



# MICROPROCESSOR DEVELOPMENT SYSTEMS



*The fastest route to the finished product*





# Microprocessor Development

Successful products are those which arrive on the market at the opportune time — on time, performing their roles faultlessly at an economic price. In the case of goods for the mass consumer market particularly, it is crucial that the elapsed time between concept and manufacture of the final commercial product is kept to a minimum, so that a market lead can be established and maintained.

Optimising the design group's progress towards the target product is especially important. Development timescales then remain within bounds and costs are held within budget.

Today, as more products incorporate microprocessor power to increase their versatility, the design process has become more complex, demanding the best possible tools to ensure that hardware and software compatibility is maintained.

Positron's Microprocessor Development Systems have been produced with all these fundamental concepts in mind. They feature:

## UNIVERSALITY:

Rather than dedicating the system to a single microprocessor or even one manufacturer's range of products, the Positron MDS offers support to a wide range of 8 and 16 bit devices from the principal vendors including Intel, Motorola, National Semiconductor . . .

Completion of one development project then frees the unit for its next task which may use the same or different processors.

## MULTI-USER CAPABILITY:

It is seldom possible for one design engineer to handle all product development tasks single-handed. The Positron MDS permits multiple user access for simultaneous program development and hardware/software integration.

## REAL TIME EMULATION:

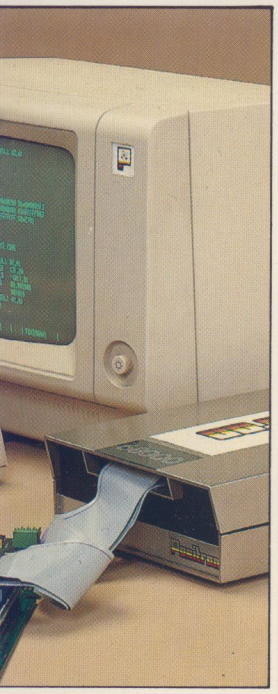
The Positron system permits incorporation of one or more in-circuit emulators for the development of both single or multiprocessor systems. In-circuit emulation provides an enhanced degree of confidence through the knowledge that all target system parameters have been met in full before hardware and software are finally committed to production.



THE FASTEST ROUTE TO THE FINISH



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The Positron MDS is already proving an ideal engineering development tool in industrial, technical and scientific environments. Using the Positron range, industry is converting concepts into realities — on time and within budget.

## Some of the benefits of the Positron approach:

- Because the Positron MDS supports such a wide range of microprocessors from a range of vendors, the designer is less inhibited in his choice of an 'ideal' processor to fulfil the particular design task in hand. MDS reusability has a further advantage — there is no development system learning curve for the designer when starting a new project.

### MICROPROCESSORS SUPPORTED:

6800 6801 6802 6803 6805 6808 6809 6809E 68000 68008  
68010 68020  
8048 8049 8050 8085 8086 8088 80186 80188  
6502 1802 Z80 NSC800 NSC16016 NSC16032

- The OS-9 Operating System, written in assembler, offers highly efficient data handling, short processing times and rapid response, ensuring designers are not left idle, waiting for results. OS-9 executive control also takes care of multi-user software development through a range of access rights, together with record locking, within tree structured directories. Libraries of proven routines can be built up for common use, without fear of corruption and in the knowledge of their reliability. A spooling capability aids the ready production of hardcopy documentation, for easier debugging. These facilities keep the design team in full control of the project throughout its lifetime.

- Four RS232C ports and an IEEE488 controller permit a versatile mix of VDUs, printers, in-circuit emulators and instrumentation to be integrated.
- Code may be written in a range of languages appropriate to the application task. Assembler, 'C', BASIC09, Pascal and FORTRAN languages are each admissible and can be linked together to form a single target system. With OS-9 and the variety of applications languages, software development is under greater control and productivity is improved.
- As work proceeds in-circuit emulators provide real-time proof of the design's validity, highlighting those technical problems which might be difficult to solve if not identified early in the development process. A universal instruction set of 23 commands (including a HELP facility), supported by real-time trace, single stepping on cycle or instruction, an ability to display and manipulate memory and registers, all make for the speedy resolution of problems.

```

ASSEMBLE      A inc
BACKWARD TRACE B (R) addr[ of q]
CYCLE STEP    C (W)
DISABLE       D 1:H:R
ENABLE        E 1:H:R
FORWARD TRACE F (R) addr[ of q]
EXECUTION     G (addr)
BREAKPOINT    H (R1:2)11 addr[ of q]2: addr
INPUT         I port[Coltime]
JUMP          J addr
LIST TRACE    L (step[ all a2L q...3333]Sstep)
MEMORY        M (a2C2C)
MEMORY SEGMENT N n
OUTPUT         O port d[42C43C4433]
REGISTER      R (R0:1:2:3:4:5:6:7:80:1:1:2:3:4:5:6:SP:UP:SR)
INSTRUCTION STEP S (SIRIC)
TRANSFER/TEST T al a2 S(Ma2)
UPLOAD        U al a2C111
RESET         X Call a23
DISASSEMBLE   Z al (a2)
DOWNLOAD      : (INT)/ (TEX)
HELP          ?
ATTENTION     !
)
PRC=02402 | | | | | EDTL | | | | | FDK(9500) |
    
```

**Positron Microprocessor Development Systems have been designed and manufactured with strict attention to quality and reliability. With a "hot line" for expert engineering support and nationwide maintenance available, they make an advanced and particularly cost efficient development tool.**

**When in the engineer's hands, they offer the fastest route to the finished product.**

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# TECHNICAL SPECIFICATION

- Dual processor system with memory management units provides 1M byte address space with write protection
- RAM 256K bytes or 512K bytes
- ROM 256K bytes (40K bytes operating system software)
- Dual channel DMA controller — supporting memory to memory block moves
- Time of day battery backed-up clock
- Three general purpose timers
- High speed I/O processor interface with 8K byte dual port RAM
- Four RS232C ports, 75bps-9600bps  
Software programmable baud rates with hardware flow control
- IEEE488 interface, full talker, listener and controller specification with full supporting software package
- Standard software: OS-9 level II operating system  
BASIC09 structured BASIC  
Dynastar screen editor with document formatting processor

## FLOPPY DISK SUBSYSTEM

- Dual double-sided disk drives — 2M byte/disk formatted
- Intelligent disk controller with full track buffering
- Able to read non-standard format disks

## WINCHESTER DISK SUBSYSTEM

- 26M byte high performance, voice coil Winchester drive
- Double-sided floppy disk drive — 2M byte formatted
- Intelligent disk controller with full track buffering

## OS-9 OPERATING SYSTEM

- Multiuser/multitasking
- Language independent modules
- Device/file independent I/O
- Piping
- Tree structured directories
- Password protection
- File access rights
- Record locking
- ROMable applications software

## IN-CIRCUIT EMULATORS

- Real-time emulation with no wait states
- Internal or external clock
- Real-time forward and backward traces up to 2048 cycles
- Up to 8 hardware trace points for examining logic status
- Two hardware breakpoints, one with wild card address specification, strobe select and count option
- Instruction and cycle step
- 32K bytes emulation memory expandable in 32K byte increments

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Our design policy is one of continuous improvement. The foregoing description is therefore subject to change without notice.

