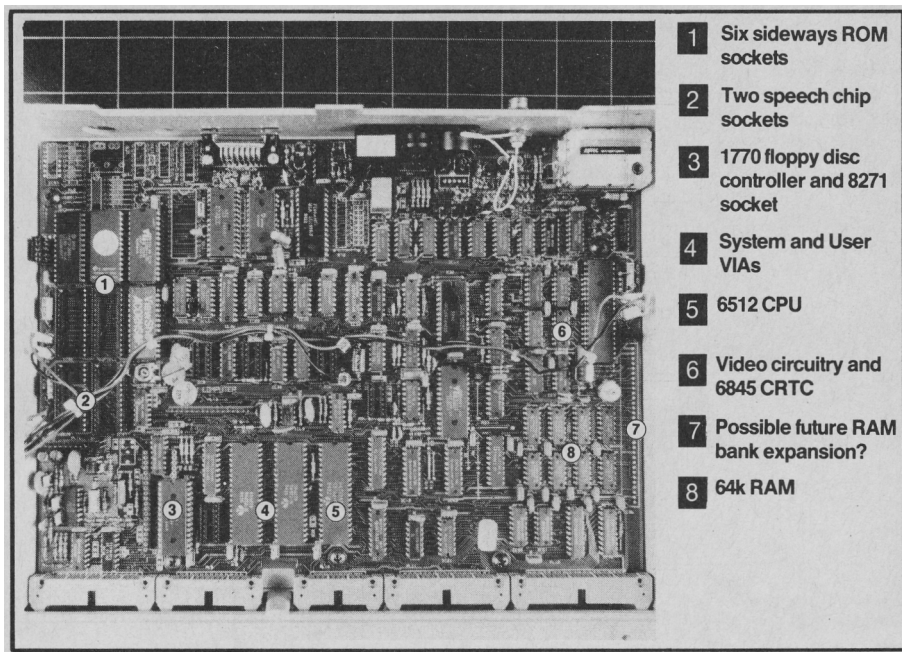
B+ GRADING

Bruce Smith lifts the lid on Acorn's latest micro and peeks inside



What's new under the lid of the B +

It finally arrived last month – the long-awaited new BBC micro from Acorn – as predicted in the March issue of *Acorn User.* Acorn claims this is not a 'new' machine but merely a replacement for the ageing model B. However, even the most cursory of glances under the bonnet reveals that the main circuit board (PCB) has been totally redesigned, and not just rehashed. By calling this micro B + , Acorn has undoubtedly left the stage door open for the arrival of *the* new machine, possibly towards the end of this year – but more on that later.

The B+ seems to have been conceived at the start of 1984, when the only major redevelopment planned was the addition of two extra sideways ROM sockets. However, standard RAM memory chips were becoming increasingly sparse, along with the 8271 disc controller, so the more popular higher capacity RAMs were included, as was the more versatile 1770 disc controller chip.

Pre-production models were under test by last summer, and there is little doubt that poor sales of the model B during this period prohibited the arrival of the B + for Christmas.

Externally the B and B+ are the same, it is only by switching the machine on that the new configuration is apparent. It announces itself as Acorn OS 64k, Acorn 1770 DFS. Taking the lid off exposes the new goodies. The first thing to notice is that, with the exception of the six sideways ROM sockets and the 1770, all chips are now soldered directly onto the main printed circuit board. The PCB itself is very neatly designed with regimentally arranged banks of chips. The other noticeable feature is the increased number of customised Programmable Logic Arrays (PLAs), which are very cost-effective.

The inclusion of a 6512, though fully compatible with the 6502, should allow improved second processor performance because of its improved clock drive circuitry.

The differences in hardware between the B and B+ are the sideways ROM sockets, increased memory capacity and the new disc interface that comes as standard. Let's look at each in turn.

Sideways ROMs

There are now six sideways ROM sockets. Each is capable of holding either 8k, 16k or 32k chips giving a possible total capacity of 192k.

The sockets are arranged in two rows of three at the top left-hand side of the board. I initially thought this was a much nicer arrangement than having them tucked away under the keyboard, but it soon became apparent that removing ROMs from their individual sockets was more difficult as the rows are flanked on top and bottom sides by the back portion of the case and the keyboard.

Basic and the MOS have been incorporated into a single 32k ROM under the title of OSBasic. The MOS version 1.2 plus a few extra functions built in, and now called 2.0. Basic 2 is supplied as the standard language. DFS 2.0 is present, also as standard and is described below in more detail.

OSBasic is normally selected as the priority ROM and as such is numbered 15 and 14. However, to allow other languages to have priority, a new link on the board, S13, may be repositioned to decode OSBasic as ROMs 0 and 1. This avoids the need to rejuggle ROM positions and is a nice touch.

There is no provision for ROM sockets 12 and 13, and remaining ROM sockets are initially set up to receive 8k or 16k ROMs. By resetting a nearby line of links, the sockets can be configured individually to accept 32k ROM firmware. Thus *View and Viewsheet,* or ISO Pascal could be combined onto a single chip and would be seen by the MOS as two 16k images.

Memory Map

The B+ memory map remains the same, ie, mapped as 32k RAM. The remaining 32k of RAM is arranged as 20k of shadow screen memory and 12k of sideways RAM as follows:

20k Shadow screen : &3000 — &7FFF
12k Sideways RAM : &8000 — &AFFF

The shadow screen memory effectively releases the whole of the normal memory, ie, &1900 to &7FFF, for user programs. The new 20k provides the video memory, thus making high resolution screen modes available to even the longest programs. Those of you familiar with the excellent Aries B20 board will know that this has been available for the standard B for well over a year.

When the B+ is switched on the shadow RAM is ignored by the MOS and for all intents and purposes the micro is the same as the B. The command *SHADOW is used to overlay the shadow RAM — however, it will only become functional on the next mode change. This condition is protected through Break but not a CTRL-Break: the shadow RAM may be software deselected with the command *SHADOW 1, followed by a mode change. Seven new mode parameters are provided to perform a *SHADOW n and mode change in one fell swoop: modes 128 to 135 relate directly to modes 0 to 8.

The 12k sideways RAM was implemented to use up the remainder of the 32k of extra RAM. Acorn says this should not be used for 'applications that may need to be compatible with future Acorn products' — presumably it won't be present in any model C. This is a shame as it's a most useful feature and, for my money, a good selling point.

This neglect towards the sideways RAM is apparent in the new Electron-style User Guide, where only two paragraphs mention it — it's not even included in the index! The sideways RAM will not run any ROM software as the MOS does not recognise it for this purpose, which is a shame. While I can fully understand the concern with ROM piracy, it is surely the way ahead. If effective licencing agreements were provided, the need for numerous ROM sockets would be decreased, thus reducing the end-user price.

Using the sideways RAM is cumbersome and relies on use of OSWORD 5 and 6 calls to read and write to it. The area can be used effectively as a data store for Basic programs or to run machine code programs.

Disc Interface

The disc interface is built around the Western Digital 1770 floppy disc controller. This is largely compatible with the Intel 8271, which was the standard up until now, and I've had no problems running the latest software using it. The 1770 is the only other chip socketed on the board, a deliberate move to allow you to insert an 8271 into a socket that straddles that of the 1770.

The DFS is version 2.0, in EPROM on my machine but should be in ROM for production models. The DFS is as it was, but includes several new commands. These include the previously missing format and verify, *FORM and *VERIFY. The other new commands are *CLOSE (close all sequential files); *EX (display directory information); *FREE (space remaining on disc); *MAP (provides a map of the disc); and *ROMS (lists details of ROMs fitted). The *DRIVE command has been modified nicely to allow software controlled double stepping. For example, the command *DRIVE 1 40 would switch drive 1 of an 80-track drive to read 40 tracks. Unfortunately it's not possible to write to a 40-track disc in this manner.

In addition, the DFS ROM also includes the Tube code for use with a second processor.

The Advanced Disc Filing System (ADFS) supplied with Acorn's Winchester hard disc will run the 1770 correctly and allows you to use it to its full potential as a double density disc controller. Acorn will probably be marketing this for the B+ in the future.

Compatibility

Although a new floppy disc controller chip has been designed into the B+ board, maintaining software compatibility has been a prime consideration. As such, the 1770 is only used in its single density mode, which means the machine should fit straight into schools without the need to re-hash existing software. A double density DFS such as the ADFS may be a future development.

The 6502 second processor will work fine, although the extra shadow RAM is of no real use as it will exist in the input/output processor.

Acorn is discussing the possibility of swapping a standard BBC B printed circuit board for the new one. This upgrade would have to be done through dealers, and is likely to cost £250 to £300, so would not be cheap.

Software

Most Acornsoft disc-based software runs OK, but *Elite* would not work: it simply returns the absurd message 'This is not a BBC micro' — well, you live and learn! However, the same cannot be said for other commercial software. For example, Micro Power's *Castle Quest* did not load, neither did *3D Grand Prix from* Software Invasion, nor *Fortress* from Pace. This is probably due to the disc protection methods used rather than the software itself.

But surprise, surprise, the screen handling on *View2.1* does not work correctly with shadow RAM, which must be most embarrassing to Acorn and Acornsoft; version 1.4 does work, however.

The trouble lies in the setting of HIMEM — *View* 2.1 was written specifically for the American market, and when in shadow mode the firmware thinks it's a Yankee. It therefore resets its text windows which means scrolling up through text is done on a single line! Acorn have provided a patch program to solve this which is given in listing 1, page 112. Neither *Wordwise* nor *Wordwise Plus* work in shadow mode.

Is it worth it?

My own view is that the B+ is 18 months too late. However, Acorn has sat on its laurels for the past two years rather than persuing an aggressive path of design and development. The ridiculous price tag of £499 will put it beyond the hobbyist, and possibly educational establishments too. Existing BBC owners should not consider parting with their cash in this way. If you want extra facilities, invest in the B20 board and the *Acorn User* UserRAM. If you're looking for a BBC micro, then the B+ may be worth considering as stocks of the BBC B will be diminishing and shortly become non-existent: but only if the price comes down to a more reasonable level.

The future

The B+ must be seen as a stop gap, pending the arrival of a model C. What such a micro will contain is still conjecture, but guesswork would lead me to believe that Acorn will persist with outdated eight-bit technology, albeit very fast at around 12MHz, and easy to program. This is obviously to allow the upward compatibility the BBC project stands for. The 16-bit 65C816, a 6502 lookalike, seems to be out of favour at present, though it does form the heart of the Communicator, and Acorn has never shown interest in anything as exciting as the 68000.

Eight bits would dictate a memory map arrangement similar to that of the B+ although possibly with paged RAM banks expanding the total to 128k. Working towards a complete PLA system would drastically reduce production costs by doing away with costly TTL chips.

I would expect the MOS to have been re-written and to be much more user friendly, with replacement of *FX operations with proper command names, eg, *LINEFEED for *FX6. In addition, Basic might have extra goodies such as an on-screen program editor similar to that found with Pascal.

Only time will tell, but I won't be planning my Christmas presents quite yet!