



Will The Real "Father Of Personal Computers" Please Stand Up . . . H. Edward Roberts

By Art Salsberg

The first time I met Ed Roberts I was struck by two of his attributes: he was a soft-spoken person and he was a big man in stature, towering over me. What wasn't immediately evident was the foresight and business courage he would display in the near future as

the developer of the first powerful, modestly priced small computer that paved the way for the entire personal computer industry.

While still on active duty with the U.S. Air Force in New Mexico, and armed with an electrical engineering degree from Oklahoma State, he started a little part-time business, MITS (Micro Instrumentation and Telemetry Systems), in his garage to

make model-rocketry devices. He had three partners, one of whom was Forrest Mims III, who writes *Modern Electronics*' monthly "Electronics Notebook" column. Ed bought them out by the end of 1970 and transferred his full-time energy to other areas, such as developing and marketing electronic kits. His main competitor at that time was Southwest Technical Products Corp.

In a few short years, he was to launch the personal computer with his Altair model, the first BASIC language for personal computers, the first computer retail store, and the first national microcomputer convention. Here, the "Father of the personal computer" tells how he accomplished all this.

Modern Electronics: What gave you the idea to develop and market a small computer for "consumers?"

Ed Roberts: My interest in computers didn't start with the Altair computer, which was first publicized when you published a cover-story article on it in December 1974.

I look upon my first personal computer as the Model 816 desktop calculator I had presented in January 1973. It had a programmer-device option that could be attached to it. I did look at Intel's 8008 CPU in '73, but concluded that it wasn't powerful enough to do anything with it in terms of a real computer.

I got sidetracked with smaller calculators, but in 1974 I developed a video terminal with an acoustic coupler to support a time-sharing service I was selling. At this time I was examining Intel's new 8080 CPU.

Coinciding with this, the calculator business went bad. Dealers were unloading calculators below what they paid for them. With this part of my business declining, I concentrated on designing a computer using the 8080 microprocessor.

Q: This meant investing a large sum of money. Since you were evidently taking a beating in your calculator business, how did you manage this?

Roberts: Well, this was a labor of love for me, beyond making money. So I decided to risk all and met with my bankers, who agreed to extend me a line of credit to \$65,000. I told them that I expected to sell 800 computers that year. I really guessed it would be around 200. The way it turned out, once I started shipping the computer,

it never went below 1500 units per month.

Q: What kind of technical support did you receive?

Roberts: Very little. I was the only double-E in the company. Bill Yates, however, had an MS in Aeronautical Engineering from RPI, and helped immensely. Insofar as product concept was concerned, the only one I discussed this with in the formulating period was the late Larry Lekashman, the then president of Olson Electronics, since I respected his marketing acumen.

Q: Didn't Intel give you plenty of tech support?

Roberts: Regrettably, they weren't any help at all beyond their literature. In the Spring of 1975 I hired Paul Allen as Director of Software, and then part-time at first, a college student named Bill Gates. Bill was about 19 years old when I put him on the payroll, but he had lots of computer experience and was very bright.

They developed Altair BASIC while working for me, which became Microsoft BASIC when Bill and Paul went into business for themselves. In essence, MITS built Microsoft, whose BASIC is the most widely used programming language today.

Q: What was Dave Bunnell's (now publisher of PC World magazine) role in all this? When I met him in Albuquerque he was working on a MITS advertising program.

Roberts: Dave started as a tech writer with me, then took over advertising responsibilities. Dave is the one, by the way, who proposed the Altair Convention, the first national computer convention. We invited people from all over the country. Frankly, he was much more excited about this than I was. I didn't think it was feasible to draw many people beyond our immediate area. How many people would spend all that transportation and living-expense money to come to New Mexico for a computer meeting? But I wound up with egg on my face because droves showed up. Dave was right. It was a great success.

Q: Yes, it was. I was surprised at the large attendance myself. The dinner hall was packed. I don't think many people appreciated the Altair bus line at the time, which became known as the S-100 bus and then adopted as a standard (IEEE-696) by the Institute of Electrical and Electronic Engineers. How did you choose 100 connections, a nice round number?

Roberts: We designed the bus around October 1974. At the time it had 85 contacts. Searching around for an industrial-spec-quality connector, we decided to purchase new connectors introduced by AMP that had a glass-composite construction and 100 connectors. They cost me \$7½ each, while lesser-quality ones were priced at \$15. By the time production was rolling, 96 or 97 connections were committed.

Q: How come you didn't get a patent on the bus?

Roberts: Hindsight is always 20/20. It was called the Altair bus, of course, but other computer makers who used the same bus conveniently called it something else. The name S-100 was a disservice to us, but there wasn't much we could do about it.

Q: MITS was selling the complete Altair computer that included the 8080 CPU and a costly cabinet for about the same price as a single-quantity 8080 was selling for. Rumors went round that you were able to do this by buying 8080 "rejects." Would you comment on this?

Roberts: We never used 8080 CPU's that were deficient in specifications or even had so-called "cosmetic" defects. Out purchase orders plainly indicated that the devices were for full-spec parts. This is what we contracted for with the device maker, Intel, and this is what we received from them. Intel wasn't doing all that much business with the 8080 at that time, so our large order earned us a much lower price. Distributors and dealers, however, had fits. They complained to Intel, I was told, who tried to explain away the lower price by telling them that my microprocessors were defi-

cient in one way or another. It quickly occurred to them, however, that MITS was by far the biggest purchaser of 8080 CPUs, and that there were other users of the device as a result of this. Then they dropped the price for the CPUs to distributors. I paid \$75 for the 8080 at that time, when it was retailing singly for around \$350. By 1977 it dropped to less than \$15 retail to illustrate what higher-volume can do to reduce prices.

Q: Did any commercial computer influence your design of the Altair?

Roberts: Yes, the front panel of Data General's Nova II did, with all its switches and LEDs.

Q: I remember having lunch with you at the "Montana Mining Company" restaurant in Albuquerque shortly after the Altair was introduced. Among the things we talked about was the future of computers. At that time you told me that about 40% of the Altair's sold were being used for business purposes. We also discussed competition. Looking back, do you think your views then held true?

Roberts: We were selling Altairs to purists. Lots of them were using them for business applications. Business is still the biggest market in terms of dollars, though purists account for only a small percentage now.

Apple at the time was just starting out with boards. It was a garage operation. In fact, I wondered if they were "for real" at that time and certainly did not look upon them as competition. That's why, I confess, that it irritates me when I read that Apple invented the personal computer. Tandy had announced that Radio Shack would market a computer. I considered *them* to be competition, of course. Processor Technology, with Bob Marsh and Lee Felsenstein [who later designed the Osborne I transportable computer], began to produce add-on boards for the Altair. I admired their products; they were fine-quality. Eventually the company produced its own computer, the SOL, which was the first all-in-one computer.

Q: What about IMSAI? They produced a computer that was an Altair look-a-like, adding large plastic piano-key knobs to the switches on the front panel. One of the owners told me that they had ordered Altairs to be used for their customers, but couldn't get delivery on time so decided to make their own computers.

Roberts: IMSAI copied the Altair design right down to errors that had occurred in early production models of the Altair computers.

Q: You later produced a smaller-size computer that used a 6800 CPU, which was developed by Motorola as a competitive microprocessor. It never matched the 8080-based Altair's success and I always wondered why you introduced it?

Roberts: It was designed to counter Southwest Technical's computer, which used the 6800 CPU. We were also getting some pressure from Sphere with its 6800-based computer. MITS sold several thousand of the Altair 680 models.

Q: You started the first computer retail store, followed by franchise stores. They disappeared amidst rumors that they failed because MITS allowed only MITS products to be sold in such stores.

Roberts: As a matter of record, the stores were very successful. They were a valuable asset to the company, enabling us to sell many machines. In 1977 more than 80% of the retail stores in the U.S. were MITS stores, excluding Radio Shack.

A MITS franchise computer store was allowed to sell anything they wished to. However, we would not provide a guaranteed territory if this was done. Thus, we would only give an exclusive territory to a store in, say, New York City, if there was no competitive products in that store. Otherwise, we insisted that other New York City franchises could be set up. Pertec, to whom I sold MITS, decided on their own to close the stores.

Q: When did you sell MITS and why

did the new owner drop the "consumer" line of computers and allied equipment?

Roberts: We had a letter of intent in December 1976 from Pertec and the sale was closed May 1977. Pertec quickly decided that the consumer market was too small.

At that time I had a number of new products lined up. The Altair II was killed on the vine, for example. It was a Z80-based machine with 64K of memory that could be expanded to two megabytes, with parity test for memory. I also designed a lap computer, for which Pertec said, "There's no market."

Q: You left Pertec shortly after you sold MITS and disappeared insofar as computers are concerned. What have you been doing with yourself these past few years and are you sorry you left the industry?

Roberts: I disappeared to pursue a dream. I've been attending medical school all this time and by next year I'll be a doctor. At the same time I have a little medical electronics business. So I haven't given up electronics at all, nor computers. I work with computers at the medical school in Georgia, where we have many computers, including a CAD system.

Q: Looking at small computers today, what do you think of them?

Roberts: I personally like Hewlett-Packard's systems the best. Their H-P BASIC is terrific. The operating system is transparent and real easy to work with. Students writing software here like me virtually fight to work with the H-P computers rather than, say, the IBM PC.

To do any real work with small computers, I feel you really need a lot of memory, at least 256K, but preferably a lot more.

Q: A final question: If you had to do it all over, would you sell MITS?

Roberts: I've thought about that in the past and speculated on what I would have done with the company. But when you get right down to it, I still would have taken the money to pursue what I'm now doing. **ME**