Whirlwind Before Core

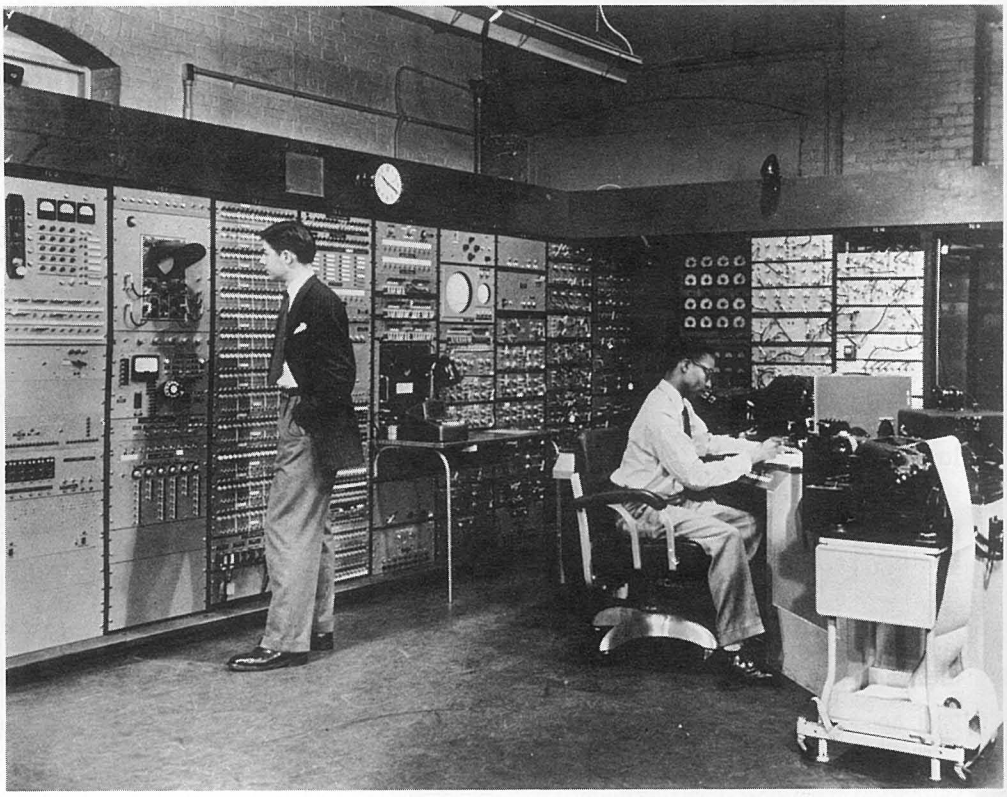
Reminiscences of Jack Gilmore

In October, 1950, I joined the Whirlwind team. At that time the first thirty-two registers of toggle switch memory were working. The four variable flip-flop registers could be assigned to any one of the thirty-two addresses. They were able to demonstrate small mathematical programs such as the bouncing ball problem or solve simple differential equations. The first memory consisted of electrostatic storage tubes totaling 256 locations. We felt really rich with a full 256 variable registers to write our programs. We calculated the operation in the octal address and then looked up what was then called the sexidecimal conversion number (later the term hexadecimal was used). We had a little load program in the 32 registers and that bootstrapped the programs up into the memory in order to run them.

The first thing that we were very anxious to do was to get an assembly program that would allow us to be able to write our programs using mnemonic symbols and expressing the numbers in decimal and octal. My boss, Charlie Adams, was concerning himself with that and so it became my job to write the assembly program. I'm fairly certain that if it is not the first, it is one of the very first assembly programs ever written. The only one that I know of that predates it was Wilkes' 'Load and Go' on the EDSAC.

In September, 1951, John Carr, later Chairman of Duke's Computer Science Department, and I wrote a document that explained how people could actually use subroutines in conjunction with assembly programs, so that they didn't have to write all the various utilities. People could write their programs in a relative fashion and then we would give them the library of subroutines and they'd actually pick out the tapes that they needed. We'd then string the tapes together and literally make a copy not only of their program but also of the subroutines. All of those would be pulled in through the bootstrap program and it would run. This was the indirect birth of the symbolic address. The thing that we discovered, I think I actually discovered it, was that when we ran the tape through twice, you could refer to an address above where you were, as opposed to everything going below. The two pass assembler came out of all that. I have a recollection of Charlie Adams and I briefing IBM's Nat Rochester on how to produce symbolic addresses.

The Ph.D. candidates who needed to use the Whirlwind really didn't know how to run the machine. There were full scale electronic technicians who knew how to bring it up, and most of the systems programmers like myself knew how to do it, as well as some of the engineers. It was a fairly routine procedure so I went to Charlie Adams and suggested that I could train two people right out of high school to be computer operators if I had enough funds to hire them for one year. Jay Forrester provided the funds and I went out to two local high schools and asked for students that were college material but didn't have the money for college. I hired Joe Thompson from Boston Technical High School (shown sitting down in the photograph) and Bill Kyle from Boston English. Within four or five months they were competent operators, and Joe stayed on to complete his



This 1951 photograph of Whirlwind shows Joe Thompson seated at the Flexowriter typewriting unit. Jack Gilmore is standing in front of the 256 × 256 point display used for alphanumeric and graphic representations of various computations. The display was utilized to plot solutions of partial differential equations for determining the optimal rate of pumping oil from underground caverns and also for displaying the optimal placement of television antennas for compliance with F.C.C. regulations.

degree at Lowell Tech in the evenings. One day Forrester came in and sat at the back of the room. He watched for about an hour while Bill and Joe completed eight or nine different jobs. Finally Jay said, "We've just created a new vocation." He also recognized this as the solution to the problem of computer operators for the SAGE project.

The flexowriter typewriting unit we used was a word processing system, originally designed for list processing and promotional mailings. It had a mechanical reader and would create a form letter in a loop with stop codes to key in the personal information. We used it as an integrated word processing system, circa 1951.

One Sunday afternoon in December 1951 the Whirlwind was featured on 'See It Now', Edward R. Murrow's program. Ron Meyer and I stayed up all weekend writing a program to display the trajectory of a Viking rocket on the display and another program that played Jingle Bells. They wired Jay Forrester with a mike and had the wire coming up his back with cables on the floor so he could walk from one part of the console to another. As he started to walk the wire snagged and the back of his coat started to come up. One of the CBS technicians decided that he was going to undo the snag and started to crawl across the floor like a commando. Forrester, not realizing that his coattails were at 90 degrees, couldn't understand why the technician was crawling towards him. We decided that Forrester was getting too distracted and so the technician was pulled back across the floor by his ankles. Meanwhile, Edward R. Murrow and Jay Forrester completed the interview which ended with Jingle Bells being played for the pre-Christmas viewers.

[The museum has archived a copy of the video tape of the Murrow interview in which Jack Gilmore may be seen loading the tape reader]

Extracted by Ben Goldberg from a Gallery Talk by Jack Gilmore, June 16, 1982.

Profile of a Board Member

Les Hogan's involvement in electronics began while he was in the Navy during World War II. His work with the acoustic torpedo led him to obtain a doctorate in physics at Lehigh following the war. In 1950, three months after he joined Bell Labs, he invented the microwave gyrator. In 1953, he was invited by John VanVleck to become a Professor at Harvard University.

Hogan's influence on the development of the semi-conductor began in December 1957, when he became executive vice-president of Motorola and general manager of the semi-conductor division. He later became President and Chief Executive Officer of Fairchild Camera and Instrument. At present, Dr. Hogan spends about half his time as Technical Advisor to the President of Fairchild, is an active board member of six corporations, and is advisor to Stanford, Berkeley, and MIT's engineering schools.

Dr. Hogan is deeply interested in the development of The Computer Museum because, in his words, "I have spent my entire career in high technology electronics including the last twenty-five years working on the semi-conductor. Computer technology has been my life."

Reported by Allison Stelling.

"All of the memorabilia in junk piles across the country needs to be collected so that people can see what the early days of computing looked like. With such fast-changing technology, a computer museum is as much for the people who are part of the industry as it is for the next generation."

C. Lester Hogan