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New Memory
Twelve-inch laser discs and the smaller compact discs can be used for storing both video and audio information as well as the digital data stored on computer cassettes and floppy disks. The drawback is that the discs cannot be written to and are technically ROM only. This means that you cannot save your own programs and information on laser disc. Instead, you will have to buy or hire pre-recorded software

640×256 pixels per screen display, which occupies exactly 20 Kbytes of memory. If a television frame were no finer in resolution than this, then storing one second's worth of video (at 25 frames per second) would require 25×20 Kbytes of storage! A minute of a television programme would occupy 30 Megabytes (30,000,000 bytes), and an episode of your favourite television serial could take over a Gigabyte (1,000 Megabytes) of memory — and on the single-sided single-density floppy disks that most home computers use would require over 6,000 disks and a week's work!

Given these figures, video tape storage becomes rather more attractive: putting half an hour's worth of television programs on a disk seems to pose insurmountable problems.

The answer to this dilemma lies in writing the data very small. A laser disc recorder etches the data with a hair-fine laser beam onto a metallic platter coated in a tough translucent shell. A low-power beam is used to read the data off the disk. Lasers are used as the read-write stylus for this disk because they are such fine-resolution low-tolerance devices. No other technique could read and write so much data in so small a space.

The format is a combination of the techniques used on hi-fis and disk drives. The grooves of a gramophone record form a continuous spiral, and the walls of the grooves carry an etched representation of the recorded sound's waveforms. Most micro users know that the tracks on a disk drive are concentric circles, and that information is written magnetically onto the disk, and stored digitally as patterns of zeros and ones. The laser disc format uses tracks, not grooves, but these form a spiral. Information is etched optically onto the disc in patterns of ones and zeros, but cannot be erased. The ones and zeros (which represent the patterns of dots comprising the television picture) are written on the disc surface by the laser's burning tiny pits into the metal film to represent ones, and leaving it intact to represent zeros. A pit is half a micrometre (0.0005 mm) wide, and one tenth of a micrometre (0.0001 mm) deep. Therefore, a square centimetre of disc surface could hold 400,000,000 of these pits.

This astonishing miniaturisation is just sufficient to cope with the storage demands of video. A 35 cm diameter disc holds 54,000 television frames per side, or roughly 36 minutes of playing time. The calculations of frame size that we made earlier in this article were based on computer graphics resolution in black and white, whereas the laser disc has to store colour information for each dot of the television picture, and carry an audio track as well. A colour frame, with its corresponding sound track, might therefore require 100 Kbytes of storage space. 54,000 such frames would use up 5,400,000 Kbytes — 5.4 Gbytes.

Having overcome the problem of storage limitation, laser discs offer extensive applications possibilities. One major benefit is to remove one of the biggest obstacles in data processing — data collection and entry. Information is usually readily available, but somebody still has to sit down at a terminal and actually type coded representations of the data into the system — a tedious, expensive and time-consuming procedure. If instead you can point a camera at the data, and let that store the visual information on disc while you enter only indexing details of the recorded pictures, then the workload is greatly diminished.

Laser disc players vary greatly in their sophistication. Already available are cheap players for home use. These can be used to show films just like an ordinary video cassette recorder but with the added advantage of tremendous picture quality both in normal use, and in freeze-frames and slow motion playing. You can also select individual frames on some machines by keying their number on a handset and using a search facility. The player will blank the screen for a moment and return with the relevant picture displayed.

The real possibilities don't begin until you can have individual frames selected by a computer program. Players that can do this are available from companies such as Pioneer and Philips, but as yet are expensive and intended only for professional use. The simplest system is to use an IEEE or RS232 interface so that the computer can select a particular frame by its number.