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| **Digital revolution** |
| Minicomputers are introduced in the early 1960s and announced a new era in computing. They are relatively low cost and small. This setup allowed more people to have access to computers and as a result a splurt of new applications in universities, industry, and commerce are created. Digital Equipment Corporation developed the PDP-1 minicomputer in 1960, and the PDP-8 virtualy conquered the market is a sweep and sold over 40,000 units. In time some 200 companies produced this type of minicomputers. DEC got at the top of the market with the PDP-11, and with the VAX 11/780 system. The latter will become a landmark system in the history of computing ([Chronology](http://www.thocp.net/hardware/mini_computers.htm#chronology))  (link: <http://www.thocp.net/hardware/mini_computers.htm>)  Mainframe is an industry term for a large computer. The name comes from the way the machine is build up: all units (processing, communication etc.) were hung into a frame. Thus the maincomputer is build into a frame, therefore: **Mainframe**  And because of the sheer development costs, mainframes are typically manufactured by large companies such as IBM, Amdahl, Hitachi ([Introduction](http://www.thocp.net/hardware/mainframe.htm#introduction)).  Building mainframes started with the MarkI soon to be followed by tens of other types and manufacturers. But as said earlier, because of the development costs only governments and large firms could pay for the development of such behemoths.  Early mainframes:   |  |  | | --- | --- | | Mainframes | Year | | [ENIAC](http://www.thocp.net/hardware/eniac.htm) | 1942 | | [MarkI](http://www.thocp.net/timeline/1940.htm#1943) | 1944 | | [BINAC](http://www.thocp.net/timeline/1947.htm#1949) | 1949 | | [Whirlwind](http://www.thocp.net/hardware/whirlwind.htm) | 1960 | | [UNIVAC](http://www.thocp.net/hardware/univac.htm) | 1952 | | [IBM 701](http://www.thocp.net/hardware/ibm_701.htm) | 1953 | | [IBM 360](http://www.thocp.net/hardware/ibm_360_family.htm) | 1963 |   (Chronology)  (link: <http://www.thocp.net/hardware/mainframe.htm>) |
| **Hewlett Packard (HP)** The **HP-35** was [Hewlett-Packard](https://en.wikipedia.org/wiki/Hewlett-Packard)'s first [pocket calculator](https://en.wikipedia.org/wiki/Pocket_calculator) and the world's first *scientific* pocket calculator: a calculator with [trigonometric](https://en.wikipedia.org/wiki/Trigonometric_functions) and [exponential functions](https://en.wikipedia.org/wiki/Exponential_function). It was introduced in 1972. (article – HP-35) (link: <https://en.wikipedia.org/wiki/HP-35>) Before the modern era (say, the 1970s), these problems could be hard to solve, requiring a lot of pencils and paper, a book of tables, or a slide rule. Mathematicians never carried slide rules, but astronauts did, [as their backup computers](https://airandspace.si.edu/collection-objects/slide-rule-5-inch-pickett-n600-es-apollo-13).  (HPE - all) (link: <https://www.hpe.com/us/en/insights/articles/the-early-history-of-hp-calculators-1709.html>)  Everything the slide rule could do, a so-called slide-rule calculator could do better—and more accurately. Slide rules are really good at few things. Multiplication and division? Easy. Exponents, like 613? Easy. Doing trig, like sines, cosines, and tangents? Easy. Logarithms? Easy.  (HPE - all) (link: <https://www.hpe.com/us/en/insights/articles/the-early-history-of-hp-calculators-1709.html>)  However, slide rules had limitations. They were good to about three digits of accuracy, no more, in the hands of a skilled operator. Three digits was fine for real-world engineering, but not enough for finance. With slide rules, you had to keep track of the decimal point yourself: The slide rule might tell you the answer is 641, but you had to know if that was 64.1 or 0.641 or 641.0. And if you were chaining calculations (needed in all but the simplest problems), accuracy dropped with each successive operation.  (HPE - all) (link: <https://www.hpe.com/us/en/insights/articles/the-early-history-of-hp-calculators-1709.html>)  Hewlett-Packard unleashed a monster when it created the HP-9100A desktop calculator, released in 1968 at a price of about $5,000. The HP-9100A did everything a slide rule could do, and more—such as trig, polar/rectangular conversions, and exponents and roots. However, it was big and it was expensive—about $35,900 in 2017 dollars. However, something better was needed, something affordable, something that could become a mass-market item. And that became the pocket slide-rule calculator revolution, starting off with the amazing HP-35.  (HPE - all) (link: <https://www.hpe.com/us/en/insights/articles/the-early-history-of-hp-calculators-1709.html>)  The original HP-35 was available from 1972 to 1975. In 2007 HP announced the release of the "retro"-look [HP 35s](https://en.wikipedia.org/wiki/HP_35s) to commemorate the 35th anniversary of the launch of the original HP-35.  The HP-35 was named an [IEEE Milestone](https://en.wikipedia.org/wiki/List_of_IEEE_milestones) in 2009. (article - history) (link: <https://en.wikipedia.org/wiki/HP-35>) |
| The PET was a revelation as all previous home computers were little more than [circuit boards](http://www.commodore.ca/popular-science-reviews-the-commodore-pet-2001-in-1977/) that could only be understood by hard core enthusiasts like the members of the [Home Brew Computer clubs](http://www.computerhistory.org/revolution/personal-computers/17/312).  inside-commodore-pet-fig3_et_feb78  Inside the Commodore PET  The first prototype PET demonstrated at the 1977 Consumer Electronics Show had been cobbled together in a hurry and on the cheap. It had a chassis made of wood and a picture tube taken from a $90 black and white TV that MOS bought from a local hardware store.  The visionary engineer behind this project was [Chuck Peddle](https://www.commodore.ca/commodore-history/the-legendary-chuck-peddle-inventor-of-the-personal-computer/). The worlds first Personal Computer was not ready even a week before the show and in the three days leading up to CES, Chuck worked 20 hours a day getting the PET prototype functional; he completed this now historic task only a few hours before the doors opened.  (link: <https://www.commodore.ca/commodore-products/commodore-pet-the-worlds-first-personal-computer/>) |
| **1976: July - The Apple I computer board is sold in kit form, and delivered to stores by Steve Jobs and Steve Wozniak. Price: US$666.66.**  **(Apple I -** <http://www.oldcomputers.net/applei.html>**)**  Only about 200 Apple 1 computers were made in total. Excited by their success, Woz went on to design the [Apple II](http://www.oldcomputers.net/appleii.html) - one of the greatest computers of all time.  (history - <https://en.wikipedia.org/wiki/Apple_I>)  **1977: May - 10 months after its introduction, 175 Apple I kits have sold.**  **(Apple I -** <http://www.oldcomputers.net/applei.html>**)**  It continued to be sold through August 1977, despite the introduction of the [Apple II](https://en.wikipedia.org/wiki/Apple_II) in April 1977, which began shipping in June of that year. In October 1977, the Apple I was officially discontinued and removed from Apple's price list. As Wozniak was the only person who could answer most customer support questions about the computer, the company offered Apple I owners discounts and trade-ins for Apple IIs to persuade them to return their computers. These recovered boards were then destroyed by Apple, contributing to their rarity today.  (history - <https://en.wikipedia.org/wiki/Apple_I>) |