

# Sinclair ZX81

**In 1981 this tiny computer was considered revolutionary, both in terms of design and price. Since then its price has fallen further, but not its stature**

The Sinclair ZX81 is the cheapest computer with a screen display and is an upgrade of the ZX80. The number of chips is reduced by the use of one ULA (Uncommitted Logic Array) chip to handle functions that previously required many components (see box). It is the Model T Ford of home computers: black, with no knobs, buttons or switches. The external power supply unit plugs into the side of the wedge-shaped case. Other connections are for cassette, television lead and peripherals. The Sinclair ZX Printer is also the cheapest means of getting 'hard copy' or listings, though the silver electro-sensitive paper that it uses is relatively expensive. The ZX81's screen, unlike other monochrome displays, prints black characters on a white background, and in upper case only. The Sinclair BASIC differs from the more standard Microsoft version, but is well suited to beginners.

The ZX81's keyboard is a striking feature. It is merely a printed picture of a keyboard with pressure-sensitive pads underneath. As such it is not suitable for touch typing, though it redeems itself to some extent when entering programs. When the computer is first switched on, the cursor is displayed as a K. This means that a 'keyword' such as PRINT or LET will be printed in full on the screen when the P or L buttons are pressed. These keywords are inscribed on the top of each key. Similarly, the cursor can be put into 'function mode' (displaying an F). When in this mode, pressing a key will print the function keyword printed above or below that key. For entering normal text, there is the L or 'letters' mode.

Though small and cheap, the ZX81 can still justifiably claim to be a computer and it has been around long enough for a vast collection of software to grow up around it. Enthusiasts have seen the tiny one Kbyte of standard memory as a challenge and have even managed to squeeze in programs like Adventures and chess. An extra 16 Kbytes of memory can be purchased in the form of a little plastic box that plugs into the back of the computer. However, this device has caused considerable aggravation for some users because the connector is not very secure and the slightest movement can result in all your data being lost. Inventive ZX81 users discovered that double-sided sticky tape helped, though Sinclair Research have now withdrawn the old RAMpack and replaced it with a more reliable one.

The ZX81 has also spawned hundreds of small companies offering all manner of extras. Some

## Uncommitted Logic Array (ULA)

Sinclair call this the 'Sinclair Computer Logic' chip. It is a special chip that contains the equivalent of several smaller 'logic' chips. These have a jargon name, 'glue' chips, because they 'glue' the important parts of a computer together. This ULA is the difference between the ZX80 and the ZX81. In the ZX80 there are about 12 small 'glue' chips, which meant the ZX80 cost more to build and has more likelihood of failure. ULAs, however, are difficult to design, and like ROMs, the design must be final and complete before any can be manufactured.

## Quantity Versus Quality

When Sir Clive Sinclair decided to launch a low-cost microcomputer for the home market, he was forced to make certain compromises. Chief amongst those was perhaps the keyboard, which has long been considered the weakest point of both the ZX80 and 81. As a result, one suspects, many users came to see the machine as ideal for running 'bought-in' software, rather than entering lengthy programs of their own, and a great deal was quickly available, especially for the games market. Hard on the heels of the inevitable versions of *Breakout*, *Space Invaders* and caterpillars that eat each other, came machine code de-bugging aids and, surprisingly, a variety of business-orientated packages, notably spreadsheets, though these need the additional RAMpack. BASIC is not the only language available for the ZX81. In addition, Sinclair offer FORTH (see page 150), and an Assembler for the Z80 microprocessor.

produce bigger and more reliable RAMpacks, connectors for non-Sinclair printers, and colour displays. There are even replacement cases that feature better keyboards and room to take most of the extras or add-ons inside them. Conversion is a simple matter of removing the PCB from the old casing, and placing it in the new one.

All in all the machine is the cheapest introduction to computing available and is also an ideal machine to buy if you're not sure you want to invest £200 or more in a home computer. Children love the keyboard. It is good enough to have found a place in nearly every primary school in Britain and will continue to be the cheapest computer for quite some time.

## ZX81 Keyboard

In order to produce a microcomputer with an integral keyboard for an economy price, Sinclair adopted a 'sealed multiple membrane', which has been criticised ever since for its insensitivity and lack of 'feel'. The need to pack the keyboard into a small space dictated that optimising techniques should be used, which resulted in each individual key having a variety of effects. The 'L' key, for example, will return that single character, the assignment 'LET', the function 'USR', or the symbol '=', depending on which mode is in use at the time.

## RF Modulator

For standard TV sets. Provides video output

## Connectors

Three miniature jack connectors for power, cassette input and cassette output. Some programs exist that produce music from the cassette output socket