

## A POTTED HISTORY OF PERSONAL COMPUTING

The evolution *of* the personal computer has depended on a range of factors, including the pre-existence of an established computer technology. New factors critical to this evolution were:

- Cheap memory (and the fulfilled promise *o-f* cheaper to come)
- Microprocessors
- Memory mapped video
- CP/M
- Programmable sub-components

### **The Intel 8080**

The first 8 bit microprocessor the 8080 was released by Intel in 1974. For a while Intel enjoyed an absolute monopoly - and in mid 1975 each 8080 chip had an Australian price *o-f* \$288.. In that year Motorola released the 6800, the -first *o-f* the series of Motorola processors - 6809 and the important 16 bit processor the 68000. The 6500 (almost compatible with the 6800) was released in late 1974 to be -followed -following a patent dispute by the 6502 ( incompatible with the 6800).

### **The Altair**

The first "Affordable computer' the Altair was released as a kit in early 1975. This microcomputer was based on the 8080 and was organised as a card cage with 100 pin cards. The bus so de-fined (the s-100 bus) permitted other manufacturers to make compatible boards.

### **The Lee Felsenstein VDM**

Processor Technology released the [Lee Felsenstein] 'VDM-1' Video Display Module -for the Altair bus late 1975. This 1K memory board offered video output -for a 16\*64 text screen. On this VDM bit 7 was used to specify inverse character

### **The Poly-88**

What is. indisputably the first personal computer was the Poly-88 which was released mid 1976. (My order *o-f* April 1976 arrived at La Trobe in July). The Poly-88 used an 8080 microprocessor, utilised the Altair's s-100 bus, and had as system software a 1K monitor (rather similar to the MicroBee Monitor), Video output was via a 1K VDM board. The Poly-88 had modest graphic capability (48\*128) as the VDM used bit 7 to discriminate between ordinary ASCII and predefined 3\*2 graphic characters. Mass storage was via acoustic tape. A Basic interpreter was supplied on tape.

### **The Zilog Z-88**

The Z-80, an enhanced version *o-f* the 8080 requiring only a 5 volt power supply was released *by* Zilog in 1976.

### **Byte**

Byte magazine commenced in September 1974. This magazine provided the principal forum for advertising microcomputer products in the coming decade.

### PCC and TINY Basics

Late in 1975 the Peoples Computer Company - a non-profit group wrote the specifications -for a **tiny Basic** - a version of Basic that could run in a 4K microcomputer. In response to the challenge several such basics were written and were published ( 1975/6) by the PCC, (which also published descriptions of the tiny LOGO developed by this writer).

### The TRS-88 = Z-80 + Tiny Basic + Memory mapped video

The first mass produced microcomputer was released by Radio Shack in 1977. About 28,000 were sold in 12 months, which about doubled the number of PCs then in existence. This microcomputer, the TRS-80 (popularly termed the Trash-80) was very closely modelled on the architecture of the Poly-88. Thus it features a 16\*64 WM, with 3\*2 graphic characters leading to coarse 48\*128 screen graphics. The TRS-80 was however implemented on a single PC board and used the Z-80 microprocessor, and included in ROM a tiny basic (the first Microsoft Basic in ROM). Model I had in addition a whole 8K of dynamic RAM. The only mass storage was acoustic tape.

### The Apple = 6502 + Memory mapped colour video + packaging

The Apple was also introduced in 1977. Based on the 6502 microprocessor. Unlike previous memory mapped video, the Apple permitted reconfigurable memory, and in high resolution mode utilised 8K of RAM. There were no update streaks in the video and colour was also available. All told very acceptable -for computer games. The Apple was attractively packaged.

### Floppy disk

The first floppy discs (8 inch) had been developed in 1973 as a means of providing a boot program - for ("main-frame") IBM computers. In 1977 Shugart released a 5 1/4 inch "Micro-floppy" drive at a relatively modest price. By late 1977 CP/M became available -for a range of microcomputers using this drive. This early availability caused CP/M to become the de-facto standard operating system for 8080 and Z-80 microcomputers.

### MSX computers

Most recent -family of Z-80 based PCs, the MSX standard, of Sanyo and other Japanese manufacturers, plus Coleco and Spectravideo, involves VDM memory that is in addition to main processor memory and cannot be directly addressed by the Z-80 but only through Z-80 ports that communicate to a TMS 9918A video display processor chip.

### IBM PC = 8088 + MS DOS + Memory mapped video

The Intel 8086 released in 1979 is a microprocessor with 16 bit data paths and 16 bit registers and in-built (integer) multiplication and division. The address space is 1 megabyte but as the 8086 does not possess any register larger than 16 bits -four 16 bit segment registers are used in the calculation of physical addresses. A version of the 8086 with external 8 bit data paths, the 8088 was used as the processor for the IBM PC circa 1983. The IBM PC has 1 Mbyte of memory partitioned into 640K of program useable RAM. The IBM PC uses memory mapped video and utilises the 6545 CRTC controller (the same controller as that used in the MicroBee). For the monochrome text display, 4K of RAM -from B0000 is utilised. Within the video RAM, every second byte is used to specify an "attribute" such as blinking rate -for that screen position. In graphics mode odd and even scan lines are stored separately, which makes the movement of a graphic about the screen tricky. BIOS utilities can perform these operations conveniently, but these are far too slow for dynamic graphics. Although the video features of the IBM PC are poor -for the 80's, its operating system MS [Microsoft] DOS represents a most significant [if flawed] advance in microcomputer operating systems. A major factor in its marketing success has been development of much screen oriented software

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**Notes added in 2002:**

The above 1986 article was NOT intended to be a complete history of personal computing:

Some omissions that should be noted are:

The first 8-bit processor was the Intel 8008, but this was followed (and totally superseded) about 18 months later by the Intel 8080 – which was the processor for the Altair.

In the 70's there were several other microprocessors developed and marketed, such as the National SC/MP, and the Fairchild F8, but as early as 1986 these were viewed (by HAC) as historical dead-ends.

Other dead-ends of the 70's include 'microcomputers' based on the Motorola 6800.

The IBM PC described is the XT model, released in 1983, 360K of RAM, hard disk drive controller.. In 1981 the basic IBM PC was released, a really 2<sup>nd</sup> rate 'microcomputer' with just 64K of RAM, no HDD, mass storage to cassette.

In 1984 the IBM PC/AT was released, based on a true 16-bit processor, the 80286, and featuring the ISA (Industry Standard Association) bus. This architecture served as THE PC architecture for Wintels until the PCI replaced the ISA (progressively) in the 90's.

The earliest version of Windows (1.0) was announced in November 1985.

The Potted History ignores UK highlights – the Sinclair (similar to the RST-80) and the Acorn..