

BBC B+ PREMIUM PRODUCT

By Roger Cullis

There are no dramatic changes, just a number of useful refinements on Acorn's upgraded machine.

Acorn has sold over half a million BBC Micros in the three-and-a-half years since the machine appeared. With the announcement of the B+ model it is clearly hoping to revive its flagging fortunes and make fresh inroads into the educational and home-computer markets. The question is: at a price just short of £500 for some not very new technology, does it stand a chance?

From external appearances, only those with an intimate knowledge of serial numbers will be able to distinguish the B+ from the B. The shape is the same, the colour is the same and the keyboard is the same. The Break key is still in the same vulnerable position, and the cursor controls are still non-ergonomically grouped with all of the other keys. There is still no numeric keypad.

Internally the changes are more significant. The motherboard has been completely redesigned, and Acorn has adopted a different processor, the 6512. The 6512 has been chosen because it uses a two-phase clock, which eases internal hardware-timing problems. This is a major factor, as it has to support the BBC Micro's many peripherals. The instruction set of the chip is exactly equivalent to that of the 6502, so software

Spot the difference . . . the motherboard of the BBC B+ (below left) is still very similar to the old-fashioned design of the BBC B (below right).

will require no amendment on this score.

The 16K RAM chips of the old model B have been replaced by 64K devices, but the main memory map remains unchanged with RAM located at &0000-7FFF and ROM at &8000-FBFF and &FF00-FFFF. The extra 32K of RAM gave the designers some spare read-write memory to play with.

The disc interface is the other area where there has been a major innovation. The expensive and outmoded 8721 single-density floppy-disc controller has finally been consigned to the graveyard — probably to the relief of Intel, which reopened its production line to supply Acorn's needs. In its place is a new double-density controller, the Western Digital 1770. It is far more versatile, and with suitable software permits the use of a number of different disc formats, including IBM's.

The total chip count has not been much reduced, because the principal role of the BBC Micro is that of an input/output processor, an application which requires large numbers of peripheral-controller chips with their associated gating devices. Most of the semiconductors are now soldered directly to the motherboard, and this should improve still further the reliability of a computer which already performs well in that department. The losers here will be third-party suppliers who make add-ons which require the removal of chips to make a connection to the motherboard. The only sockets on the B+ motherboard are for the speech system and the paged ROMs.

The layout of the pcb has been completely revised and a number of chips have been relocated to reduce track lengths. The paged-ROM sockets have been moved into an accessible position, so that it is no longer



SPECIFICATION

CPU: eight-bit 6512 running at 2MHz, further eight-bit processors may be connected via the Tube 2MHz asynchronous bus

Memory: 64K RAM, up to 192K ROM

Discs: built-in double-density disc interface, but current software only supports single-density

Display: RGB, composite video or modulated UHF; two parallel sets of modes each giving eight alternative displays with up to eight colours and 40/80-column text; VDU not included

Sound: three channels plus noise; built-in speaker, no sound output socket

Speech: optional speech upgrade

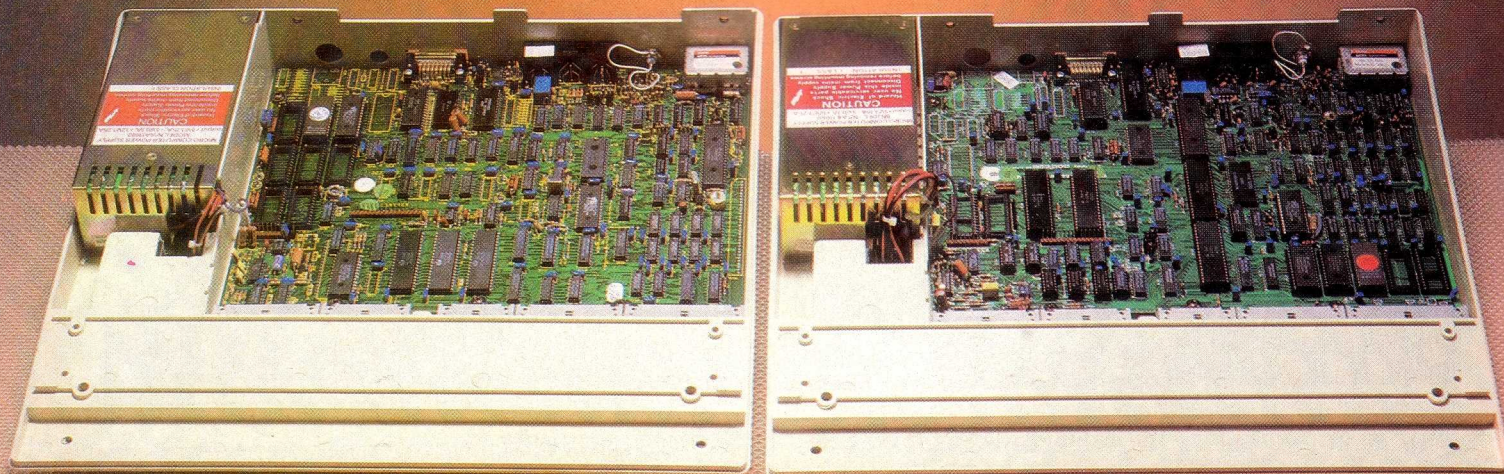
Other interfaces: parallel printer, RS-432 serial I/O, Econet LAN optional extra, cassette, disc, 6522 VIA user port, analogue/joystick input, 1MHz bus, low-voltage d.c.

Price: £499 including VAT

Supplier: Acorn Computers Ltd, Fulbourn Road, Cherry Hinton, Cambridge CB1 4JN. Telephone: (0223) 245200

necessary to remove the keyboard to install or remove the chips. An extra ROM socket has been combined with the operating system in a single 23256 ROM, which liberates a further space.

The disc-filing system now occupies a single 27128 EPROM on its own, whereas the previous DFS 1.2 had been combined with the Econet routines. A ROM socket may hold either a 16K or a 32K ROM, the appropriate address decoding being selected by adjustable links on the pcb. However, although more physical locations have been provided, each of the six sockets addresses



FOR TORCH USERS

Torch has established itself as the largest third-party supplier of peripherals for the BBC Micro and since its inception has used the BBC motherboard as the base processor for its own range of computers. Torch says that it will continue to support its users and to make upgrades freely available. Acorn will still be supplying the existing model B for the time being, so Torch will not be making a changeover in the immediate future. In the meantime, Torch will be actively evaluating the B+ motherboard to see how best to exploit its new features, such as the double-density floppy-disc controller and the shadow-mode screen display.

only two sideways ROM pages, a total of 192K, whereas in the model B each of the four sockets can address four pages, a total of 256K.

The language interpreter supplied with the B+ machine is the 1982 version of Basic 2. The further enhanced 1983 code, released with the 6502 second processor, has not been used; it would have required relocation as it runs at &B800-F7FF.

The operating system is designated OS 2.0. It contains many of the routines from its predecessor, OS 1.2, but has been substantially revised. The starting locations have been changed, so the naughty people who have written software which does not use Acorn's standard indirection addresses will have to get busy again because their code will not run on the new machine. An interesting point is that the greetings message has been changed and the computer announces itself as "Acorn OS 64K"; the "BBC Computer" message has been dropped, presumably to avoid the confusion with the Brown Boveri Company which has got Acorn into trouble outside the U.K.

64K RAM CHIPS

The main innovation in the new operating system is concerned with the VDU routines and results from the extra RAM made available by the use of 64K RAM chips. Acorn has located the extra 32K at addresses &3000-AFFF, in parallel with the existing CRT screen buffer and the bottom 12K of paged ROM. The lower part, &3000-7FFF, is used to implement a further set of display modes 128-135, known as the shadow modes. They function in a similar manner to modes 0-7 in the existing machines, but have Himem always set to &8000.

The system is similar to that introduced by Cambridge Computer Consultants with its Aries RAM board. For compatibility with the model B, the Acorn system defaults into the normal mode, whereas the Aries board defaults into the shadow mode. The new *Shadow command and an associated operating system Osbyte call select shadow memory. Acorn uses Osbyte 72 and Aries uses Osbyte 6F for this purpose. A further and hitherto unused Osbyte call EF is used to invoke the shadow mode.

The upper part of the extra RAM, &8000-AFFF, is configured as sideways RAM. It uses different protocols from the paged ROMs, so it may not be used for ROM emulation by loading software from disc. The already comprehensive Plot graphics command, and associated VDU25, have

been further enhanced to permit the drawing of a horizontal line until a defined background colour is reached. New operating system calls Oswrsc and Osrdsc are used for a direct write to or read from the screen. These calls will not work across the Tube.

FORMAT AND VERIFY

The disc-filing system is a disappointment since it is merely an emulation of the model B's DFS 1.20 and earlier versions. Acorn's explanation is that this is done for software compatibility. What it means in practice is that the constraints of the earlier system, such as a maximum of 31 files on a disc, have been ported across to the new code. A number of new utilities, together with Tube communications code to operate a second processor, are now included since there is space available on the 27128 EPROM. The new utilities are format and verify, plus one which allows you to read, but not write, 40-track discs with an 80-track drive. They were previously supplied on disc, while the Tube comms came with the Econet firmware.

There is no means of tapping the extra facilities of the WD 1770 floppy-disc controller chip except by writing directly to its registers via Sheila. This will have to await the B+ implementation of Acorn's advanced disc-filing system (ADFS). It is currently available on the Electron and the Winchester disc and is, according to the User Guide, the "filing system for all future filing operations". It incorporates a proper hierarchical file structure, with 47 files per directory, but carries an additional RAM overhead of three pages for housekeeping.

John Coll's excellent User Guide has been reset and, where necessary, updated. Basic 2 changes are now documented and the sections on assembly language and operating-system calls have been expanded. There is a new chapter on the use of the shadow screen and the incorrect drawing of the serial DIN connector has been put right. Most of the changes are minor, such as the replacement of "operator precedence" by "operator priority" and the renaming of the "piing" operator as the "shriek" operator.

Consigning its Advanced Business Computers to limbo obviously created a big components inventory to add to Acorn's well-publicised cash-flow problems. As the BBC B+ shares the ABC's motherboard, there was a powerful incentive to launch the new machine now rather than in September as was previously rumoured. Acorn has never before launched anything early.

At first sight the price tag of £499 makes

the B+ vastly overpriced in relation to the Ataris, Commodores, Amstrads and Sinclairs, which all offer more bytes per buck. The price is, however, merely a reflection of free-market economics with the manufacturer charging the price the customers prepared to pay, albeit under protest. Acorn commands a premium because it has a captive education market and because it designs for a product life of more than two years. On the same principle, the Apple II is more expensive because it has a huge software base, and IBM charges extra for its logo.

With a tremendous range of internal and external facilities available, the BBC Micro is an exciting computer to use. The B+ removes a number of limitations of the previous model and there is more mileage in the concept for the future. However, before the launch of the next model, I hope Acorn will pause to take a look at what its competitors are offering and that when the model C eventually materialises, it will have at least some extra features. Among those worth considering are: an LCD display for function keys; a separate numeric keypad, Shift-lockable to alternate function key set; ergonomic positioning of the cursor keys and a safe place for Break; and facilities within the case for adding accessories so that the computer does not have to be festooned with ribbon cables. Another welcome innovation would be a clean 64K RAM shadow memory map so that OS and paged ROMs can be changed at will.

BBC B+				
PC VERDICT				
	POOR	AVERAGE	GOOD	EXCELLENT
Performance	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Ease of use	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Documentation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Value for money	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

It's B+ for compatibility and potential but C- for timing and price.

CONCLUSIONS

■ When the BBC Micro was launched it was a superb machine. The second processors, and other enhancements such as teletext, IEEE, instrumentation and music synthesis, have kept it abreast of the state of the art. It is still a superb machine with facilities which will keep it vital for several years yet.

■ Acorn should have concentrated its resources on the computer itself, and left the add-ons to third-party suppliers.

■ The B+ is at least two years late yet it still bears indications — such as the outmoded DFS software — that it was released in a hurry.

■ The price includes a heavy premium because the principal purchasers are a captive market.

■ The new motherboard offers improved performance coupled with lower manufacturing cost, so there is no doubt that it will completely replace the existing model B as soon as current stocks are sold. PC