



# TO THE LIMIT

Few computer manufacturers expect to sell a million units of any one machine; yet Sinclair sold a million Spectrums in little more than 15 months. Now in its third version, the Spectrum still has some idiosyncratic features, and a few that are sub-standard, amongst them its keyboard, and its limited capacity for expansion.

As a piece of hardware, the Spectrum's most noticeable feature is the keyboard. While it is true to say that the configuration is QWERTY, that is as far as its resemblance to a typewriter goes. Each of the 40 keys is part of a membrane that allows the keys a certain amount of travel: the 'feel' of the keys is yielding and 'spongy'.

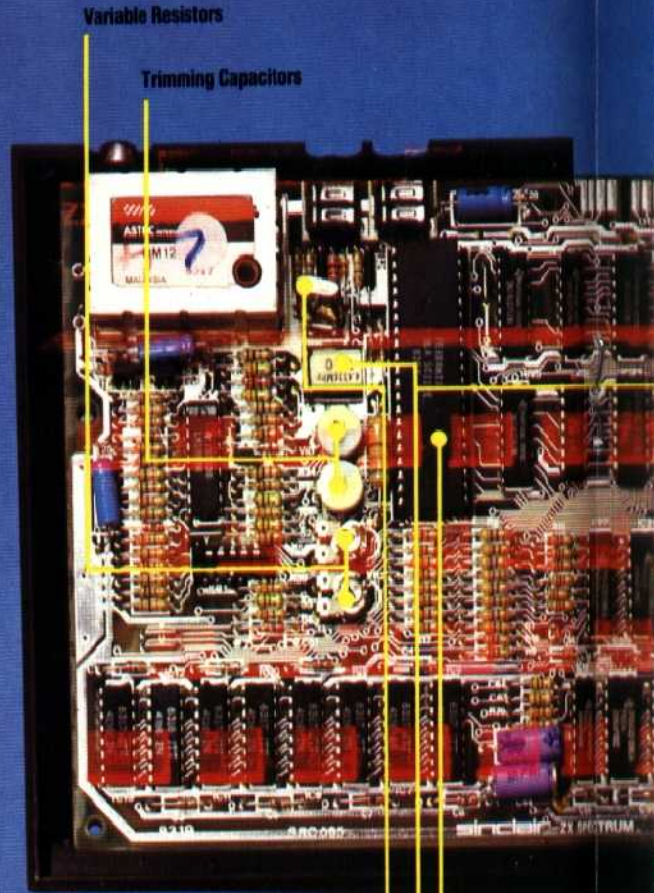
The Spectrum has a system bus connector, which allows the user to connect the ZX Printer (originally designed for the ZX81), the ZX Interface 1 and the ZX Interface 2 — or all three peripherals at once. There are also MIC and EAR sockets, which allow cassette storage of programs. The program loading procedure is not very satisfactory. Although successful loading and saving is indicated by reassuring blue and yellow strips in the border area of the screen, in order to save a program you must first disconnect the EAR lead. Equally annoying is the lack of a Reset button on the computer, which means that whenever a system crash is experienced the power lead must be pulled out — which could eventually weaken the connections. Fortunately, a number of small independent companies produce add-on devices that incorporate both a 'Save or Load' switch and a Reset switch.

This is only one example of the way in which Sinclair Research appears to have been beaten to the mark in supporting its machine. This seems to be deliberate company policy, however, for while enjoying the spoils of its computer sales Sinclair can move on to another project, such as the QL. Even so the company has developed the ZX Microdrives and the associated ZX Interface 1 unit, which provided the back-up storage potential of 680 Kbytes, an RS232 port and the concept of networking up to 64 Spectrums. There was also the introduction of the ZX Interface 2 unit, which allows access to ROM-based software and two joysticks to be connected.

Sinclair Research have also left the production of software to others: having honoured certain packages produced by independent software houses with its seal of approval. Its library of 50 tapes covers such diverse subjects as education, business, domestic, utilities and games.

## Spectrum Evolution

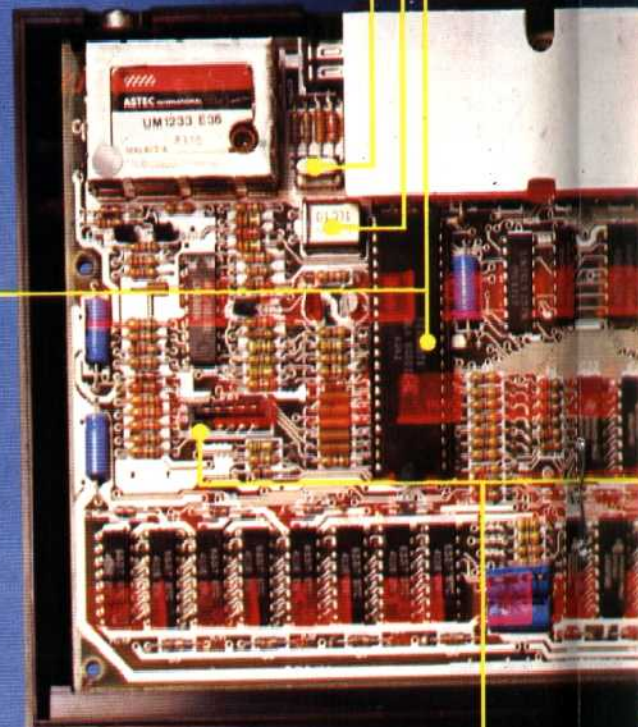
Between its introduction in 1982, and its partial eclipse by the QL at the beginning of 1984, Sinclair's ZX Spectrum sold more than a million units, and went through three versions of its motherboard (the printed circuit board that holds all the major components). Version 1 was current for only the first 60,000 units sold, and so is not common. Versions 2 and 3 differ in two major respects. Firstly, one could 'fine tune' the video output circuitry in Version 2 by means of the two trimming capacitors and the two variable resistors shown. Secondly, the 'temporary modification' to the Version 2 microprocessor had been properly executed by the time Version 3 was introduced. The heat sink is in a different place because the voltage regulator chip has been relocated closer to the power input socket.



Variable Resistors

Trimming Capacitors

Main Clock Crystal  
Runs at 14 MHz



Uncommitted Logic Array

This 40-pin chip replaces a wide variety of logic chips, controls input/output operations, including the generation of a composite video signal, later modulated with a radio frequency, and controls CPU interrupts

Keyboard Connectors