

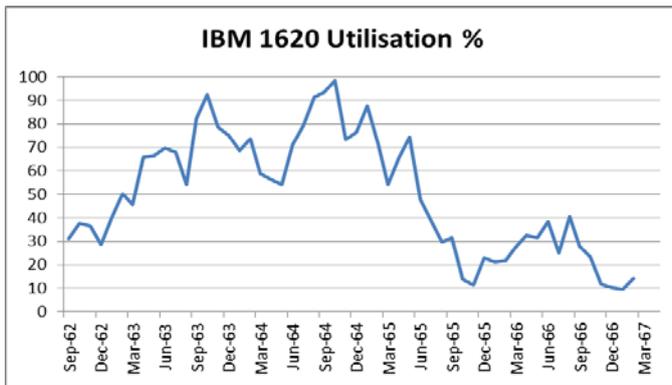
IBM 1620 Facts

The IBM 1620 was announced by IBM on 21-Oct-59, and marketed as an inexpensive “scientific computer”. Model II, with improved arithmetic capability, was released in 1963. After a total production of about 2,000 machines, it was withdrawn on 19-Nov-70. The console typewriter was a modified Model B1, which typed at 10 characters per second.



UWA's IBM 1620:

The unit purchased by UWA was a Model I, with 20,000 decimal digits of memory. It cost \$88,054, and was installed early in September 1962. Take-up of the machine was very rapid, and usage approached 100% utilisation within a year. It was used by various research groups around the University, as well as by many other educational institutions and government departments. It was replaced by a DEC PDP-6 in May 1965, but continued life as a student workhorse till about 1970. [the PDP-6 was the first time-shared computer to be delivered anywhere in the world, and was over 100 times faster than the 1620].



Architecture and Speed:

The central processor clock speed was 1MHz, which was divided by 20 by a 10 position ring counter to provide the system timing/control signals. Instructions took 8 Memory cycles (160µs) to fetch and a variable number of memory cycles to execute. Indirect addressing added 4 Memory cycles (80µs) for each level of indirection. Core memory cycle times were 20 microseconds for the Model I, 10 microseconds for the Model II. It had a variable word length decimal, as opposed to fixed-word-length pure binary.

All arithmetic was done by table lookup in core memory. Addition and Subtraction used a 100-digit table (@ address 00300..00399). Multiplication used a 200-digit table (@ address 00100..00299). In the basic machine, division used software subroutines, but optional divide hardware could be installed using a repeated subtraction algorithm (not installed at UWA). Floating point arithmetic instructions were also an available option (if the divide option was installed).

Addition or subtraction (5 digits): 560µs, a rate of 1,780/second.

Addition or subtraction (10 digits): ~1,000µs, a rate of just over 1,000/second.

Multiplication (5 digits by 5 digits): 4.96ms, a rate of 200/second.

Multiplication (10 digits by 10 digits): 17,700 μ s, a rate of 56/second.
 [Modern microprocessors can add (or multiply) in 1 cycle time, ie ~1 million times faster].

The first 20,000 decimal digits of Core memory were internal to the CPU itself (which reduced the floor space requirements of the basic system). Expansion to either 40,000 or 60,000 decimal digits required the addition of an IBM 1623 Memory unit (not acquired by UWA). All input and output was by punched cards; the output cards had to be printed on a separate IBM 407 tabulator to get printed output.

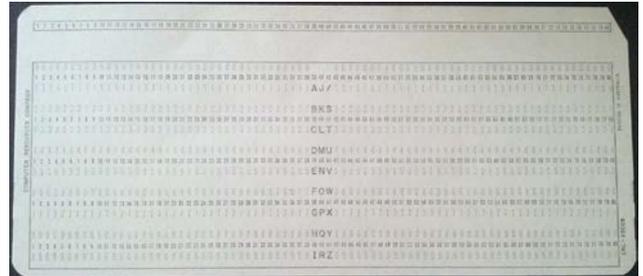
Software:

IBM supplied the following software for the 1620:

1620 Symbolic Programming System (SPS)
 (assembly language).

FORTTRAN: an earlier and simpler version of FORTRAN II (which required 40,000 digits or more of memory).

GOTRAN: a simplified, interpreted version of FORTRAN for “load and go” operation (replaced by FORGO at UWA).



Anecdotes about the IBM 1620:

When put into production following the development of a prototype, the 1620 was given the code name CADET (Computer with ADvanced Economic Technology), which many claimed actually stood for “Can't Add, Doesn't Even Try”, referring to the use of addition tables in memory rather than dedicated addition circuitry.

Edsger Dijkstra famously was quite critical of the architecture, and said “I can remain silent no longer”, upon reading various glowing reviews of the machine in the Communications of the ACM (April & September 1962).

Work was begun on a 1620 Model III but the project was quickly cancelled as IBM wanted to promote sales of their new System/360 (launched on April 7, 1964) and discontinue the old lines.

Sources:

Wikipedia: http://en.wikipedia.org/wiki/IBM_1620

Computer History IBM1620 Project: http://www.computerhistory.org/projects/ibm_1620/

Manuals: <http://www.bitsavers.org/pdf/ibm/1620/>

IBM Archive: http://www-03.ibm.com/ibm/history/exhibits/mainframe/mainframe_PP1620.html

Swansea University Archives: <http://hocc.swansea.ac.uk/book/export/html/64>

Dijkstra's Critique: <http://www.cs.utexas.edu/users/EWD/transcriptions/EWD00xx/EWD37.html>

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