

1 The 701 in the IBM Technical Computing Bureau

DANIEL R. MASON

In these recollections, I am going to go back 30 years and pull out memories of the most exciting and challenging years of my life.

Right after I received my master's in mathematics from MIT in June 1950, Cuthbert C. Hurd (and others in IBM) offered me a job as Applied Science representative in Boston. Two years later Hurd asked me to head a small logical design group in Poughkeepsie. A year after that he asked me to head the 701 installation at IBM's World Headquarters on the corner of Madison Avenue and 57th Street.

The 701 was already installed when I arrived in the spring of 1953. It was the first production model, and except for a couple of blemishes on the drum surface, the machine ran pretty well.

In addition to its main function as IBM's premier "showroom" computer, the 701 served three important functions.

1. One shift for 701 program debugging by the organizations that ordered their own 701s.
2. One shift for conventional service-bureau work—programming and machine time being billed to the users.
3. One shift for maintenance.

We also offered classes on programming the 701. I believe these classes lasted one or two weeks, and they were offered continuously.

Although we ran the 701 seven days a week, 52 weeks a year, it was during the day shift, Monday through Friday, that "spit and polish" prevailed. Rightfully so, because the typical (but unwritten) IBM dress code was enforced. Therein arose my first big problem. When our friends from the installations in California arrived for their turns at debugging, their attire was less formal than ours. In fact, the only things missing were leis around their necks. IBM's rule: ties and jackets in the 701 room, 9:00 A.M. to 5:15 P.M., Monday through Friday. In response to these strictures, our friends from California debugged on the second shift, with drapes pulled and doors locked. I'm not very proud of this. After all, each installation was coming up with the then-incredible sum of \$15,000 a month for a 701.

Early during the operation, we invited the press in to witness the first live demonstration of a computer used for English-Russian translation. [*Editor's Note:* See the photograph in the section on the Technical Computing Bureau.] We made the front page of the

New York Times. We also learned something interesting. Recall that the 701 used electrostatic storage tubes for its immediate access memory. The roster of stored data was visible on the face of these tubes, and all tubes (or at least their faces) were exposed in the front of the memory unit. While the demonstration was going on, the photographers were taking flash pictures all over the place. When they started to take close-up flashes of our electrostatic memory unit, we got blown clear off the air. It seems the flashbulbs erased or rearranged the bits on the tube faces. Thus we suspended further pictures, reloaded program and data, and from then on everything worked fine.

It wasn't too long after this demonstration that Thomas J. Watson, Sr., came into the 701 room to observe the machine in operation. After a few minutes he left. A half hour later, one of his assistants arrived and told me that Watson wanted the card-reader portion of the 701 removed immediately. When I explained to the assistant that the card reader was the only way we could get information into the 701, he said that made no difference; it had to go. He said Watson felt that the card reader detracted from the rest of the totally electronic aspects of the 701. It took me 20 milliseconds to get to Hurd's office, and half that time for Hurd to get to Thomas J. Watson, Jr.'s office. Presumably, he talked with his father. I never heard anything more. The card reader stayed, obviously. And I wasn't fired.

We had a large programming staff, since we were doing service-bureau work, and also doing the beginnings of "software"—then called utility programs. Most of the staff, having completed writing a particular program, would read the program to E. L. (Ted) Glaser, who would debug it verbally to about 95 percent purity. Glaser happened to be blind and was one of the most brilliant and personable individuals I have ever known.

One day one of the software fellows engaged me in a conversation on an idea he had. He took an hour or two to explain it, and I was enthralled. I asked him what I could do to help bring this idea to fruition. He simply asked for permission to work full time on his idea and not be interrupted to program customer applications, etc. Hurd agreed, so John W. Backus went to work full time on his own project, and FORTRAN was born.

Shortly after Russia's Sputnik launched the space age, Hurd called me to his office to meet a visitor. My introduction to Wernher Von Braun and subsequent

Author's Address: P.O. Box 969, Middletown, CA 95461.

conversation with him can only be described as breathtaking. I was plunged into a whole new world of security and classified documents, with the people from Huntsville (Von Braun's installation in Alabama) having top priority on the 701, which they used voraciously but quietly.

It is important to know that the 701 installation at IBM World Headquarters was unique among all the 19 installations of the 701. It wasn't better or worse than the others, just different. Its soul was shaped by absolute support from IBM's top management and by the sharing of ideas from many people, both within and without IBM. Certainly Hurd played the dominant role in shaping its vitality and destiny. Walter H. Johnson, too, was of tremendous help. G. Truman Hunter did an outstanding job in education, both verbal and written. Others who were indispensable: Charles R. DeCarlo, subsequently the director of Applied Science; D. W. Pendery, on the West Coast, later to come East; John von Neumann, from the Institute for Advanced Study in Princeton, who consulted one day a month with us, bringing ideas not only for the

next generation of the 701, but perhaps also for the fourth or fifth generation.

Who could forget Herbert R. J. Grosch? Once I invited Grosch to be a guest lecturer at one of IBM's executive seminars at Poughkeepsie. I knew full well that he was going to come down hard on me (and IBM) for a real blunder on our part that had adversely affected Herb and General Electric. His talk was rough; he did come down hard. But after the meeting he accepted my invitation to drive him to LaGuardia airport in New York City. We had a marvelous conversation, and our friendship has remained strong over the years.

All this leads me to say, quite emphatically, that it was really those folks at the other 701 installations who really built the foundation for the computing base that exists in this country today (with more than minor help from FORTRAN).

The 1950s were exciting years, creating experiences and challenges for me that I wouldn't trade for anything. But I did start to breathe a lot easier when the magnetic-core memories started to arrive on the scene.

2 & 13 Computing at Los Alamos Scientific Laboratory with the 701

Editor's Note: Following telephone conversations with Willard G. Bouricius, Bengt Carlson, Harwood G. Kolsky, and Edward A. Voorhees, we gathered considerable material concerning the 701 at the Los Alamos Scientific (now National) Laboratory in New Mexico. Printed here are recollections by Voorhees, undated LASL reports by Dora A. Sweeney and Voorhees on programming, and the title page, contents, introduction, and description of the Dual coding system. I call your attention to the reference at the end of Voorhees's recollections for further information.

Voorhees refers to SHACO, which is described in the introduction to the SHACO manual, dated June 1953, as "a shorthand coding system which has the effect of making the 701 calculator simulate a three-address all-floating-decimal machine." In the introduction to the Speedcoding manual printed in the Programming section of this issue, acknowledgment is made of the

work by LASL. Voorhees mentions 606 and 607, successive versions of assembly programs that, he says, were "based on an early IBM assembly program called S02."

Voorhees sent other material that is highly interesting but could not be published because of space constraints: SHACO and Dual manuals, a monthly summary of 701 time, a "701 Facility Questionnaire" that was sent to the twelve other 701 installations, the results of the questionnaire, and a memorandum from Kolsky to Voorhees dated November 15, 1954, entitled "Electronic Computer Speed and Storage Requirements for Two Space Dimensional Hydrodynamics Problems."

Lloyd C. Hubbard was the Applied Science representative at Los Alamos at the time of installation. Richard Thomas was the IBM sales representative and branch manager in Albuquerque.

Recollections of the 701 at Los Alamos

EDWARD A. VOORHEES

I arrived at LASL in early September 1952 and was a member of Group T-1. At that time all of the comput-

ing (CPCs and hand computing) was centered in the Theoretical Physics Division (Carson Mark was division leader). More specifically, it was in Group T-1; Bengt Carlson (still consulting for the lab) was the

Author's Address: 57 Valle Vista, Los Alamos, NM 87544.