synchronous method of handling information. Developed by Jay Forrester in 1949, magnetic core memory was an important step in miniaturization and speed of computer memory. The Whirlwind was only commissioned in 1958, finding use as the control and prediction computer for the SAGE air defense system. This relied on real-time communications to remote radar stations for which a key digital communication technology was developed—the modem. However, it has been argued that Whirlwind's time was over before it ever began: the system had become redundant by the Cold War proliferation of intercontinental ballistic missiles.

The UNIVAC is regarded as the first commercial digital computer. It was designed and built by J. Presper Eckert and John Mauchly who had worked extensively on the engineering of ENIAC project. The acronym stems from "universal automatic computer," the intention being that it would have universal appeal to scientists, engineers and business. Although the core functional "organs" were similar to the EDVAC, it was a more robust machine and required less maintenance. The UNIVAC incorporated some key improvements that vastly speeded up data processing which included a magnetic tape system for secondary memory storage and a data buffering mechanism to the delay line primary memory storage. The first commercial installation of a UNIVAC was at the U.S. Census Bureau in 1951. LEO (Lyons electronic office) however went into commercial office action a few months before UNIVAC. LEO, based on Cambridge University's EDSAC, was used by Lyons & Company Limited Bakery for data processing. With interest from other companies, Lyons later sold LEO II computers to other British firms.

IBM responded to UNIVAC in 1952 with the Model 701, which was technologically similar to the UNIVAC with the exception that it featured cathode-ray tube memory. This was a technology appropriated from the television industry, the phosphorescence of the screen providing the ability to store binary signals. Another key feature was the use of a magnetic oxide-coated drum for secondary storage (the predecessor of the hard disk) as well as a lightweight plastic tape tertiary memory. This had a lower inertia than the metal tapes of the UNIVAC and sped up tape operations considerably. Due to IBM's massive market presence and infrastructure, the 701 was a considerable market success.

Following the success and proliferation of these computers in business and scientific research organizations from the early 1950s, a plethora of startups presented the global market with a diverse range of digital computers. These companies were initiated by key staff members from the pioneering organizations, such as Seymour Cray and William Norris. Besides technological improvements in processing speed, primary and mass storage memory density, architecturally digital computers did not diverge from the classic "von Neumann architecture." Furthermore, military-sponsored research in the U.S. produced key advances such as the transistor, the integrated circuit and computer networking (from which the Internet grew) although personal computing was more of a civilian initiative. Larger demand for computers in all spheres of society spawned a global industry, which ultimately drove down prices and increased miniaturization, and resulted in the digital computer becoming ubiquitous in most industrialized societies by the turn of the century.

See also Calculators, Mechanical and Electromechanical; Computer Memory, early; Computers, Analog; Computers, Mainframe; Encryption and Code Breaking; Vacuum Tubes/Valves

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Computers, Hybrid

Following the emergence of the analog–digital demarcation in the late 1940s—and the ensuing battle between a speedy analog versus the accurate digital—the term "hybrid computer" surfaced in the early 1960s. The assumptions held by the adherents of the digital computer—regarding the dynamic mechanization of computational labor to accompany the equally dynamic increase in computational work—was becoming a universal ideology. From this perspective, the digital computer