puters. General Microelectronics had been pioneering in LSI for calculators, but by the late sixties the technology was not ready. Several manufacturers, such as Viatron and Four-Phase Systems, were working on intelligent terminal chip sets. Most of these approaches, however, were for multichip sets, and most of the developers were aiming those chip sets at particular system problems, not at general logic replacement.

Electronics, then, was at a turning point. Intel was a fertile environment for an innovation as bold as the microprocessor. The small company was technology-driven, and it had no stake in random logic markets.

From calculator to computer

The genesis of the microprocessor was sparked by an assignment from Busicom, a now defunct Japanese manufacturer of calculators. In the summer of 1969, Busicom asked Intel to produce a chip set for a planned family of high-performance, programmable calculators. The 12 chips specified by Busicom were intended to realize designs for printing and display models, among others. ROM chips would be used to customize the basic design for the various models.

By that time the use of MOS circuitry in calculator designs was well established. The calculators in production typically required half a dozen chips, each chip having 600 to 1000 MOS transistors. Intel believed its recently developed silicon gate technology could achieve reasonable yields at a complexity of perhaps 2000 transistors per chip. This confidence led the company to examine Busicom's needs with an eye toward a more aggressive design solution.

Marcian E. "Ted" Hoff, Jr., a young engineer from Stanford who had joined Intel in 1968 as the twelfth employee of the fledgling company, was assigned to the Busicom project because of his systems and application experience. He looked at the design being developed by a team of Busicom designers, who had come to Intel from Japan, and concluded it was too complex to be cost effective. It required 3000-5000 transistors per chip and packages with 36 to 40 leads—package types not then in use at Intel. Hoff identified three major sources of complexity in the Busicom design:

(1) Most of the control logic for peripherals such as the keyboard, displays, and printers was done by separate structures.

(2) The shift register memory required fairly complex timing.

(3) The elemental instructions were quite intricate. Many corresponded to one or more passes through a register, involving alteration of both mantissa

The first advertisement for a microprocessor ran in Electronic News, November 15, 1971. The ad's bold announcement of "a new era of integrated electronics" has proved very accurate.

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