

THE TENTH ANNIVERSARY OF THE ALTAIR 8800

Popular accounts of the invention of the personal computer are fraught with error, ego, and eccentricity. To tell the story behind the story, *COMPUTERS & ELECTRONICS* asked Forrest Mims to review the history of the microcomputer. Mims is one of the founders of MITS (Micro Instrumentation and Telemetry Systems), the company that produced the Altair, the first successful personal computer. In the articles in this issue, Mims chronicles the development of the micro and talks with H. Edward Roberts, the "father" of the Altair.



RICHARD PIERES

SETTING THE RECORD STRAIGHT

BY FORREST M. MIMS III

Few major inventions have uncontested ancestries. Consider, for example, the controversies over who invented the telephone, the incandescent lamp and, more recently, the digital computer. Now, the invention of the personal computer is being written about in magazine articles and books, and some of these accounts contain glaring errors and omissions. That should

trouble those of us who use personal computers, for we are the first generation to have at our fingertips the means to extend intellectual and creative abilities once available only to a few.

Two facts about the history of personal computing are indisputable. One is that the introduction of the Altair 8800 through the pages of *Popular Electronics* exactly ten years ago sparked the personal computer revolution. The other is that both individuals and small companies were building small computers long before the Altair arrived in 1975.

As a high school student in 1959, I, among others, began building simple analog machines that performed basic arithmetic. By 1961 these early machines culminated in an analog computer that translated 20 words of Russian

into English. The key circuit of this machine, which I still have, was a memory consisting of 20 miniature trimmer resistors that were automatically scanned by a mechanical sequencer made from a modified electric music box mechanism.

Ed Roberts also began building both analog and digital computing devices in 1959. Even before Ed Roberts, Stan Cagle, Bob Zaller and I formed MITS in 1969, Ed and I used to discuss the homebrew analog computers we had built a decade earlier. In the summer of 1970, we discussed designing and selling, through an article in *Popular Electronics*, a kit analog computer that would use operational amplifiers. Had not Ed become interested in designing the 816 digital calculator featured on the cover of the November 1971 issue of *Popular*

Electronics, MITS might have developed an analog machine.

Sol Libes, who writes the "Bits & Bytes" column for this magazine, is particularly knowledgeable about the pre-Altair era of personal computing. He has written about the formation of the Amateur Computer Society by Steven Gray in 1966 and several discrete logic and microprocessor-based machines built prior to the Altair.

Among the most important commercially available pre-Altair machines was the Scelbi-8H, a product of Scelbi Computer Consulting Company. This machine used the 8008 microprocessor, Intel's first 8-bit microprocessor.

Jonathan Titus' Mark-8, which was featured on the cover of the July 1974 issue of *Radio-Electronics* and which also used the 8008, soon became more widely known than the Scelbi. Titus' article listed a source for circuit boards for the machine, but hobbyists who wanted to build a Mark-8 had to locate the components on their own. Nevertheless, according to Libes, more than 500 Mark-8's were eventually assembled by experimenters.

To say Scelbi, Titus or Roberts invented the personal computer would be manifestly unfair to Marcian Hoff, Stan Mazor, Federico Faggin and the other engineers at Intel who conceived and designed the first microprocessors in the early 1970s. The architecture of the first microprocessors was itself based upon concepts developed decades earlier. The personal computer was then a logical culmination of more than a quarter of a century of digital developments, and everyone involved rightfully deserves credit for the roles they played. If you want to find out more about the early days of digital computing, the classic work is *The Origins of Digital Computers* (Springer-Verlag, 1982), a collection of early papers in the field compiled and edited by Brian Randell.

The Henry Ford of Personal Computing

Though Henry Ford didn't invent the automobile, his role in the early automobile industry was unsurpassed. Similarly, while the invention of the personal computer cannot be attributed to a single individual, credit for fathering today's multi-billion-dollar personal computer industry rightfully belongs to one man, H. Edward Roberts.

Ed's Altair 8800 was a major advance over its predecessors because it used Intel's new 8080 microprocessor, a more powerful version of the 8008 that required fewer support chips. Computer

**On opposite page:
the garage in New
Mexico where it
all started.**

From top to bottom: Altair 8800 was introduced to the world in the January 1975 issue of *Popular Electronics* (predecessor of *COMPUTERS & ELECTRONICS*). Altair 8800 in the flesh. One of the original sites occupied by MITS. Ed Roberts.



PHOTO TINTING BY LINDA M. EKLUND

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hobbyists knew about the 8080 before the Altair. They could obtain from Intel "From CPU to Software," a 47-page booklet that described in great detail the 8080, its instruction set and its support chips. The booklet even included two system block diagrams. But because the 8080 sold for \$360 in single quantities, few people could afford it. Ed Roberts bought the chips in large quantities and was able to get a substantial discount, allowing him to sell his Altair in kit form for only \$40 more than the cost of a single 8080. This helped account for the incredible response to the two Altair articles that appeared ten years ago in *Popular Electronics*.

Of course Ed Roberts and MITS did far more than design the Altair; they set the stage for the personal computer industry as we know it today. In addition to hardware peripherals and software, MITS pioneered personal computer conferences, clubs, stores, users' groups, software exchanges and company newsletters. By the time Ed sold MITS to

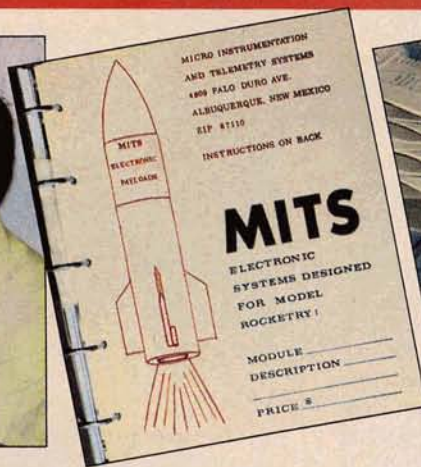
Pertec in May 1977, MITS was often called the IBM of personal computers.

Today, comparatively few people have heard of MITS and the Altair 8800, much less of Ed Roberts. And to make matters worse, some of the new generation of computer journalists have written books and articles containing errors about the origins of personal computing. A recurrent theme in many articles and books about computers is that personal computing was born in California, either among members of the Homebrew Computer Club, in Steven Wozniak's garage or in Silicon Valley itself. Even while preparing this article, I happened across still another perpetuation of the persistent California myth in an otherwise interesting piece by Steven Levy in the November issue of *Popular Computing*. Levy described how Wozniak and others brought circuit boards to Homebrew meetings and concluded that: "Those ridiculous boards attached to boxes with blinking lights turned out to be the spark of the modern personal computer industry."

Many members of the Homebrew Computer Club can point with justifiable pride to their accomplishments. Stephen Wozniak, for example, co-founded Apple Computer, one of the most spectacular success stories in American business. But the fact of the matter is that the modern personal computer industry was sparked by the Altair 8800. Indeed, the Homebrew Computer Club, which first met in March 1975, was itself sparked by the arrival of the Altair. Wozniak himself recalls in *Digital Deli* (Workman Publishing, 1984) that when the Homebrew Computer Club was formed, "There was just one personal computer then, the Altair 8800. . ."

Rewriting History

By far the most important book yet published on the early days of personal computing is *Fire in the Valley* (Osborne-McGraw-Hill, 1984) by Paul Freiberger and Michael Swaine. This fact-filled book contains a wonderful
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MIMS AND MITS

WHEN he helped form MITS, Inc., in 1969, Forrest Mims had no idea the company would eventually start the personal computer revolution. After he left MITS 18 months later to become a professional writer, Mims continued working part-time for MITS and wrote the operating manuals for the firm's first digital calculator and the Altair 8800.

From 1969 to 1976, Mims accumulated dozens of early MITS papers, photos, catalogs, ads, fliers, data sheets, and operating manuals. He also saved the carbon copy of the original draft of the Altair operating manual and 12 issues of

Computer Notes, the post-Altair tabloid published by MITS.

As for hardware, Mims has dozens of the model rocket telemetry modules that were MITS's first products and the 816 calculator he built while writing the machine's assembly manual. He also has an Altair, which still runs and is in excellent condition, given him by Ed Roberts in return for writing the machine's operating manual. Mims's Altair lacks a serial number because it was one of several preproduction test machines.

Last summer Mims's collection of MITS memorabilia came to the attention of Dr. Uta C. Merzbach, curator of the Division of Mathematics at the Smithsonian Institution's National Museum of American History. While Dr.

Merzbach was visiting Mims's home in Texas to review the material in person, Mims suggested a conference on the history of the development of the personal computer to be held at the Smithsonian. He believes such a conference could help put an end to many of the widely believed myths now being published as facts in computer books and magazines.

Dr. Merzbach agreed to consider Mims's conference idea. She also asked him if he would donate to the Smithsonian his collection of MITS material and a language-translating analog computer he built when a high school student in 1961. Mims has agreed to donate the material as soon as he can find time to prepare an inventory and make copies of some of the papers. ◇

Left: Dr. Uta C. Merzbach, of the Smithsonian Institution, with Forrest Mims.
Center and right: Some of the materials that will be donated.

