you having to know it. The most recent and sophisticated of these is Windows™ which allows you to use more intuitive mouse-driven commands like pointing at a picture of the programme you want to run and then clicking the mouse button. Windows also provide an **environment** within which you can run software specifically written to take advantage of its **graphical user interface**.

Apple-Macintosh machines use a mouse-driven, GUI based operating system directly, and have always been regarded as easier to use.

Laptops

Laptops (or **notebooks**, which are even smaller) are personal computers which are small enough to be portable.

They can also run (for a short time) on rechargeable batteries. Their main disadvantage is the screen which is usually a small monochrome LCD display. Also, they have limited expandability due to their small size, so there is little scope for adding things like extra memory cheaply.

So what should I buy

To take advantage of the recent, easier to use software, most sources recommend these minimum specifications:
386SX processor
VGA monitor, preferably colour
2–4 Mb RAM
40–100 Mb hard disk
3.5" 1.44 Mb floppy drive
Mouse

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