forward/rewind to a point just before the desired file, or a search by the computer for the file name from the beginning of the tape. Sequential storage also means that it is impossible to store data efficiently that needs to be read in small sections from any point in a file without processing the whole file. The type of storage that can achieve this is known as 'random access' and is necessary for any effective database filing system such as address listings or stock control entries.

3. The above, in conjunction with the small number of bits that are stored/retrieved per second using cassette storage — typically between 300 and 1,200 bits — means that a cassette tape system is excruciatingly slow in operation. Quite small programs of, say, five Kbytes could take between one and three minutes to load or save. This also means that it is inconvenient to make back-up copies of programs, although this is highly recommended.

4. Even when it has been recorded correctly in the first instance, data can be corrupted after an unpredictable number of replays, owing to wear by the tape head.

5. Because the characteristics of cassette players can vary from manufacturer to manufacturer, data recorded on one model may not play back on another. In addition, cassette tape is frequently damaged by the crude tape transport systems of many portable cassette units and breaks easily.

FLOPPY DISK

Compared with the cassette and cartridge storage systems, disk storage has few major drawbacks. Floppy disk drives are complex and delicate in their construction, and expensive — from £150 upwards. Floppy disks themselves are also costly at between £2.50 and £4 each. But the user gains a reliable, flexible and fast means of storing large amounts of data, operating at 50 to 200 times the speed of tape storage and retrieval.
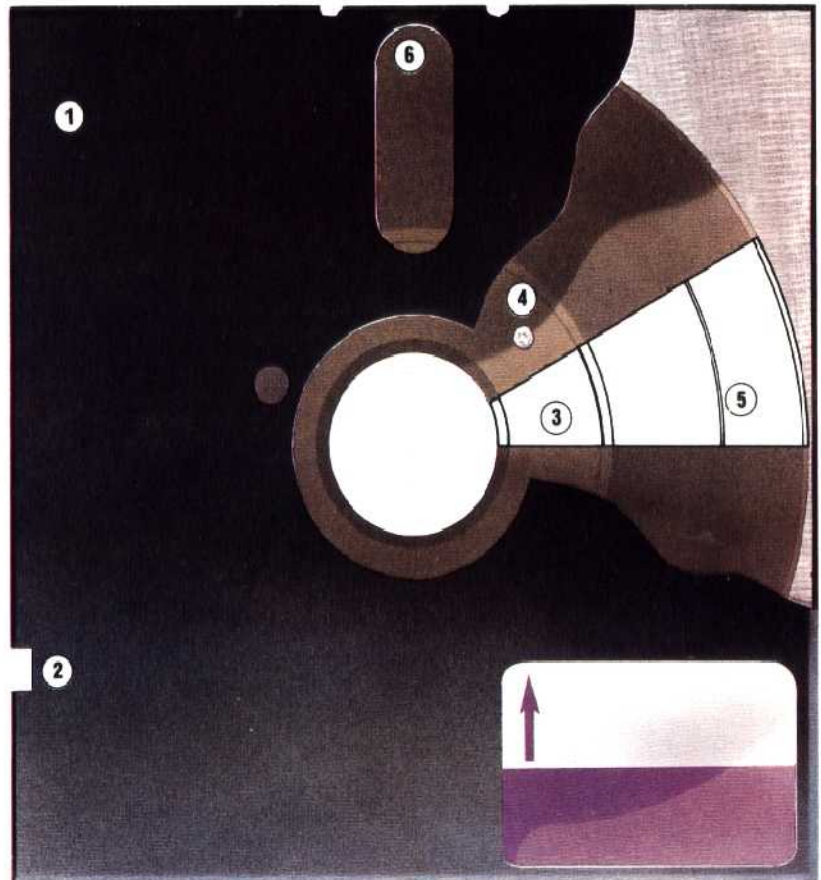
All disk drives have a form of Disk Operating System (DOS), which contains a routine that formats the distribution of information on a disk into tracks. There are usually between 35 and 80 tracks per side, each track divided into a varying number of arcs called sectors. There are fewer sectors on the shorter tracks near the middle of the disk than on the long outer tracks. Each sector consists of a block of data, usually 256 bytes.

The DOS 'remembers' where all the information contained on the disk is stored. This is usually achieved by the creation of a Block Availability Map (BAM), either stored on the disk or held in memory, and a catalogue or directory. The BAM holds a record of the blocks currently in use and those free for new storage. The catalogue is a list of the file names, file types and track and sector locations for each file. It is usually held on the central track and can be loaded into computer memory for reference. The DOS positions the read/write head after reference to the BAM, and catalogues and manages the storage and retrieval of data.

The layout of the information in tracks and sectors and the accurate positioning of the read/write head enables the DOS to offer random access filing. Data can be recorded and extracted in chunks as small as a byte at a time, if required. In broad terms, differences between disk drives are confined to the amount of data that can be stored — typically between 100 and 400 Kbytes; the speed at which data can be transferred; and the means by which the user can control storage and retrieval using DOS.

There are three main methods of implementing a DOS. The most efficient is to include it in ROM form within the disk drive, under the control of the drive's own microprocessor with associated RAM. This is known as an 'intelligent' disk drive; on receipt of an instruction from the central processor it can process complex disk-handling routines independently, allowing the processor to continue running a program. All current Commodore disk drives are intelligent in this manner and use no internal computer memory in operation.

A more popular system is the type that loads the DOS from disk into computer RAM on command or automatically when the computer is switched on. The third method includes a form of DOS in the computer's own operating system. Spectrums have this facility and Acorn Computers supply a DOS for the BBC Micro called the Disk Filing System that provides limited disk control. Disk-handling routines include SAVE and LOAD commands, a CAT (or directory) command, a command to format a disk (or tape cartridge) and various random access and sequential file creating, handling and deleting commands.

In A Spin
Floppy diskettes are composed of Mylar, or a similar stretch and tear resistant plastic sheet, coated with a metallic oxide capable of holding a magnetic charge. Enclosed inside a protective square plastic envelope, the disk is spun from the hub. The recording surface is accessible to the read/write head through the slot shown at the bottom of the illustration

DAVID WEEKS

1 PROTECTIVE ENVELOPE

2 PROTECT/PERMIT SLOT

3 SECTOR

4 REGISTRATION HOLE

5 TRACK

6 ACCESS SLOT