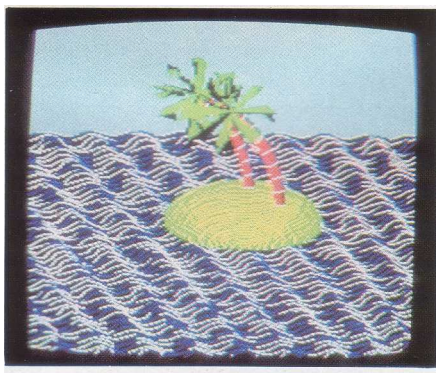
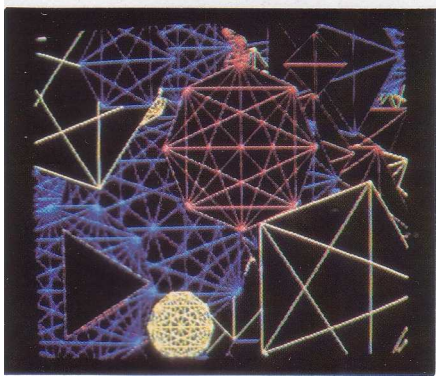
ELECTRON

Acorn's long awaited Electron is here. It is smaller and cheaper than the BBC Micros, but the machines have a lot in common. Neville Maude thinks it should do well.





A Welcome tape is provided which follows the BBC Micro style. It includes Polygon; Island, where the waves move; and Draw, the horizontals and verticals are fine, diagonals difficult, and curves almost impossible.

Specification

CPU: 6502A running at 2MHz
Memory: two 16K ROM/EPROM chips plus 32K of RAM from four chips
Keyboard: 56 typewriter keys in QWERTY layout
Ports: UHF TV, video, RGB monitor and cassette ports; expansion bus
Features: colour graphics and sound; number keys used as function keys; optional single-key Basic keyword entry; user-definable characters
Notable ommissions: BBC Mode 7; no joystick ports
Power supply: separate, 19V 14W
Dimension: 343mm. × 159mm. × 57mm.
Origin: assembled in Malaysia for Acorn Computers, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN
Price: £199

Technical details

The 6502A processor runs at 2MHz when accessing ROM, but in the Electron at 1MHz from RAM. This is because the RAM is in four 64K by 1-bit chips, for cheapness. so every access needs two operations.

In modes 0,1 and 2 the RAM access of the video part of the ULA is interleaved between the 6502A access. For 40µs out of 64 the processor is out of action. In mode 3 the processor is running full speed on alternate lines. In modes 4, 5, and 6 it runs at 1MHz all the time it accesses RAM. Hence a program taking 10 seconds on the BBC in all modes can take on the Electron about 43secs in modes 0,1, and 2, about 34secs in mode 3. and 20secs in modes 4,5 and 6.

A trick is to draw graphics by shifting the Electron into its faster modes during the drawing period and then back again. The screen display will be somewhat strange during that period but become normal at the end.

The ULA register of mode is in &FE07, a write-only register, and the operating system uses &0283. So program inserts could be something like:

```
500 DEFPROCquick
510 ?&FE07= &BO
520 ENDPROC
  (PROGRAM)
900 DEFPROCslow
910 ?&DE07 = ?&0282
920 ENDPROC
```

Of course, this does not help to speed up programs where the graphic display is used not just drawn, but it helps with those like Persian, in both manuals, where one looks at the results. Times for this are about 34secs on the BBC, 50secs with Procquick on the Electron or 105secs unaided.

THE ELECTRON is small, neat — less than half the size of its ancestral BBC Micros. The finish, including keys, is light cream and mainly plastic which contributes to its light weight.

The mains transformer, 19V 14W, is separate and has an integral three-pin plug, which is rather large, 3.5in. by 2.5in. by 2.65in., excluding prongs. This can cause problems with some switched sockets or double sockets when two plugs are being used. The advantage of having only low voltage reaching the computer is obvious, especially for children, there is also no heating problem in the main casing. The transformer appears to have a thermal overload cut-out — a good idea.

The nominal RAM is 32K, which is not immediately apparent from the instruction books. If one asks the computer now much RAM is spare, with the standard phrase

DIM P%:PRINT HIMEM –P%

the answer is 20,990. It is because the Electron does not support the teletext mode 7. The nearest is mode 6, see table, which needs about 8K as compared with mode 7 which uses 1K. Apart from this ommission the modes are the same as for the Model B, not the A — a real achievement in so low-priced a micro. The high-definition modes 0, 1, and 2 need 20K as they do with Model B but this is unavoidable, for example, mode 5 permits 16 colours with 160 by 256 pixels. In general the graphics are outstandingly good though slower than the Model B.

The standard question to determine the operating system with these micros is *Help and the Electron replies with 1.0 OS, not the latest 1.2. However, it is versatile with plenty of *FX commands. Indeed, there are a couple which the Model B does not have, namely *FX226 which sets the base number for Func A to P, and *FX227 which does the same for Func Q to /.

There are four sockets on the left of the computer, not the right as shown in the manual, and these are labelled underneath the case, UHF TV, video, RGB, cassette. The video socket is for a monochrome monitor and the DIN socket for the cassette player is for 1,200 baud, not alterable to 300 baud. There is also a multi-pin connector under the body, thoughtfully shielded with plastic in case anyone puts the micro on a metal projection. Presumably this will be used in conjunction with the first add-on for the Electron which is called the Elk. It is a general-purpose module to enable sideways ROMs, printer interface, games paddle sockets and RS-232.

The ULA is a large one, about 30mm. by 30mm. with 68 connections. It controls the colour palette and takes over the CRT controller action of the 6845 in the Model B.

But the Electron has no 6845, so there can be no sidways scrolling as used in games such as Planetoid. Internal timing is also taken over by the ULA, as is sound. This is less complicated than the BBC method. To allow reasonable compatibility between the two micros there are three tone channels and one for noise. However, only one tone channel at a time can be used on the Electron and the envelope is also more simple, most people will find it still complex enough.

If tested for speed using the statutary benchmarks the Electron runs about 30 to 40 percent slower. Arithmetical computations are the slowest but, since the BBC Basic is so fast the Electron is still doing well.

If one tries to load a BBC cassette into the Electron the the title page usually comes out as monochrome hash — not always. The main program generally loads but then runs like an arthritic snail, about 2.0 to 4.3 times slower than it should. The Electron does its best, for example, it interprets mode 7 as mode 6 instead of just stopping, and since it cannot implement the double-height BBC command for titles it just prints two identical normal-height lines. The programs on the Electron Welcome tape ran perfectly on the Model B, but at present it is not known if the versions of Snapper, etc., being rewritten for the Electron will, be perfectly compatible on the Model B. As a very rough rule, programs for the BBC Micros will not work on the Electron unless altered; programs for the Electron probably will work on the BBC but may not take advantage of all BBC facilities.

The Electron keyboard is a real one, not rubberised plastic, an experienced typist reported that she was perfectly happy with it. The construction is a little cheaper than that of the Model B but is still good. The number of keys has been reduced and both the user-programmable keys and the cursor keys are combined with others. A function key may be used in conjunction with 29 keys to give Basic keywords. For example, Print may be entered in full or as P or Func P, so the Electron has the best of both worlds. There are two ommissions, Tab and the shift lock, but those who never had them will presumably not miss them.

In general the Electron keyboard is easier to learn than the BBC and considerable thought has gone into making it simple.

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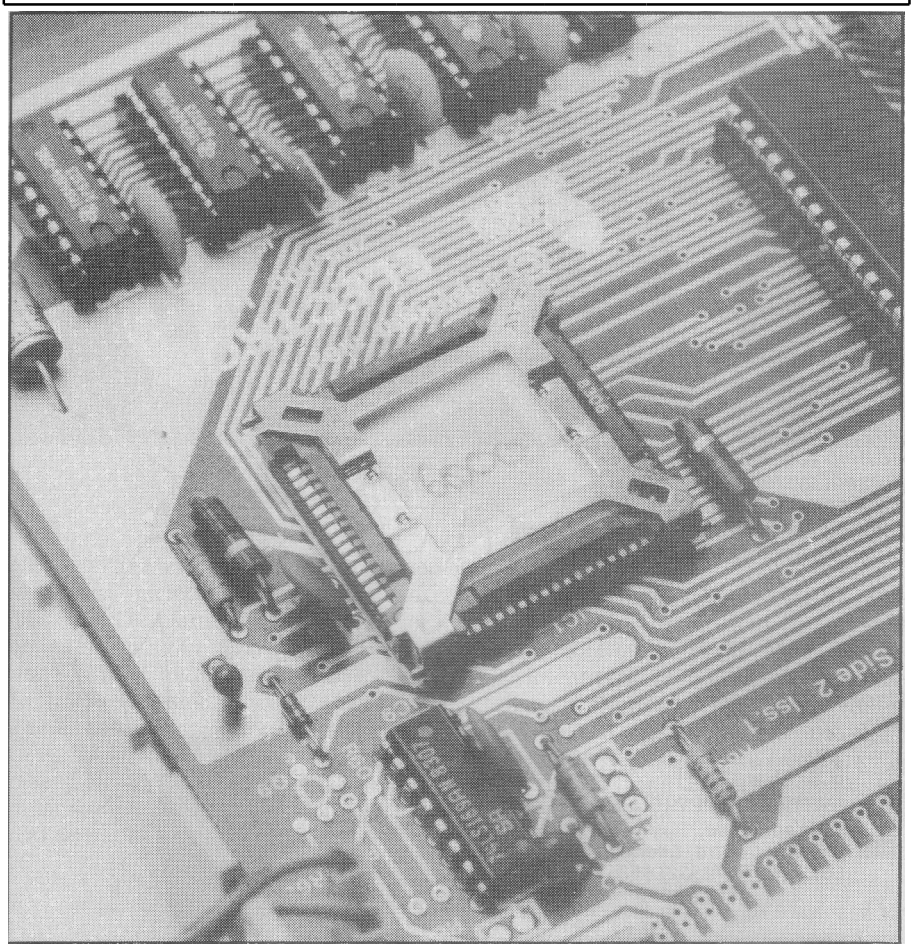
Mode	Characters	Pixels	Colour	Memory
0	80 x 32	640 x 256	2	20K
1	40 x 32	320 x 256	4	20K
2	20 x 32	160 x 256	16	20K
3	80 x 25	**TEXT**	2	16K
4	40 x 32	320 x 256	2	10K
5	20 x 32	160 x 256	4	10K
6	40 x 25	**TEXT**	2	8K



The ULA is a major reason for the Electron being cheaper than the BBC computers.

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The programmable keys run from 1 to 9 and then 0, as distinct from the BBC 0 to 9 series. The change means that the numeric and f values are the same on the same keys. Only one definition can be put in each programmable key, not three as in old BBC. Small hands will find it easier to reach keys without stretching, a useful point since most Electron users will be young.

The Electron comes with a user guide, 290 pages, in a ring binder. It is smaller than the BBC one, partly because there is less to descibe but also because it is written more simply. Apart from not having an index it is a really superb book with better organised information than in the more detailed BBC manual. Those who have trouble with the BBC could try this volume as an alternative, if available separately, since much of the information is similar.

Another book supplied is Start Programming with the Electron; again this is excellent, much better than most other books written to help learning to program the BBC computer. One hopes the authors will produce a companion book for the BBC, otherwise this one will help to get started with both.

A Welcome tape is provided which follows the successful pattern with small improvements from experience. Some programs, such as Patterns, are much the same. Gomuku has come in from the BBC games of strategy cassette, Island is from Acornsoft's graphics book and others are new. A two metre coaxial lead is provided for connection with a television set, production machines will also have a lead for the cassette player.

Many comparisons have been made between the Electron and the BBC micro; unavoidable as the latter is a known machine and the two have so much in common. Nevertheless, in the market place the contest will be between the Electron and micros costing less than £200 — a crowded arena. The Electron should do well as it has many advantages over the present competition. Others will arrive, in particular there are Ataris on the way; the 600XL and 800XL should come in this price range and are said to be compatible with the vast range of existing software. It is not impossible for Acorn to reduce its price should it become necessary. Acorn's decision not to release machines to software houses prior to the launch is interesting. On one hand it gives Acorn about two months lead with its 10 or so cassettes which are the first to be converted, on the other hand software sells computers.

The Electron will go out to dealers and high street chains. Acorn projects sales of 100,000 by Christmas with W H Smith stocking it and then perhaps Boots. The Electron should carry BBC Basic into many more homes and it is anticipated children will use the BBC at school and the Electron at home. Curry is quoted as saying "The BBC is happy because they see it as support for the language, making it as standard as possible."

Conclusions

• The Electron is an excellent micro for the money. It is rumoured it will sell for £199. It is a little unfair to compare it with the Model B which costs more than twice as much.

• The Electron will sell well at the cheaper end of the market place and the first add-on module should be available almost immediately after the launch.

• The Electron is not a replacement for the Model A; the Electron cannot be upgraded to a Model B as could the A. Even when all add-ons are available, which will make the cost higher than a Model B, the result will still be an augmented Electron, not a B.

• Backing will be good; books for the Electron has e been written and a users club has been announced.

• The Electron has a good keyboard, colour. graphics and Basic plus strong connections in the educational field. It can be recommended as a first computer on which to learn, or as a step up from still cheaper types such as the ZX-81.