Contents

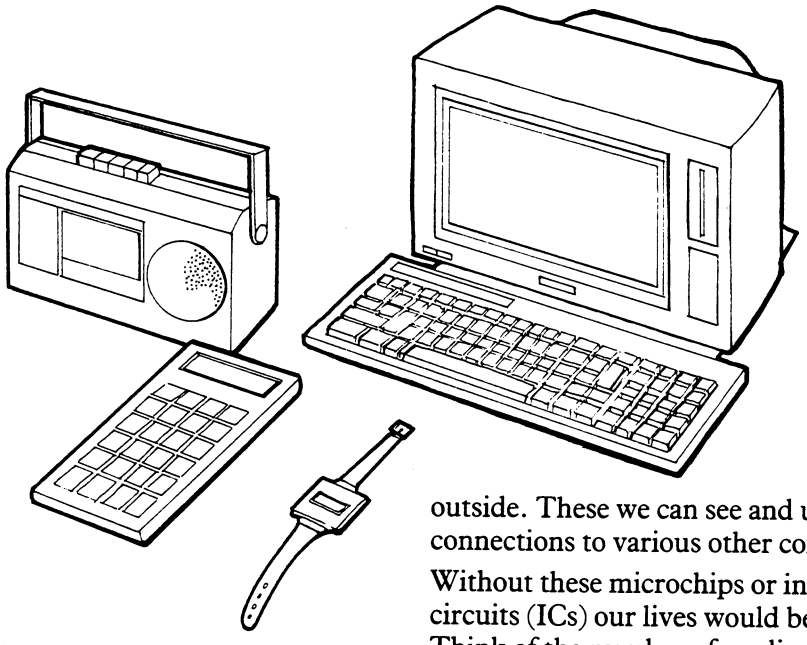
Introduction

This book invites you into the fascinating world of microelectronics. Many people think this subject is hard and a bit mysterious, but if you read on you will find yourself doing microelectronics – and enjoying it.

To get the most from this book, try not to skip pages, and have a go at all the activities. All the words that will be new to you are printed in **bold** to start with and are listed in a mini-dictionary at the back. This will give you more information and help you to answer any questions.

A new kind of revolution is taking place in our lives and it is just as important as the Industrial Revolution which began in the late eighteenth century. Maybe even more important. The 'microchip' revolution is well and truly with us.

Very complicated electronic circuits are reduced in size microscopically and built into a tiny 'chip' of silicon. Minute gold threads connect the circuits from inside their cases (known as packages) to larger pins on the outside. These we can see and use to make connections to various other components.



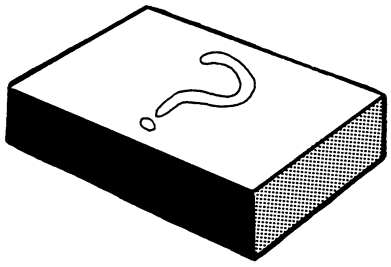
Without these microchips or integrated circuits (ICs) our lives would be very different. Think of the number of appliances, machines, gadgets, etc., that use ICs: watches, calculators, radios, computers. I'm sure you can think of many, many more.

Fact File

Some computers can carry out several hundred thousand calculations *every* second.

The Black Box

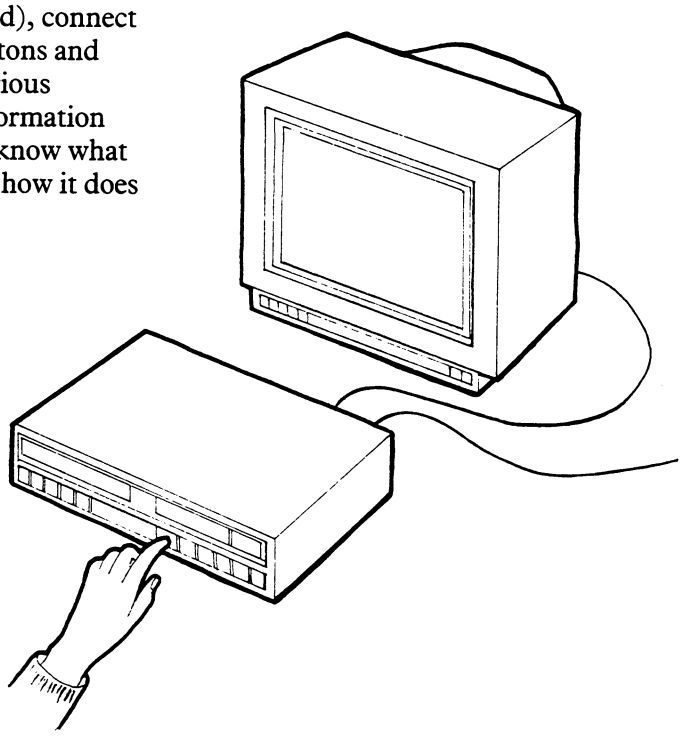
Although complicated microscopic circuits are built into tiny ICs, it does not mean that we cannot make use of them because we have only a limited knowledge of electronics. We simply treat them as **black boxes**.



We do not need to know how the inside of a video works in order to use it. We find out what the various ones on the market can do, select the one we want (or can afford), connect it up correctly, adjust the right buttons and knobs and it should perform its various functions properly. We get this information from the book of instructions. We know what it does but we do not need to know how it does it. We treat it as a black box.

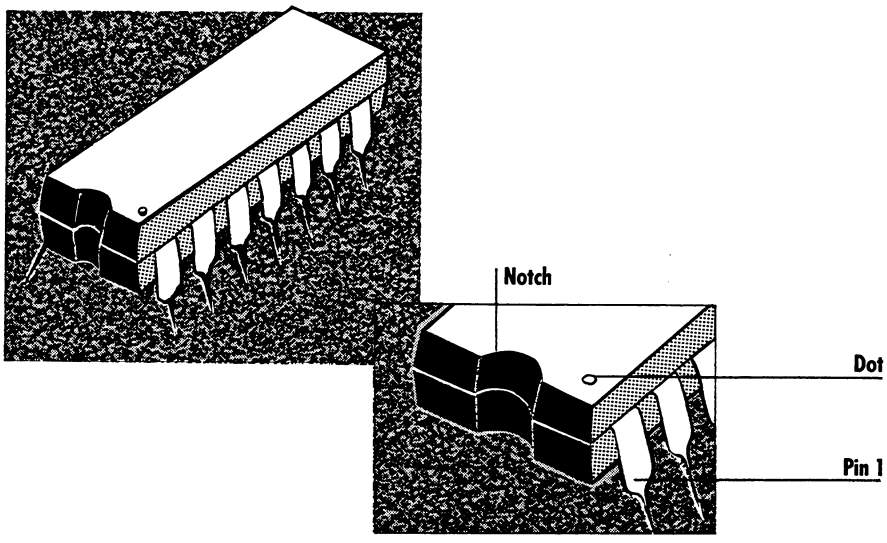
The same applies to ICs. We find out what they are capable of doing, choose the ones we want, connect them up correctly, make the fine adjustments and they should also perform their functions properly. This information or data we gather from instruction booklets or even the catalogues from which we buy the ICs. So anyone with an interest, the data, and patience can use microchips to build some very exciting and useful projects.

You will find it useful to read or refer to the **Electronics** book from this series, as many methods and components used in this book apply to electronics as well. References are made to the book many times as a way of learning more about a particular topic.



1 Packages

The package or container that an IC comes in can vary enormously in looks but the **dual in line** (DIL) package is probably the most common and easily recognized by almost everyone.



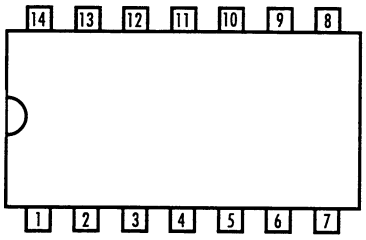
It varies in size and number of pins but certain similarities can be seen even between those produced by different manufacturers.

The pins are normally 2 mm apart and the rows of pins 6, 8, 10 mm, etc., in length. There should be a notch or small dot on the top surface identifying where pin 1 lies.

The pins are numbered in anticlockwise order from pin 1 to however many pins the package has.

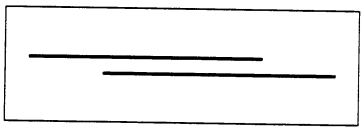
Connections

Armed with these basic rules we can come closer to understanding the pin connections on a diagram. The use of diagrams makes it easier to see the vital information that we need for connecting up. Most diagrams are drawn as though looking from above. A pin layout for a typical 14-pin DIL IC would look like this.

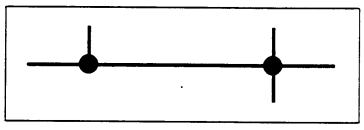


14 Pin
View from above

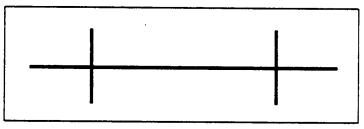
Connections to and from the IC and between other components are shown as solid lines.



Where the lines should be joined together a blob represents the joint.



Where two lines cross without a blob it simply means that one wire passes over the other without touching.



The solid line at the top of a diagram with *Vcc* or +Volts printed on it is the track or wire going to the positive (+) of the power supply.

The solid line at the bottom of the diagram labelled with 0 volts, earth, gnd or ⏚ is connected to the negative (−) of the power supply.