Thaddeus Whirlwind, pioneer computer, in retrospect

By Stephen Blatt


"It" was the Whirlwind Computer, the "first attempt at a real-time system, the first with magnetic core storage, the first cathode tube display, the first synchronous electronic parallel machine, the first time-sharing machine, and the first to use a light pen with the CRT display," according to Professor Jay W. Forrester of the School of Management and director of Project Whirlwind.

Whirlwind was MIT's first computer project and one which led to the formation of the Lincoln Laboratory and MITE Corporation, an MIT spinoff. It began in the late 1940s as an attempt to build a flight simulator which could respond in real time to the pilot's actions.

As the first attempt at a real-time system, it ran into many problems. "It was the first type of system in which all errors had to be eliminated," said Professor Robert R. Rathbone of the Humanities Department, who served as "a writer and editor of news releases for non-technical readers." He added that "prior to Whirlwind some errors could be tolerated as noise" and that computer downtime (breakdowns) could also be tolerated.

The memory device for Whirlwind at first was electrostatic storage tubes, each of which stored 1024 bits with an access time of 100 micro-seconds. A 2500 volt electron beam "wrote" and "read" the information on the bits and a 1000 volt electron flood replaced leakage and helped to retain stored information indefinitely. However, the tube turned out to be quite unreliable and a search for alternatives began.

Forrester said: "We had been aware that what we were looking for was a non-linear element that could be read by coincident excitation of coordinate axes." He saw "an ad for a rectangular hysteresis loop, and proceeded to try to put that kind of material into a matrix structure. In a couple of days I had succeeded in principle," and soon had invented magnetic core storage.

"It was primarily the old story of necessity being the mother of invention," explained Forrester. "We needed high capacity, reliable storage. The programs, project, budget and reputations depended on it so we had to do something." Magnetic core storage dominated the computer field for the lifetime of the patent, to 1973, but now we are beginning to find new ways - there are new machines that don't use magnetic core storage.

Forrester's invention also led to a court proceeding between IBM and MIT over the validity of the patent, which was settled out of court. "The patent was upheld," Forrester said. "Nearly all of the manufacturers have paid royalties, which go to MIT and the invention."

"See It Now" arranged a TV show live from Whirlwind's location at 211 Massachusetts Avenue, (now the Graphic Arts building) with Edward R. Murrow in New York and an admiral in Washington, D.C., who asked Whirlwind to compute such things as the path of a missile, fuel consumption, etc.

Rathbone recalled that "for every thing (in the computer) there was a backup and for every backup a backup." Forrester said that after the coast-to-coast TV show was over, he learned that "the plans for what to do if the computer didn't work had never been made.

Forrester always wanted people to know the computer could be used for non-military applications," commented Rathbone, and Forrester himself said that "we had a far broader view of the utility of computers than most people at that time. Most people only wanted to make it function for short periods, while we were dedicated to reach the objectives of very high speed and very high reliability." Rathbone noted that "millions of bucks were spent on the machine for desk calculator problems. People didn't realize what computers are for."

Rathbone described Project Whirlwind as "a great experience for all the engineers and me, too."

We were breaking new ground with the first generation of large-scale electronic computers. During the life of the project, "quite a lot was done," Rathbone said. "The results of research that were made available stimulated computer development elsewhere."

Eventually Whirlwind was incorporated into the Cape Cod system, a prototype all-defense system, which was a forerunner of SAGE, a real-time air defense system for the North American continent.

While Whirlwind was obsolete by 1959 and now resides in the Smithsonian Institution in Washington, "today's machines show more traces of Whirlwind than the other machines that existed at the same time," said Forrester.