

# REVIEWS

## HARDWARE

# SECOND HALF

**A 64k second processor at half the price of Acorn's?  
Benjamin Rietti puts the B2P through its paces**

Many have criticised Acorn over the lack of memory in the BBC micro. That's where the idea of a second processor came in, but at almost £200, not every owner can afford one in order to make the most of the micro's outstanding capabilities.

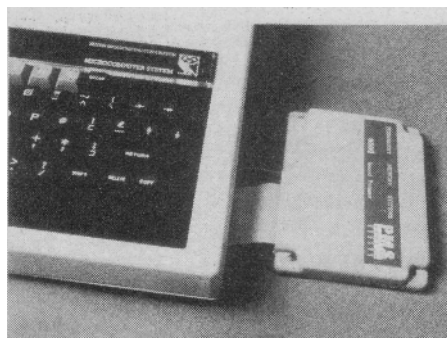
But the Scottish company Permanent Memory Systems (PMS) has now launched its own second processor at half that price.

You are not confronted with one of Acorn's infamous 'make it look really big, and leave over-sufficient room for ventilation' type boxes. Instead, there's a literally pocket-sized module held together with four screws, with a 6in ribbon cable trailing out. There is also a twoway wire for connection to the 1MHz bus socket.

Like the Acorn 6502 Second Processor, PMS has used a 65CO2 chip, which includes the 65CO2 opcodes which programmers can use to optimise speed and memory. The 16k ROM chip supplied includes commands to disassemble 65CO2 and also transfer memory between Input/ Output (I/O) and Tube processors.

The beauty of extending memory via a second processor is that there is no need for additional soldering or moving about of integrated circuits – it's just a case of 'plug in and go' – and the PMS B2P is no exception. The 16k EPROM chip supplied, termed 'the BOS ROM', must be fitted in a spare ROM socket inside the micro. This takes care of the interface between micro (I/O) and the second processor (Tube), also giving the user extra utility commands, including a full 65CO2 disassembler and Tube memory editor.

After plugging in the Tube cable, the PMS B2P requires additional connection via the 1MHz bus. This is not necessary on the Acorn 6502 Second Processor because it contains the 'Tube ULA' which effectively deals with the highspeed memory transfer over the Tube port. This constitutes the bulk of the price difference between the two second processors, and therefore PMS had to bridge the gap using memory set aside for the 1MHz bus. This also explains why the PMS B2P only runs at 2MHz (as does the micro itself) whereas



**Low price, small box, high power**

the Acorn one can run between 3MHz and 4MHz. The link is made via a lead plugging onto one of the pins on the 1MHz socket on the underside of the micro. If this port is already in use, for example with an EPROM programmer or Music 500, then PMS will supply, free of charge, a clip to be attached to a diode

Despite the lack of Tube ULA, the PMS B2P is amazingly compatible with products originally intended for the Acorn beast. I have tried and tested several pieces of popular software and hardware, and found all the following to be compatible: ADT ROM, Tube Elite, AMX Super Art, CommSoft, HiInterSheet, Ultracalc, View, ViewSheet, ViewStore, ViewSpell, BitStik II, Music 500, and Music 5000.

In the case of *Wordwise +*, PMS has arranged with Computer Concepts to supply a special version that will relocate in their B2P giving over 48,000 characters free, with preview in 80 columns! This will only work with the PMS B2P (with *Wordwise +* fitted inside the main machine) and is sold for £6 by PMS.

Given compatibility with such products as RoboCom's Bitstik II, the cost of running the system is cut dramatically, opening up broader horizons and user bases.

The B2P will function equally well with both Acorn DFS and ADFS, including ACP's Advanced 1770 DFS. However, at the time of writing, it will not function properly using Econet, which will unfortunately cut out the educational market and the possibility of a cheap fileserver until PMS root out the problem.

The increased processing speed is very

noticeable with graphics usage, and I have managed to attain up to a 65 per cent increase in speed. However, since the B2P is running at 2MHz, simple arithmetic algorithms can actually run slower using the B2P rather than I/O memory.

The main advantage in any second processor is the extra memory available – up to 44k for Basic (or 30k without HiBasic) and 60k for machine code applications. And you can do everything in high-resolution without losing user memory. *HiWordwise+* and *HiView* (or *View 3.0*) will give 48k for text in 80 columns.

In Basic, PAGE is set to &800 for all applications. HIMEM would usually be &8000, although if using HiBasic, this is extended to &B800. PMS will supply HiBasic, either on disc or EPROM chip, for just £5. You do not require sideways RAM for the disc-based version, as the second processor will allow any language ROM to be loaded into its own RAM – typically at &8000, but if it is specially designed for second processor use, it can load higher, saving constant inserting and unplugging of fragile chips. Comal, Prolog, Lisp, IsoPascal and MicroText+ have all been tested, and work well on the B2P.

PMS's manual has been very well written. My only reservation here is the lack of explanation as to memory transfer over the Tube using the Acorn OSWORD calls – Acorn also neglected this point in its own manual, although PMS assure me they will include these details in the next edition.

Well, what more can I say? PMS has added to the Tube what Acorn missed out, supplying the necessary utilities to make control much easier and more user friendly. I have no hesitation whatsoever in giving it a firm thumbs up – high power, at low cost, and from a company renowned for its friendliness and policy of continual improvement to products. I hope it does as well as it deserves.

*The PMS B2P 6502 Second Processor (for the BBC Model B only) costs £99.95 plus £2 post and packing from Permanent Memory Systems, 38 Mount Cameron Drive, St Leonards, East Kilbride G74 2ES.*