

## *History in the Computing Curriculum*

### Appendix A2

#### **1900 to 1939**

- 1900: Hollerith introduces the automatic card feed into his electromechanical information machine to process census data. (p)
- 1901: The keypunch appears and changes very little over the next half century. (e)
- 1904: John Ambrose Fleming patents the first diode vacuum tube, setting the stage for better radio communication. (e,p)
- 1906: Lee de Forest adds a third valve to control current flow to Fleming's diode to create the three-electrode vacuum tube. (e)
- 1907: Gramophone music constitutes the first regular radio broadcasts from New York. (e)
- 1908: Percy Ludgate proposes a new design for an analytical engine. (w)
- 1908: British scientist Campbell Swinton describes an electronic scanning method and foreshadows use of the cathode-ray tube for television. (e)
- 1911: Dutch physicist Kamerlingh Onnes at Leiden University discovers superconductivity. (e)
- 1911: Hollerith's Tabulating Machine Co. and two other companies combine to form C-T-R -- Calculating, Tabulating, and Recording Co. (e, p)
- 1914: Thomas J. Watson, Sr. becomes president of CTR. (p)
- 1915: Use of microchips is foreshadowed as physicist Manson Benedicks discovers that the germanium crystal can be used to convert alternating current to direct current. (e)
- 1917: The word "robot" (derived from the Czech word for compulsory labor) is first used by Karel Čapek in his play RUR (Rossum's Universal Robots). (e,p)
- 1919: Eccles and Jordan, US physicists, invent the flip-flop electronic switching circuit critical to high-speed electronic counting systems. (e)
- 1921: Karel Čapek releases his play RUR (Rossum's Universal Robots). (e,p)
- 1924: T.J. Watson renames CTR to International Business Machines (IBM) and popularizes the "Think" slogan he coined at National Cash Register. (e,p)
- 1925: Bell Labs is formed, later becoming one of the premier research centers on communications and computers. (p)
- 1925: First analog computer is developed by Vannevar Bush to solve differential equations. (p)
- 1927: Herbert Hoover's face is seen on screen during the first demonstration of television in the US. Accompanying voice transmission uses telephone wires. (e)
- 1928: Vladimir Zworykin invents the Cathode Ray Tube (CRT), which will later become the first computer storage device. (p)
- 1928: The quartz crystal clock makes possible unprecedented time-keeping accuracy. (e)
- 1928: Punched card equipment attached as output devices to standard mechanical calculators in Germany. (w)
- 1928: Punched card machines in use by L.J. Comrie to calculate the motions of the moon. (w)
- 1929: IBM founds the Columbia University Statistical Bureau and donates some punched card equipment. (w)
- 1929: Color television signals are successfully transmitted. (e)
- 1930: The Differential Analyzer, devised by Vannevar Bush and colleagues at MIT, solves various differential equations. (e,w)
- 1931: Reynold B. Johnson, a high-school teacher in Michigan, devises a way to score multiple-choice tests by scanning conductive pencil marks on answer sheets. IBM later buys the technology. (e)

1931: L.J. Comrie converts a National Accounting Machine into a difference engine. (w)

1931: Konrad Zuse builds the Z1, the first electric digital calculator. (p)

1932: Large-scale electronic counters first used to count events in a physics experiment by C.E. Wynn-Williams at Cambridge. (w)

1932: Bell Labs creates "Daisy," the first computer-generated tune. (p)

1933: The first electronic talking machine, the Voder, is built by Dudley. (p)

1934: In Germany, Konrad Zuse seeks to build a better calculating machine than those currently available. He realizes that such a machine would only need a control, a memory, and an arithmetic unit. (e,w)

1934: Moore School differential analyzer operational. (w)

1935: IBM introduces not only the 601 multiplying punch-card machine but also an electric typewriter. (e,w)

1936: Konrad Zuse realizes that programs composed of bit combinations can be stored, and he files a patent application in Germany for the automatic execution of calculations, including a "combination memory." (e,w)

1937: Howard Aiken submits to IBM a proposal for a digital calculating machine capable of performing the four fundamental operations of arithmetic and operating in a predetermined sequence. (e,w)

1937: Claude Shannon develops a master's thesis that applies Boolean logic (binary arithmetic) to switching circuits, paving the way for the electronic digital computer. (p)

1937: Claude Shannon publishes the principles for an electric adder to the base two. (e)

1937: George Stibitz experiments with relays at Bell Labs and develops a binary circuit based on Boolean algebra. (e,w)

1937: Alan Turing's paper "On Computable Numbers" presents the concepts of the Turing machine. (e,p)

1937: Zuse writes of an elementary operation of equality by checking two binary digits with the result a binary digit. (n)

1937-38: John Vincent Atanasoff and Clifford Berry spend the winter devising the principles of the electronic-digital machine, the ABC machine. The machine provided the foundation for the next advances in electronic digital computers. (e,t,w)

1938: William Hewlett and David Packard form Hewlett-Packard in a garage in Palo Alto, California. (e)

1938: Zuse completes the Z1 electromechanical binary computer and refines the design with the Z2. (e,n,w)

1939: The voice coder Vocoder follows the Voder from 1933. (p)

1939 [April]: Construction started on the Complex Number Calculator at Bell Labs. (w)

1939: Construction started on the Harvard Mark I. (w)

1939: Working from October through November, John Atanasoff, with the help from graduate student Clifford E. Berry, builds a prototype electronic-digital machine that uses binary arithmetic. (e)

1939: Dickinson files a patent for the \_\_\_\_\_ data storage element. (a) <<< What kind of storage element?? >>>

1939-40: Konrad Zuse completes the Z2, which uses telephone relays instead of mechanical logical circuits. (e,w)