D

DISASSEMBLER

A *disassembler* is a software program for converting machine code back into Assembly language. It will change a byte value into the three-letter mnemonic for the particular op-code that it represents (LDA, JMP, etc.), and, from the addressing mode specified by that particular byte, it will decide what operand is represented by the next one or two bytes, and print it in suitable form alongside the op-code.

Disassemblers are very useful when examining or modifying machine code written by other people. However, it is very important to realise that a disassembler cannot turn a piece of object code back into its original source code — i.e. with all the labels and symbols — because no record of these exists in the object code.

DMA

Direct memory access is a hardware technique that allows more than one device to share a common area of memory. Specifically, it allows a microprocessor to allocate an area of memory for this purpose so that another device can read the contents of that area without interrupting the operation of the micro. One application for this in microcomputing is graphics programming. If the video controller chip can read the contents of the screen RAM directly, instead of requiring each byte to be fed to it from the CPU, operation will be much more efficient.

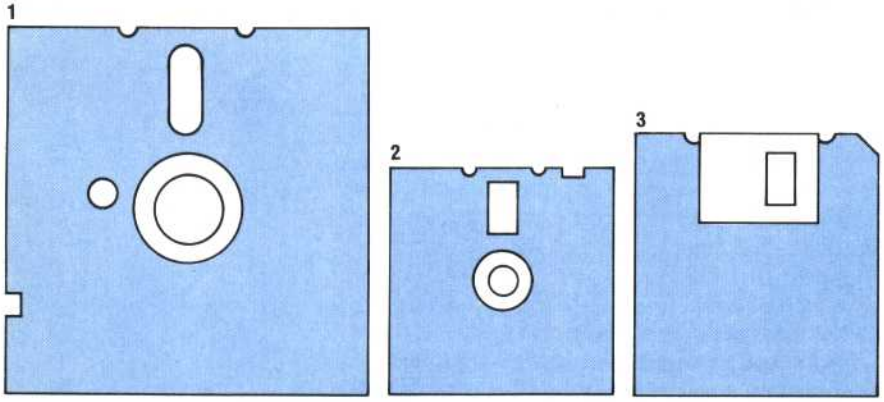
DMA works because the external device reads the memory in a different phase of the clock cycle from the CPU. The processor is thus completely 'unaware' that any other device is linked to the same area of RAM.

DOUBLE DENSITY

The capacity of a disk unit is determined by its recording density — that is to say, whether it records on one side of the disk or both. In the early days of microcomputing, there were two standard disk capacities: single density and *double density* — the latter featuring twice as many tracks on the same size disks. Double density disks required far more accurate control of the disk drive's read/write head, and initially were more expensive and less reliable.

However, disk technology has advanced a great deal in the last few years, and these original standards have less and less significance. A 5¼in disk can now store anything from 90 Kbytes to one Megabyte, and the new 3½in drives, which can hold anything up to 700 Kbytes, are rapidly taking over the market.

Information Transfer
Double density refers to a method of transferring information onto the surface of disks, and is the same principle for all sizes of disk. We show double density disks in the following sizes: 1) 5¼in mini-floppy; 2) 3in microfloppy; 3) 3½in microfloppy



DOUBLE PRECISION

Real numeric variables, the ones most commonly used in BASIC, generally store the equivalent of eight or nine decimal places ('equivalent' because the values are stored internally as binary, not decimal, numbers). These are called 'single precision variables'. *Double precision* variables store twice as many digits, and therefore are far more accurate.

Most programming languages for mainframe computers (particularly FORTRAN and ALGOL) give the programmer the option of using either single or double precision on each variable. Some BASICS now have this facility; using a symbol like # or ! after the variable name indicates double precision values, just as $ distinguishes string variables from numeric ones.

There are very few applications that require answers to be given to eight decimal places (the exceptions are fields like astronomy and codebreaking), so why the need for 16? The reason is that for every arithmetic function performed (addition, subtraction, etc.), there will be some loss of precision, because the least significant digit will be rounded up or down from the true result. In 'number crunching' applications, like engineering, statistics and weather forecasting, programmers must use considerable skill to prevent these errors from accumulating (thereby producing answers with little reliability). Double precision doesn't eliminate the problem, but it does help.

DOWNLOAD

Telesoftware is the name given to programs that can be transmitted from a central source to individual users. *Downloading* refers to the process of receiving the transmission and storing it in RAM or on disk. Originally, downloading was used to mean transferring a file from a central mainframe computer to a local intelligent terminal or minicomputer. Nowadays, you can download to a home computer over the telephone (the Prestel directory contains a large number of programs that can be purchased in this manner) or even over the airwaves — both television and radio networks have successfully transmitted programs on standard audio channels.

Downloading may radically alter the way that software is purchased in the future. Now that games programs rise and fall in popularity in weeks rather than months, holding large and expensive stocks is becoming a real problem for retailers. One idea under trial is the re-programmable cartridge, which the user can take back to the shop, where the program will be changed for a small fee. A special terminal downloads the program from a central source onto the cartridge, and then adds one to the 'popularity score' of that program.

LIZ DIXON