

Permanent Memory Systems

B2P 6502 Second Processor for the BBC.

WHY ADD A SECOND PROCESSOR?

It has long been realised, by companies such as ACORN, that the best way to increase the power of a computer is to add a Second Processor. Up until now the addition of a Second Processor has been an expensive route to expansion.

NOW! PMS can bring you SECOND PROCESSOR POWER at a price you can afford. The B2P 6502 Second Processor costs ONLY £86.91 excl. VAT (£99.95 inc. VAT).

LOOKING FOR MORE MEMORY?

This principal advantage of adding a 6502 Second Processor to your BBC, is that BASIC programs, languages and machine code programs written for a standard BBC will run unaltered on a 6502 Second Processor, but with far more available memory. All software which is to work in a Second Processor must obey the official Acorn TUBE protocols. Languages such as BASIC, VIEW, PASCAL, COMAL etc. closely follow these protocols and so these will run normally with the B2P. Programs which disobey these protocols (usually machine code games) will not run on any Second Processor.

By far the greatest increase in available RAM is attained by adding a Second Processor. Shadow RAM, another method of RAM expansion, simply frees the memory normally used for the screen giving at most 20K extra RAM. Also a major disadvantage of this means of expansion is the internal hardware modifications required when you fit shadow RAM.

In comparison the B2P can give an increase of AT LEAST 38K of RAM (when using "Hi" Languages) - with absolutely no internal modifications.

On a standard BBC with ADFS, using a high resolution screen mode, less than 5K is free for programs, data or word processing text. Running standard versions of languages, the B2P increases this available memory to AT LEAST 30K in ALL screen modes. With "Hi" versions of languages a massive 44K is free in HiBASIC, 47K in HiVIEW, and similar increases with the other "Hi" languages.

Machine code programmers can directly access an enormous 60K of RAM for programs and data.

These large amounts of RAM become available as a result of the sharing out of workload. With a B2P fitted, all the BBC RAM is dedicated to I/O processes - disk workspace, screen memory, expanded character sets, soft key buffers etc.... The memory claimed for these purposes in the BBC is free for user applications in the B2P.

In BASIC PAGE sits at £800, and HIMEM is at £8000 irrespective of the screen MODE in use. In BBC HiBASIC - available from PMS - PAGE=£800 and HIMEM=£8000!! and VIEW has 30462 bytes free in all MODES when running on the B2P (47K free for HiView).

The B2P runs a 6502A processor at 2MHz. This is slower than the Acorn 6502 Second Processor which runs at 3MHz. This means that the increase in speed of program execution while running the B2P is not as great as with the Acorn 6502 Second Processor. There is however a significant speed increase on the B2P since a degree of parallel processing takes place especially during graphics handling. Using a standard BASIC program to plot a filled circle the B2P is 30% faster than the BBC alone.

TECHNICAL DETAILS

The B2P plugs into the BBC TUBE via a 40-way header, with a 2-way header connected to pins 11 & 12 of the 1MHz Bus, with absolutely NO INTERNAL MODIFICATIONS required. The B2P draws its power from the TUBE connector, and its power consumption is well within the recommended limits.

The B2P communicates with the BBC via the TUBE byte at &FEE5, and by a page of memory located at &FD00 in the BBC. All the Acorn TUBE protocols are supported by the B2P Operating System (the BOS), which is located in a 16K ROM in the BBC. The BOS ROM which is supplied with the B2P also contains a number of TUBE utilities.

The default language - BASIC, VIEW, COMAL etc, in the BBC, is automatically copied over the TUBE into the B2P on a hard-break or when the language is initialised by a STAR command, eg *WORD. Certain languages may be directly *LOADED from disk into the B2P and do not require the presence of the language in ROM in the BBC. For Example, HIBASIC can be directly *LOADED to &B800 in the B2P.

The BOS implements full 32 bit addressing for filing system commands. Addresses in the I/O are prefixed by &FFFF, and addresses in the B2P by &0000 (leading zeros may be omitted). To save the screen the command might be - *SAVE"screen" FFFF3000 FFFF8000. To save a block of RAM in the B2P the command might be - *SAVE"memory" 2000 3000. Basic programs will automatically be loaded to PAGE, no matter what address they were saved from.

The following languages have all been tested on the B2P - BASIC, HIBASIC, VIEW, HIVIEW, VIEWSHEET, VIEWSTORE, COMAL, ULTRACALC, PROLOG, ISO-PASCAL, LISP, Acornsoft LOGO, MICROTTEXT Plus. Other software which has been written to Official Acorn TUBE protocols will also run.

B2P OPERATING SYSTEM ROM (The BOS)

The BOS ROM contains the TUBE operating system for the B2P and various Second Processor Toolkit Utilities.

*B2PON Activates the B2P. Unlike the Acorn Second Processors the B2P can be left plugged in to the BBC without affecting the operation of the BBC, and is only activated when this command is issued.

*B2POFF Switches off the B2P and returns to the I/O processor. Performing a B-BREAK has the same effect. The B2P can be reactivated by *B2PON. The contents of the B2P RAM are preserved at all times.

***GO** This command is exactly equivalent to the CALL command in BASIC but can be issued in the B2P when any (or no) language is present.

***GOIO** This is the same as *GO except that it will CALL a machine code routine located in the I/O Processor.

***TBUF** Configures the free RAM in the I/O processor (between OSHWM and &3000) as a Printer Buffer (about 4K).

***PURGE** This command controls whether or not the buffer is emptied when the Escape key, *FX12 or *FX15 are used.

***IOREAD** Allows blocks of memory in the I/O processor to be moved across the TUBE into the Second Processor, eg to copy a BASIC program from the I/O to the B2P.

***IOWRITE** This command is similar to *IOREAD except the transfer occurs from the B2P to the I/O processor.

***TSHIFT** This command moves a block of memory within the B2P.

***TZAP** Enters a powerful, interactive, Second Processor memory editor. The full 64K of the B2P memory can be examined and edited in real time. Input can be either in ASCII, HEX, Decimal or Binary.

***TSEARCH** Using this command, all occurrences of a string of bytes in the B2P memory will be located. The interactive memory editor is entered each time a match occurs.

***TDIS** A complete 65C02 disassembler. This disassembles machine code programs in the B2P memory.

HiBASIC & HiWORDWISE PLUS

PMS are licensed to sell ACORN HiBASIC for the B2P at a cost of £15.00 including VAT and carriage. HiBASIC can be supplied on 5.25" disk OR ROM - please specify when ordering.

A special "Hi" version of Computer Concepts WORDWISE PLUS is available for the B2P (standard WORDWISE and WORDWISE PLUS will not work on the B2P). This version gives up to 44K free for text in any screen mode, and only works on the B2P Second Processor. It requires the standard WORDWISE PLUS ROM to be present on the I/O Processor. PMS HiWORDWISE PLUS costs £6.00 including VAT and carriage. It is ONLY available from PMS and comes on 5.25" disk.

65C02 PROCESSORS on the B2P

If you write programs in 6502 machine code, and you wish to take advantage of the extra instructions available on the CMOS version of the 6502, then for an additional £5.00 inc VAT, a 65C02 can be fitted to the B2P.

OTHER DETAILS

The B2P is housed in a compact, beige ABS case (5.5" x 4.5"). The B2P sits to the right of the BBC and has a very small footprint. If required the B2P may be removed from its case and mounted internally in the BBC. If the 1Mhz bus connector is used for other devices the NFPD signal may be picked up on the main BBC PCB and PMS will supply a suitable cable and miniture connector for this purpose.

ORDERING THE B2P-6502

The B2P-6502 costs £86.91 plus VAT @ 15% (£99.95 including VAT) plus £2 post and packing. The B2P comes with the BOS ROM and a comprehensive User Guide which covers all aspects of the Second Processor and the TUBE Utilities.

The B2P has a full 6 months guarantee.

Please use the Order Form below.

B2P-6502 Second Processor ORDER FORM

Please send me _____ B2P-6502 Second Processor at £99.95 + £2 P&P.
_____ HiBASIC at £15.00 on ROM/Disk (delete as reqd.)
_____ HiWORDWISE PLUS at £6.00

If a 65C02 processor is required in the B2P add £5.00

All the above prices include VAT at 15%.

I enclose cheque/postal orders for a total of £ _____.

OR

Please debit my ACCESS account by £ _____.

ACCESS A/c No. _____

NAME _____ SIGNED _____

ADDRESS _____

POSTCODE _____

CHEQUES SHOULD BE MADE PAYABLE TO 'PERMANENT MEMORY SYSTEMS'

Send to: Permanent Memory Systems, 38 Mount Cameron Drive,
St Leonards, EAST KILBRIDE, G74 2ES

Please allow 28 days for delivery.