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DIGITAL PLOTTERS

Plotters used by home computer owners are, almost invariably, digital in design. They are connected to the micro via the printer interface and are used to interpret bytes of data in such a way as to produce (x,y) co-ordinates, and in some cases different colours, as printed output. Earlier plotting devices were analogue in nature, and these were widely used in scientific applications. For example, an analogue plotter would be used to show how the temperature of a furnace varied over a given period of time.

DIGITISE

To *digitise* is to convert analogue information into its digital equivalent. One application is the digitising of speech: the output of a microphone is fed into an analogue-to-digital converter, and the resulting bytes of data are stored on disk. By reversing the process, the computer can reproduce speech in a far more intelligible form than a speech synthesiser can. However, in such applications, the term 'sampling' is more common than 'digitising', because the signal is being sampled and measured at regular intervals. It can be proven mathematically that to reproduce a signal accurately it must be sampled at least twice as often as the highest frequency in the signal. Thus, if we assume that speech entails frequencies from 300Hz (hertz—cycles per second) to 3,400Hz, the signal must be sampled 6,800 times per second.

DIGITISER

Many applications for computers, notably in the fields of engineering, surveying and design, require that a visual image on paper be transferred to the computer. The device needed for this is a *digitiser*. The most advanced units are essentially television cameras coupled to very fast A-D converters (see page 28), but, more commonly, the image has to be traced over by hand, using a special stylus.

The means by which the digitiser detects the position of the stylus, and thereby creates the digital values to represent the image, varies considerably. Some units employ a mesh of wires embedded in the base plate of the unit. In this system, the stylus traced over the image picks up the magnetic field from the wires. Ultrasonic systems exist, too, in which two sound detectors measure the distance from the pen, and calculate its absolute position.

DIL

To reduce manufacturing costs, most integrated circuits (chips) are soldered directly onto the printed circuit board. They are inserted into the holes on the board using automatic insertion machines, and then the whole assembly is dipped into a bath of molten solder.

On older microcomputers, the chips weren't soldered to the board but were inserted into *DIL* (Dual In-Line) sockets that were soldered onto the board. The DIL name simply comes from the two
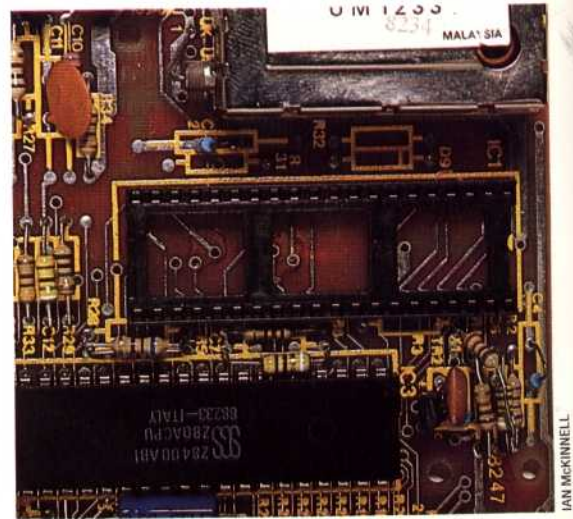
The photograph above is a printed circuit board from a home computer showing a DIL socket

lines of pins that characterise integrated circuits.

Despite the increased manufacturing costs, the advantage of using DIL sockets is that the replacement of faulty chips doesn't entail any soldering. However, RAM chips are now far more reliable than they were 10 years ago — and, faced with a fault, many manufacturers now find it cheaper to replace the whole board than to de-solder an individual chip.

Some home computers feature empty DIL sockets on their printed circuit boards. These are particularly useful, as they allow additional ROMs (for a disk operating system or graphics utility language, for example) to be fitted by the user.

DIMENSION

The number of *dimensions* in a system is the number of parameters that must be supplied to specify a unique point in that system. We are used to three-dimensional spatial systems, where co-ordinates on three axes define a point in space.

In computing, the concept of dimensions becomes relevant when we deal with array variables. The array A(5,6) is two-dimensional, because two quantities have to be given to access any particular variable element. Note that the size of the array is something quite different: in this case it is 30 (5 × 6) elements. Some BASICS will allow only one or two-dimensional arrays.

DIRECT ACCESS

This is really a better term for random access — particularly when referring to disk files. *Direct access* means that any item within a file can be accessed immediately, without the need to work through a lot of other items — as is the case with a sequential access file. If a file is composed of records — as in a database, for example — this means that the disk operating system must keep a constantly updated set of pointers to indicate where each record starts within a file. When a particular record is requested from disk, the DOS looks up its position from this table, and then moves the head directly to the appropriate track and sector.