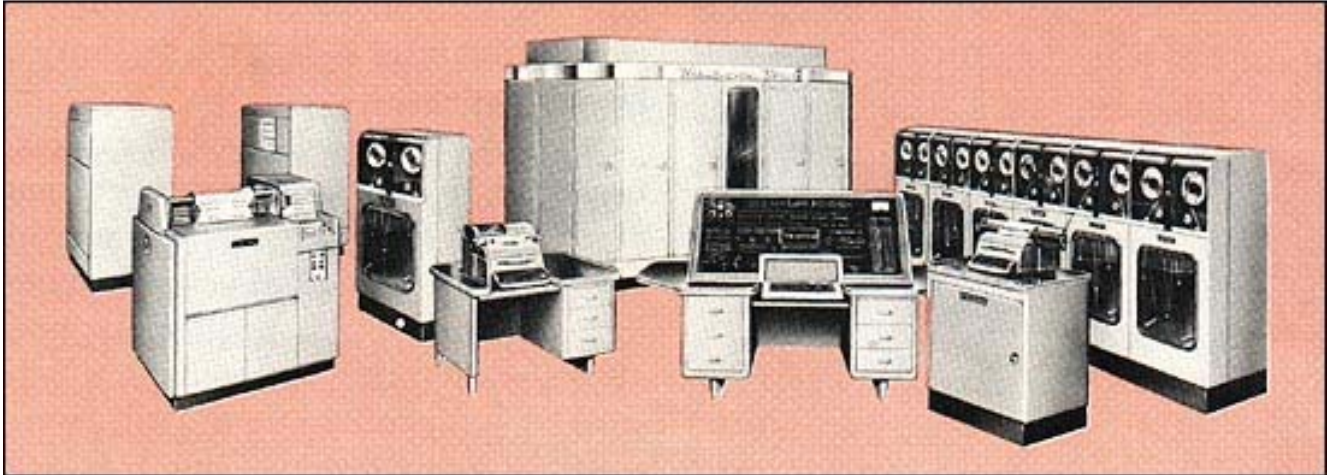


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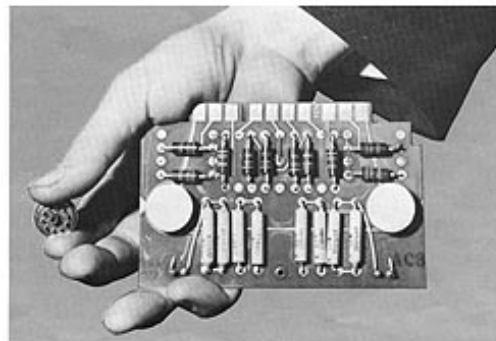


Univac 1 computer, the first business data processor. Shown, left to right, High-speed printer with power supply and magnetic tape input unit, Unityper II, the central computer, the control console, the Universo 1 input-output unit, and the Uniprinter

One of the largest factors in the success of UNIVAC I was the revolutionary input-output equipment offered with it. All input to the computer and output from it was by means of magnetic tape. The magnetic tapes were prepared off-line by a Unityper and information from them was printed out (also offline) by a Uniprinter. A keyboard and a typewriter were also provided.



The circuitry for the Univac I consisted of crystal diode switches and vacuum tube circuits. In 1952, Univac engineers developed a magnetic amplifier which they later trademarked under the name Ferractor. Each of these tiny components could do the work of a vacuum tube and do it better and more reliably. These solid state components lasted much longer than the vacuum tube circuits they replaced.



Above, two Ferractor amplifiers, each of which can do the work of a vacuum tube. Book match provides comparison for size. Below, man holds a printed circuit board. "Pill boxes" house units similar to one in his finger, with two tiny amplifiers at center.

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with UNIVAC I for getting information into and out of the computer, but these generally were used in the course of checking out programs and rarely during the actual computer run.

The Uniservo I was for communication and intermediate storage between the input-output devices and the computer. The magnetic tape was recorded at 120 digits per inch and could move past the read-write heads at 100 inches per second. Since Mylar tape had not been invented and the other alternative was acetate film, (which was very unstable), Univac choose to use metallic tape. Uniservo used small tape reels because they each weighed 25 lbs, but were very reliable. Also vacuum buffering was not yet invented so the buffering technique was to use elaborate rubber bands.

Before long, the Card-To-Tape Converter was added to the input-output array. It read punched cards and converted the data into pulses on magnetic tape ate the rate of 240 cards per minute. A single standard reel of tape could hold as many as 4000 punched cards.

A new High Speed printer was introduced which read magnetic tape and printed at 600 lines per minute. Newer High-Speed Printers operated at about 720 lines per minute but technology at that time limited printer speeds to 720 line per minute.

Improvement in Technology was an ongoing process. The Unityper II, occupied 2 cubic feet instead of 20. Besides costing less to begin with it costs less to maintain. Uniservo II tapes moved at the same speed as the Uniservo I tapes- 100 inches per second but they were effectively twice as fast because twice as much information was recorded per inch.



Univac Solid State High-Speed printer is capable of printing up to 600 lines per minute



Universe III reads data at the rate of 200,000 digits per second.

UNIVAC File Computer

Remington Rand, through its acquisitions of the Eckert-Mauchly Computer Corporation (EMCC) in February 1950 and Engineering Associates (ERA) in December 1951 became the leading (and for a brief time the only) computer vendor in the world. Remington Rand decided to market a medium - scale computer to be called the UNIVAC File Computer. As its name indicated the File Computer was intended to provide access to data files stores on magnetic drums. This was very unusual for

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that time. Most computers read in data records from punched cards, paper tape or magnetic tape, process them back out to cards or tape, but they had no provision for long term on-line storage of data. The original File Computer had a 1,070 word drum, a memory that had twelve 6-bit digits or characters per word. The computer performed decimal arithmetic on numbers represented in Excess-3(XS-3) code. In XS-3, each decimal digit was represented by a binary value three higher, that is, 0 by 000011, 1 by 000100, etc. There were also codes for letters and special characters, such as 0101100 for A, 010101 for B and so on. The 1070-word drum which had an average access time of 2.5 milliseconds, was for storage of data actually being worked on by the program. General storage data was provided by from one to ten 15,000 word drums, whose average access time was 17 milliseconds. It was possible to have a processor which did tape sorting and collating, separately from the central processor.



File Computer console

Besides doing the usual sort of batch work, the File Computer could provide interactive access to the stored data via one to ten terminals, which were called "input-output devices". An input-output device consisted of an inquiry typewriter, a punched card unit(using either 80 or 90 column punched cards), a paper type unit, a printer, and an optional Magnetic Tape drive. The input-output devices could operate independently from the Central Processing complex and perform input-output operations while the processor was doing something else.

The File Computer Model 1 was built in 1957. It has twenty words of core storage, a tiny amount, but enough to provide for some internal programming capability, It allowed for a combination of internal and plug board instructions in the same operation, There were 27 instructions in the internal instruction set, including the arithmetic, comparison, jumps, suppression of left zeros, test for input from I/O station, and transfer to the plug board. The plug board had 19 operations, one of which transfer of control to the program memory. The memory instructions were twelve-digits in length, the last three specified the instruction code, while the others comprised three three-digit storage addresses. A field upgrade was later available which replaced the main memory drum with 1740 words of core memory this upgrade increased the operating speed by a factor of 3.6.

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Central computer - 80 col. Card Reader Punch

Eastern Airlines used a File Computer for their reservation system. In 1957 Eastern and the St. Paul engineering staff developed a terminal device, called an agent set, for use on the File Computer, which had a keyboard and push-button matrix for selection of the function to be performed. A demonstration of the agent set took place in August 1957, but the reservation system did not start running until September 1958. The system covered nine cities (Atlanta, Birmingham, Boston, Houston, New Orleans, New York-Newark, Philadelphia and Washington) and within two months was processing one transaction per second. Northwest Airlines started using this reservation system in November 1959 and Capitol Airlines followed in early 1960.

Douglas Aircraft Company was the largest user of File Computers, with 7 installations. Other users of the File Computer included the C&P Telephone Co., Western Electric, Michigan Bell, First National City Bank, various Army and Marine Corp bases. (The photos above were taken by this writer in 1958 at Edgewood Army Chemical Center, Edgewood, Maryland)

A series of development delays meant that the File Computers were delivered toward the end of the vacuum-tube generation of computer hardware. Transistor (second generation) computers began appearing in quantity in 1960 and 1961. These new Solid State computers made vacuum-tube computers such as the File Computer obsolete.