

Single Board Computer has half megabyte of RAM

British microcomputer manufacturer Positron Computers has taken another leap forward in the advanced microcomputer performance stakes with a new 2Mhz (500ns cycle time) dual processor version of their highly successful 900 Series microcomputer. The new processor unit is based on their advanced 9000/4 processor board.

Positron are using two Motorola 68B09E 2Mhz microprocessors communicating through dual ported high speed memory. The main processor enlists the co-operation of two Motorola 68B29 2Mhz Memory Management Units (MMU) to expand the processor address space to a physical address space of one megabyte with a write protection capability. The MMUs also support the efficient implementation of the advanced

multi-user multi-tasking operating system OS-9 by providing high speed task switching. Memory management is supported by high speed DMA circuits which perform block memory to memory transfers in addition to I/O to memory transfers.

The second processor is dedicated to the control of the four serial I/O ports on the 9000/4, using a number of protocols, all running up to 9600 baud; an impractical task for single processor systems supporting such sophisticated operating systems as OS-9. This I/O processor also frees the main processor for the execution of user software.

The 9000/4 contains an IEEE-488 interface as standard for which Positron supply software to enable the user to control a wide range of

IEEE-488 compatible devices. The 9000/4 also maintains compatibility with the Positron IEEE-488 network for interconnecting multiple processors and disk units.

User memory of up to 512k-bytes of RAM is available on board, supplemented by 256k-bytes of EPROM for the OS-9 operating system and any System Integrator's or OEM's application software.

The provision for flexible expansion has been maintained with the inclusion of the 'bus expansion port'. This enables OEMs to connect their own specialised IO boards to the 9000/4 under the control of their own PROMed software. Positron are about to announce a number of expansion IO boards for digital and analogue applications.

Plug in I/O board provides interface for process control

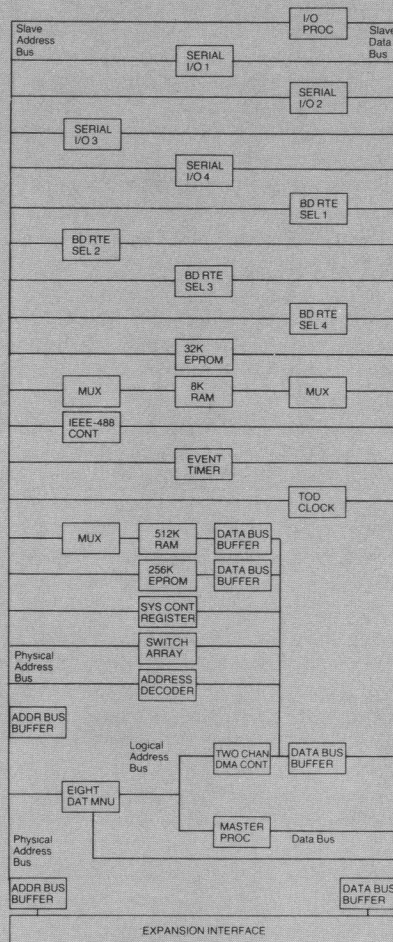
The Positron 9000/6 I/O board provides an easily implemented low cost interface to the 'real world'. The board plugs directly into the Positron processor's 'bus expansion port' to give four additional facilities:

- 12 Bit analogue to digital conversion with sixteen channels (single-ended) or eight channels (differential input) under software control.
- Four 12 Bit digital-analogue conversion channels under software control.
- 32 Bits of bi-directional parallel input/output with optional buffering, selection of direction under software control.
- 3 Independent 16 Bit timer channels that may be cascaded or gated externally, with software selection of timer data.

Positron have added the I/O board to their range to extend the opportunity for low cost applications of their 9000 series boards in process control. The extensive facilities provided for ROMed application software can sometimes mean that disk storage is not required at all. Positron 9000 boards are already used in a wide range of control and logging applications and are incorporated into:

Data Acquisition Systems
Weighing Equipment
Process Control Systems
Analytical Equipment
Alarm Systems
Test Equipment
Energy Management Systems

9000/4 BLOCK DIAGRAM



'C' and OS-9 give outstanding combination

The popularity of the 'C' language for microcomputers is continuing its rapid growth. Commenting on this, Peter Plinston, managing director of Positron Computers said:

based Positron Computers, 'C' and OS-9, the UNIX-like operating system, form an outstanding combination."

Positron can offer a low cost, ready to run, 'C' development system for as little as £2288 (excluding

The UNIX* operating system is rapidly becoming the de facto standard for mini and micro-computer multi-programming operating systems because of its versatility and relatively simple, yet elegant structure.

However, UNIX was designed for fairly large scale minicomputers (such as large PDP-11s) that have high CPU throughput, large fast disk storage devices and a static I/O environment. UNIX is not particularly time or disk-storage efficient, especially when used with

In announcing their latest product using the Motorola 6809 microprocessor Positron Computers have elected to remain with Microware Systems OS-9 operating system, which is modelled after UNIX. OS-9 was designed to retain the overall concept and user interface of UNIX, but its implementation is considerably different. OS-9's design is tailored to typical microcomputer performance ranges and operational environments. For example, OS-9, unlike UNIX, does not dynamically

disk because floppy disks and many lower cost Winchester disk systems are simply too slow to do this efficiently. Instead, OS-9 always keeps running programs in memory and emphasises more efficient use of available ROM or RAM.

Positron have found OS-9 to be perfectly suited to the 6809 processor, and with the introduction of their latest product using 2Mhz (500ns cycle time) 68B09E processors, very high performances are being achieved from the combination.

BASIC09 advanced programming language has PASCAL-like structures

The choice of BASIC or PASCAL for use in numerical or scientific programming on microcomputers has been a problem for the system designer for some years. Positron Computers are able to offer a solution on their range of microcomputer systems that provides the best of both languages.

BASIC09 is an enhanced and structured BASIC language programming system specially created for the Motorola 6809 microprocessor. In addition to the standard BASIC language statements and functions, BASIC09 also includes many of the most useful elements of the PASCAL programming language so that programs can be modular, well-structured and use sophisticated data structures based upon combinations of the five basic data types (byte, integer, real, boolean and string).

'Module' concept readily supports application software in EPROM

The OS-9 operating system running on the Positron range of computers is a multi-tasking, multi-user real-time operating system, offering extensive support for structured, modular programming.

OS-9 introduces some important new features in microcomputer operating systems design that are intended to make the most of the capabilities of third generation microprocessors such as support of reentrant, position independent software that can be shared by several users simultaneously to reduce overall memory requirements.

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BASIC09 is unusual in that it is an interactive compiler that has the best of both kinds of language system - it gives the fast execution speed typical of compiler languages plus the ease of use and memory space efficiency typical of interpreter languages. BASIC09 is a complete programming system that includes a powerful text editor, multipass compiler, runtime interpreter, high-level interactive debugger, and a system executive.

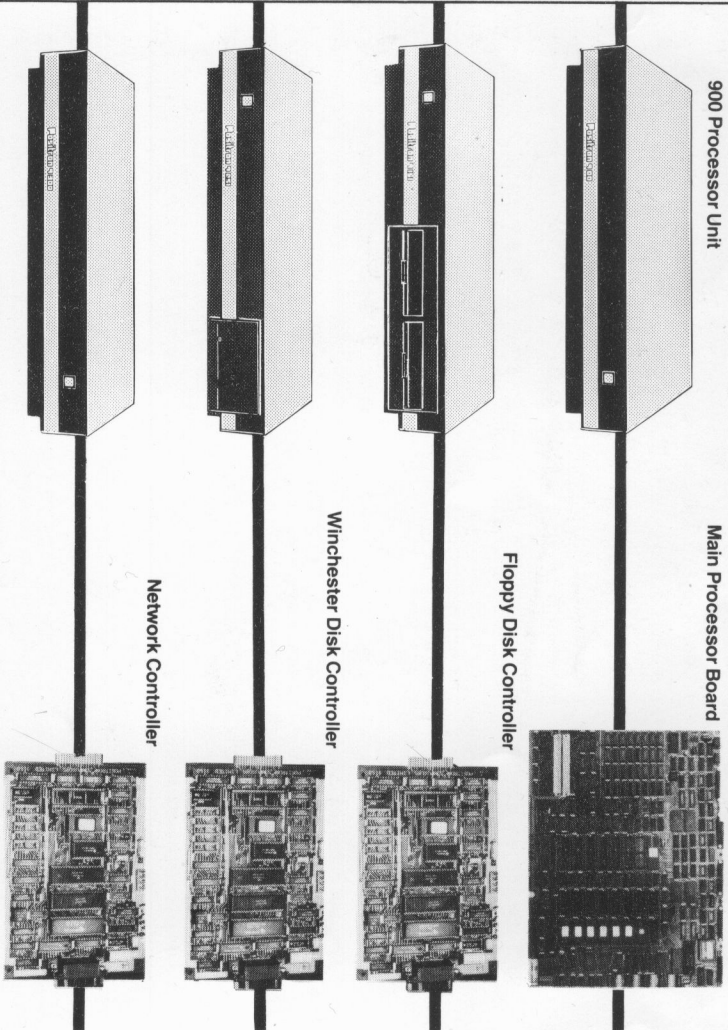
The two versions of the bubble sort program shown below can both be run by BASIC09 without change. The first is unstructured and difficult to understand, but it is traditional BASIC; the second program is well structured and easy to follow by use of the PASCAL-like control structures. With BASIC09 it is possible to program either way, or mix the best of both, making it considerably more advanced than the BASICs normally found on microcomputers.

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Bubble Sort example
DIM Array(5)
LET I=5
IF I=1 THEN 120
FOR J=1 TO I-1
  IF Array(I) <= Array(J) THEN 90
  T=Array(I)
  Array(I)=Array(J)
  Array(J)=T
NEXT J
I=I-1
GOTO 30
120 RETURN

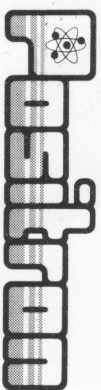
DIM Array(5)
outer=5
WHILE outer>1 DO
  outer=outer-1
  FOR inner=1 TO outer
    IF Array(inner)>Array
      (inner+1) THEN
      temp=Array(inner+1)
      Array(inner+1)=Array
      (inner)
      Array(inner)=temp
  NEXT inner
ENDWHILE
RETURN
    
```

6809 COMPUTERS SYSTEMS BOARDS



The Positron range offers a selection of Systems and Boards with outstanding price/performance

Positron Advanced 6809 board: ■ 68B09E master processor with 500ns cycle time ■ 64K to 512K on board RAM ■ 4K to 256K on board EPROM ■ 4 × RS232C Serial ports with programmable baud rates ■ IEEE-488 port with talker/listener/controller capability ■ MC6840 Timer ■ MC146818 Time of Day Clock with RAM and battery back-up ■ Expansion interface ■ Operates from single 5V power supply



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