Behind The Bars

How those mysterious-looking stripes on book covers and supermarket goods spell out a message to a computer and help to run the store more efficiently

Decoding The Stripes

The illustration above shows a bar code. This represents the number 72. It appears as nothing more than a series of black lines of different thicknesses. In this case each set contains five bars, two of which are broad. The position of the two broad lines in each set gives the number. Extra bars mark the beginning and end of each individual unit of information. Here the number 72 is coded in two units, the digit 7 and the digit 2.

There are many different ways of encoding information in a bar code. Since a bar is either thick or thin, the bar can be numerically represented as a 1 or a 0. This leads directly into the binary mathematics of computers. A somewhat different bar code in commercial use is the Universal Product Code. Here the bars can be of variable thicknesses. Fewer bars are needed, and the information is read from the breadth of the line.

It is because bar codes can be read by machine that they have become so widespread in supermarkets and libraries. The can of Coke goes past a light detector, and the librarian wields a light-sensitive 'pen'. In both cases the bar code is illuminated and the amount of light reflected is registered. The black bars reflect hardly any light in comparison with the white background. The reflected light is converted into an electrical signal and amplified. Either light is registered (a binary 1) or there is no light and no signal (a binary 0). The information is now in a form that the computer can accept.

The bars give strings of 0s. The wider the bars are, the more 0s they contain. Similarly, the white background gives strings of 1s. In this way, the wand feeds the computer patterns of binary digits from which it can determine the composition of a bar code

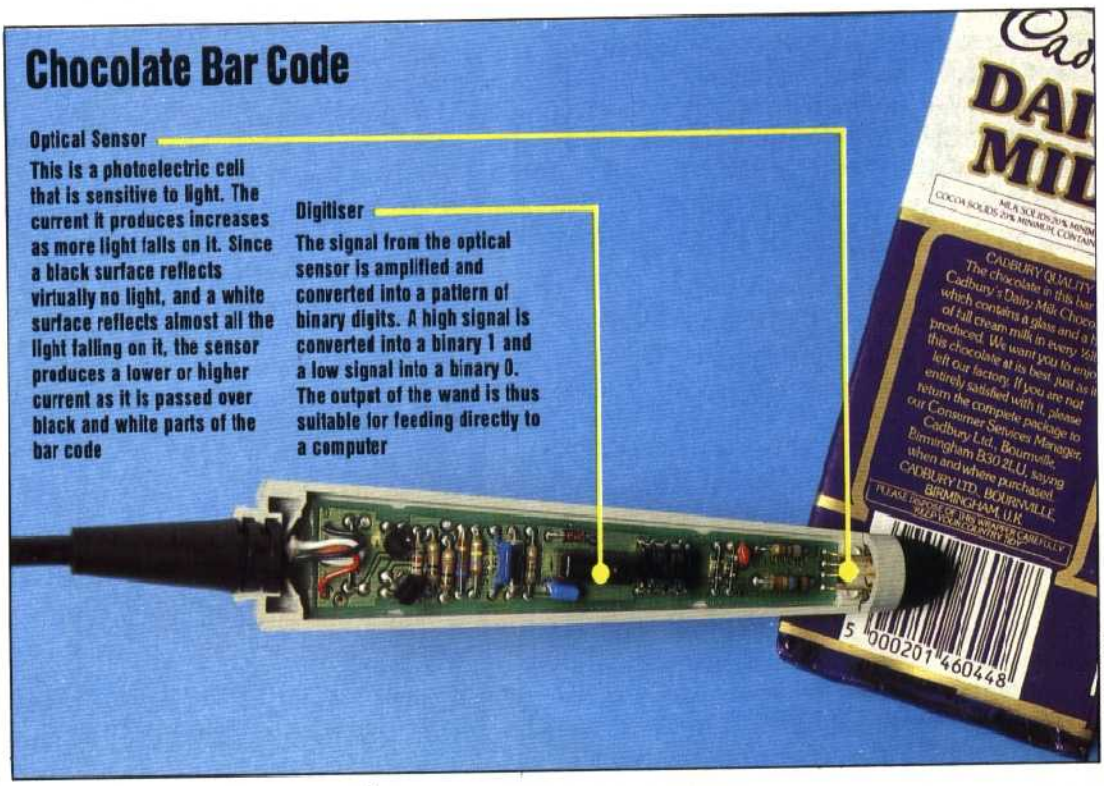
Noticed anything different about the cans of Coke you've been buying lately? Or about a lot of paperback books? Or maybe you've noticed a curious kind of trolley being wheeled around your local branch of Sainsbury's, with someone running a kind of pencil (making blips and beeps) along the shelves. Take a close look at the shelves, or the Coke can or a recently published paperback, and you'll see a set of stripes. That is a bar code, an ingenious device that can be read in a fraction of a second by a light-sensitive 'wand', and that can feed information about the goods involved directly into a store's computer. That, in turn, means that information about cash flow, stock levels and so on is instantly available to the people who keep the shelves full, who run the warehouse and who buy in the goods in the first place — all making for a much more efficient service for the customer.

Let's see how this works for a paperback. Every book published in all the major countries of the world has an International Standard Book Number (ISBN). This consists of one or more digits to indicate the language or the geographical area in which the book is published (it's 0 for all English language books), from two to seven digits to identify the publisher, and from one to six digits to identify the individual book title and edition. This gives a total of nine digits — then there's a check digit (which the computer uses to make sure that all these digits have been given to it in the correct order).

For bar-coding, books are numbered according to the European Article Numbering (EAN) system, which uses a total of thirteen digits (most grocery items usually employ a short eight-digit number). The first three digits are the EAN 'flag' — 978 for books. Then comes the ISBN, and finally an alternative EAN check digit. In the USA and Britain, the ISBN (complete with its own check digit) is also printed above the bar code in figures that can be read both by the human eye and by an Optical Character Reader.

Optical character readers are another interesting development with far reaching consequences. Machines now exist which can literally read the printed word by scanning the line optically. The output signal of the reader is coupled to the computer, which can then process the information in various ways. Words read by the scanner could, for example, be displayed on the computer screen, avoiding the need for laborious typing and all thanks to the computer.

Chocolate Bar Code



IAN MCKINNELL