



AN INFORMAL HISTORY OF THE HOBBY COMPUTER MARKET

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This article expands upon the "History" section of The Home Computer market study published by Venture Development Corp., Wellesley Hills, Mass. The author thanks the hundreds of computer hobbyists who were interviewed and who completed the company's detailed questionnaire.

The hobby computer market was born in January 1975 when *Popular Electronics* ran a cover story on the MITS Altair 8800. Here's the interesting story of why that was the turning point and how the market has developed since then.

Origins (1963-1970)

Potential home experimenters (hobbyists) received their first tantalizing

exposure to computers in the Sixties. The two most significant events during this period were (1) colleges installed timesharing terminals and instituted courses in BASIC and FORTRAN programming and (2) Texas Instruments Inc. introduced a series of integrated logic circuits (7400 TTL series) priced within range of electronics experimenters. In turn, two distinct interest groups took shape: one primarily software-oriented and another hardware-oriented.

These two groups proceeded on independent paths and rarely communicated with each other. Nonetheless, by the late Sixties both were quite large and highly motivated. Computer clubs existed even at the high school level (mostly to share BASIC programs), and amateur electronics publications invariably contained 7400-series circuits for simple counting and control applications. In 1967, Steven Gray of Darien, Conn. formed an

Amateur Computer Society. By then a few hardy souls had succeeded in constructing rudimentary TTL computers with surplus core planes or "Rube Goldberg" mechanical memories.

Still, no hobby computer market developed, mainly because system-level hardware costs were beyond reach of the amateur, though they dropped rapidly throughout the Sixties. For example, Digital Equipment Corp.'s first minicomputer, the PDP-5, was introduced in 1963 for \$30,000. In 1965, DEC introduced its popular 12-bit machine, the PDP-8, for what was then considered the incredibly low price of \$18,000. By 1970, a basic PDP-8 configuration with 4K words of core was base-priced at about \$10,000, but this price was above the amateur range.

Furthermore, few hardware- or software-oriented people would have known what to do with a mini even

if the price *had* been within range. Most software "types" were familiar only with interpretive languages, and even those with some assembly-level knowledge rarely knew anything about interfacing. Hardware types, slightly better off, had little or no experience with system-level software; they were generally at the digital logic level.

The Pre-Market Period (1971-1973)

The disciplines and interests needed to create a base for the hobby market began to consolidate. The jelling point came in 1971, when Intel Corp. introduced the first microprocessor, the 4004.

Although the 4004's short word size (4 bits or one "nibble") was adequate for electromechanical control routines, it was too slow for most other applications. The 4004 was also expensive, if indeed the hobbyist could obtain single units at all. But the message was clear: Intel had packaged a complete processor in one integrated circuit.

In 1972, Intel followed the 4004 with the 8008, an 8-bit (one-"byte") parallel processor. The 8008, with its ability to address 16K bytes directly, was even more significant. Though constrained by its 18-pin configuration and 8-bit data bus, it could take on many of the low-level tasks previously delegated to minicomputers in the way the 4004 could replace discrete logic. However, there were problems: it was expensive; its availability was uncertain; there was a severe shortage of know-how; and a support IC, the 8229, was delayed in production.

The following year, 1973, Intel introduced the 8080. It was 10 to 100 times as fast as the 8008, more flexibly packaged (40-pin DIP), architecturally advanced (with internal address register, 16-bit program counter and stack register), addressed more memory directly

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(65K bytes), and possessed a larger instruction set (74 basic instructions vs. 48 for the 8008). But 8080's didn't become generally available until the

following year at prices in the hundreds of dollars. 8008's, however, were beginning to dip below the \$100 level.

Popular Software (1973-1974)

The potential was clearly building for a hobbyist market among both the software-oriented and the hardware-oriented factions. On the software side, 1973 was a vintage year for the BASIC programming language. BASIC (for Beginner's All-purpose Symbolic Instruction Code) had been developed in the Sixties by John Kemeny and Thomas Kurtz at Dartmouth College, and for several years had been the pre-eminent language at schools. Almost every time-shared educational system contained a library of BASIC games and recreational graphics programs. In 1973, thanks largely to the efforts of Robert Albrecht, a West Coast computer "populist," and David Ahl, then at Digital Equipment, BASIC became the chief reason for non-students to want their own computers as well.

Albrecht, a "Johnny Appleseed" of the computer age, had acquired a PDP-8 and used it to introduce as many people as he could to computing. He installed his system in an artist's cooperative in Menlo Park, Calif., produced an inexpensive (65¢, now \$2) text, *My Computer Likes Me When I Speak In BASIC*, and gave informal classes in BASIC to anyone, of any age, who would listen. Then he sent them out to teach others.

Albrecht's purpose was to "bring computers to the people" by first removing their mystique and then "turning people on" to the fun they could provide. Today thousands of computer hobbyists and even computer professionals owe their first lasting association with computers to the efforts of Bob Albrecht and his non-profit "People's Computer Company." In February 1973, Albrecht published the first issue of *People's Computer Co.*, a monthly tabloid of BASIC computer games, happenings and educational articles.

David Ahl deserves similar credit for cultivating a home computer market and, like Albrecht, used BASIC as his "seed". Ahl was Digital Equipment Corp.'s manager for educational systems and editor of *EDU*, a DEC professional publication for teachers. In October 1973, Ahl got his employer to publish *101 BASIC Computer Games*. This book was the first comprehensive collection of *tested* BASIC program listings for recreational use, and the games it included spanned a wide range of

machine memory requirements and personal interest levels. Much to Ahl's delight and DEC's surprise, it outsold all other DEC publications within a year, and DEC found itself swamped not only with book orders but also with requests for quotations on minimum DEC configurations that would run the games.

Unable to convince management that a worthwhile popular computer market was imminent, Ahl left DEC for AT&T in 1974. In November of that year he

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published the first issue of *Creative Computing*, a magazine for computer users, teachers and observers of the computer's effect on society.

Popular Hardware (1974)

Some argue that the hobbyist market began in 1974 when at least three low-cost, 8008-based microcomputer kits were available. Unfortunately, none led to a popular market. One of them, however, the "Mark-8", came close. The Mark-8 was as significant a factor in preparing the hardware base for a popular microcomputer market as David Ahl's games book and Bob Albrecht's People's Computer Co. were in exposing prospective hobbyists to software and recreational applications.

The Mark-8 was designed by Jonathan Titus, a graduate student in chemistry at Virginia Polytechnic Institute. After experimenting with the Intel 4004 in 1972, Jon in 1973 designed a hardwired "home brew" system around the 8008. Later that year he sent an article on his system to *Radio-Electronics* magazine. Appearing in the July 1974 issue, the article was accompanied by an offer to provide a printed circuit board and a book of experiments. Over 1250 readers wrote to request the PC board (at approximately \$50) and at least three times as many purchased the book for \$5.

Independently, David Larsen and Peter Rony, who were teaching chemistry at VPI, had prepared an excellent series of "learn-by-doing" experiments in digital logic. Their *Bugbook I* was published in August 1974, after a tie-in was arranged with E&L Instruments,

expensive assembled units. Roberts had Inc., Derby, Conn., to package the necessary hardware. Titus, who had set up Titus Labs and was doing government work on microcomputer interfacing, informally joined with Larsen and Rony to design the hardware. Titus then produced *Bugbook III*, a similar learn-by-doing collection of interfacing experiments based on an 8080 system to be called the "Mark-80." E&L Instruments packaged the Mark-80 and re-named it the "Micro-Designer."

Bugbook III and the Micro-Designer were not available until 1975, but before the end of 1974 over a thousand Mark-8's were in the hands of home experimenters. Titus and the authors of *Bugbooks I* and *II* had provided the

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hardware and documentation for an intelligent but electronically ignorant hobbyist to construct his own system, one on which he could learn digital logic and machine-language programming. Before Mark-8, any market for basic design kits would have been only an extension of the electronics hobby market. Unless "already into" electronics, a hobbyist was unlikely to "get into" *building* an electronic computer. Mark-8 cleared a path for everyone.

By the end of 1974, the hobby market was a coiled spring waiting to be released. Exciting new microprocessors, notably Motorola Corp's M6800 and National Semiconductor's 16-bit PACE, were described in trade (and financial) publications as "opening the door to a computer in every home." BASIC interpreters were being implemented on microcomputers. A growing number of working applications, in contrast to systems that merely worked, sparked the interest of the non-computer oriented. A demand arose for low-cost terminals (particularly the Teletype ASR-33) and for software. Commercial minicomputer suppliers noted that demand for products for personal use increased in both quantity and quality.

Purchases of minicomputers for personal use were still rare enough to rate press releases ("Digital Equip-

ment Helps Boy to Acquire Own Computer"; "Glendale Man Uses Computer to Pick Horses"). But now individuals were requesting software and low-speed peripherals, often for the stated purpose of interfacing to microcomputers.

All this activity still didn't add up to a commercially important popular market. Notwithstanding the yeomanry of Titus, Albrecht, *et Ahl*, there were still too few hobbyists with the right combination of means and inclination for any established manufacturer to risk developing a low-cost, general-purpose microcomputer system for popular use. By every common sense dictate, such an effort *would* have been premature. No one by this time doubted that a hobby market would develop; the question was when it would materialize and whether a "volkscomputer" would generate its own market or would appeal only to the highly motivated few who were interested already.

In 1974, the established computer industry was having trouble enough meeting delivery dates for non-hobby applications. To release the coiled spring required an established company small enough to commit itself to developing a new market yet with sufficient means and experience to do so intelligently.

The Market Emerges (1974-1975)

Micro Instrumentation and Telemetry Systems, later known as MITS, had been founded late in 1969 by H. Edward Roberts. It had developed a few products for radio telemetry, then produced what is generally believed to be the first calculator offered in kit form to the consumer market.

When the calculator market sagged, Roberts began looking for another product. The success of Titus's Mark-8 *via* the *Radio-Electronics* article was all he needed to put into motion his own idea for an inexpensive computer in kit form.

Roberts rushed to complete the design of what was to become the Altair 8800 by Christmas of 1974 and arranged with *Popular Electronics* to do a cover article. The article didn't appear until January 1975, which disappointed Roberts, since he had been depending on Christmas mail orders for a large part of the 200-300 units he hoped to sell in 1975. As it turned out, that projection was too low by more than an order of magnitude. MITS' 20 employees were soon deluged with orders for its \$395 (later \$439) kits and more

greatly underestimated the market for a low-cost ready-to-run microcomputer.

In the next few months, Roberts more than doubled his staff and blanketed the computer trade and electronics hobby publications with ads for the Altair. Roberts was aware that potential competitors had noticed its popularity, and he was determined to pre-empt the fledgling market.

To accomplish this objective, he first committed MITS totally to penetrating the hobby market at *all* levels. This meant developing a BASIC interpreter for the Altair that would attract those who wanted a system they could interact with immediately. Second, he challenged the commercial sector even before existing microcomputer manufacturers could react at the hobby level. A full-page advertisement in the April 1975 issue of *Digital Design* magazine, for example, offered an "Advanced Accounting/Engineering System" consisting of "an Altair with 32K of memory, serial interface, Teletype (or terminal), line printer, disk controller and disk drives, DOS and extended BASIC software" for \$10,489.

Whether MITS could deliver and support these "Advanced Accounting/Engineering Systems" is a matter of conjecture, but Roberts' reading of the market for a ready-to-run BASIC system was on the mark. Altair offered something for every level of hobbyist. By the summer of 1975, orders from hobbyists were arriving at a rate that, according to MITS then-VP of Advertising, David Bunnell, on one Friday afternoon exceeded 300.

A Clear and Present Market (1975-1976)

What had been an "emerging market" in the first half of 1975 became an "emerged market" in the second half. That summer the Computer Store Inc.,

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a MITS retail outlet, opened in Santa Monica and was soon followed by several non-affiliated retail stores.

Carl Helmers, a knowledgeable and innovative hobbyist who had been publishing a newsletter, and Wayne Green, publisher of an amateur radio magazine called *73*, launched a new "slick" magazine, *Byte*, for amateur

computer enthusiasts.

The increasing popularity of programmable pocket calculators whetted appetites for more programming power. The IBM 5100 portable BASIC/APL computer, introduced in September for under \$9000, further educated the public to the viability of the "home computer" concept.

A new organization, the Southern California Computer Society, grew almost overnight to encompass a national membership in the thousands.

In the second half of 1975, MITS faced competition from firms that were able to capitalize on and improve upon the weaker features of the design with which MITS had hurried to market. Notable competitors were IMS Associates Inc. ("IMSAI"), Southwest Technical Products Corp., Processor Technology Corp., Sphere Corp. and the Digital Group, Inc. Cost and product quality became competitive points as the new systems were introduced, and MITS began to produce improved second-generation equipment in a maturing market.

One of the most unrelenting of these new rivals was (and is) IMS Associates Inc., whose IMSAI 8080 advertisements were replete with such words and phras-

es as "rugged" (three times in one full-page ad), "durable", "heavy-gauge" and "commercial grade". IMSAI was priced \$160 above the Altair 8800, but this was more than made up in the view of many hobbyists by the IMSAI's design

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improvements and much heftier power supply. However, the IMSAI 8080, like several others of the newer systems, was designed to be bus- and PC card-compatible with the Altair 8800: a memory or interface board for the IMSAI 8080 also works in the Altair 8800.

The cross-compatibility amounted to nothing less than a *de facto* standard, opening the door to any number of smaller firms capable of producing add-in memory, directly compatible

peripherals and even alternate processor boards. In less than one year, the hobby computer market had evolved to the point of supporting a PCM (plug-compatible manufacturer) infrastructure at the board level.

This development is as important as the original Altair announcement because it indicates the pervasiveness and staying power of this young industry. Indeed, the impetus it provides will extend far beyond the hobby market, and it will only be a matter of time before the machines that barely a year ago were considered novelties will be almost as ubiquitous as the CB radio, at least as much a fixture in the home as the microwave oven and as common in the small office as the editing typewriter. Their appeal is not merely that they are affordable but that they are *understandable*. They can be used by preschooler as well as professional and are limited in application only by the imagination.

Today's hobby computer is nothing less than the leading edge of the consumer revolution. It cannot be ignored by any company presently serving the computer industry. The marketing question is no longer "should" but "how".

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