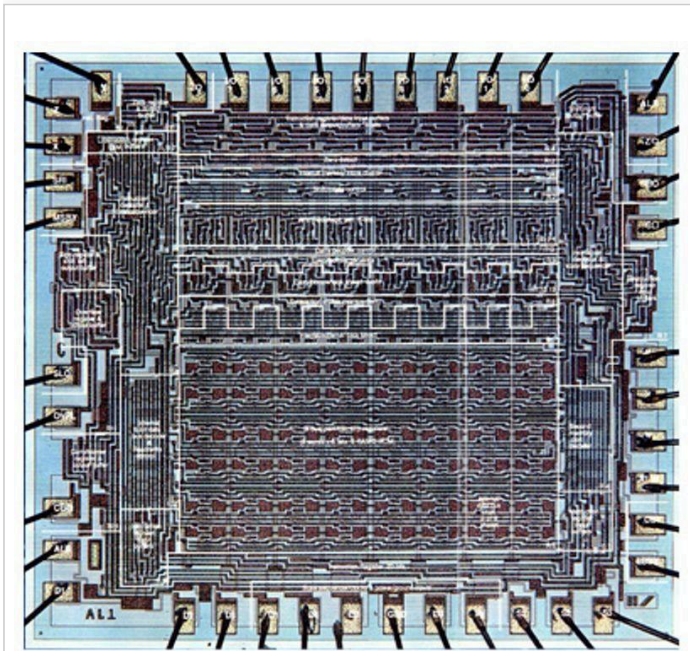


1971: Microprocessor Integrates CPU Function onto a Single Chip

Silicon-gate process technology and design advances squeeze computer central processing units (CPU) onto single chips.



© Four Phase Systems, Inc. AL-1 8-bit computer processor slice. Design commenced October 1968. Final working devices March 1969

Courtesy of: Lee Boysel



(PACE), TI (TMS9900), and Zilog (Z8000). Boosted by the PC boom of the 1980s, Intel's 8086/8088 (IBM PC) and Motorola's 68000 (Macintosh) devices enjoyed the widest market success.

« Previous Milestone

Next Milestone »

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By the late-1960s, designers were striving to integrate the central processing unit (CPU) functions of a computer onto a handful of MOS LSI chips. Building on 8-bit arithmetic logic units (3800/3804) he designed earlier at Fairchild, in 1969 Lee Boysel created the Four-Phase Systems Inc. AL-1 an 8-bit CPU slice that was expandable to 32-bits. In 1970 Steve Geller and Ray Holt of Garrett AiResearch designed the MP944 chip set to implement the F-14A Central Air Data Computer on six metal-gate chips fabricated by AMI.

Ted Hoff and Stanley Mazor conceived Intel's first integrated CPU, the 4004 4-bit device, as a member of the MCS-4 Micro Computer Chip Set. In 1971, Federico Faggin, assisted by Masatoshi Shima, applied his experience in silicon-gate MOS technology (**1968 Milestone**) to squeeze the 2300 transistors of the 4004 into a low-cost 16-pin package. Faggin also supervised Hal Feeney's design of the 8-bit 8008 device announced in 1972. Designed for CTC (later Datapoint), prototypes of the 8008 function were also built by Texas Instruments as the TMX1795 but never offered commercially. Popularly known as a microprocessor or MPU (from micro-processor unit), these MPUs required additional supporting and peripheral functions to build a complete system. Single-chip solutions offering limited functionality for a specific application are called microcontrollers. (**1974 Milestone**)

Second generation 8-bit designs from Intel (8080) and from a team led by Tom Bennett at Motorola (6800) in 1974 established widespread acceptance of the MPU concept. A low-cost variant on the 6800 architecture by MOS Technology (6502) enabled personal computers and games from Apple, Atari, Commodore and others. By the mid-1970s many vendors offered enhanced 8-bit architectures, with Zilog's Z80 being the most enduring. Beginning in the mid-1970s, 16-bit MPUs emerged from General Instrument (CP1600), National

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