



## HP Celebrates 35 Years of Handheld Calculator Innovation

In the early 1970s the slide rule was still standard fare and the personal computer was a vision of the future. Then, in 1972, HP introduced the world's first scientific pocket calculator – the HP-35 – and delivered portable “computing power” into the hands of users. An instant hit among scientists and engineers, the HP-35 soon displaced many a slide rule and marked the birthplace of HP's innovative and successful heritage in the handheld calculator market.

### **Mandate from the top**

In 1970, an all-electronic handheld calculator caught the attention of Bill Hewlett, co-founder of HP. This 1.8-pound device was designed to compete with simple mechanical adding machines with its ability to add, subtract, multiply and divide. Hewlett was convinced HP could do better.

Hewlett's goal was to shrink down HP's first electronic desktop calculator – the 40-pound HP 9100A – into a lightweight, yet powerful device that could be easily carried around. He personally challenged HP engineers to develop a scientific calculator that was small enough to tuck into a shirt pocket.

Development was quick and intense. Just one year after Hewlett's encounter with the basic handheld calculator, HP brought the pocket-sized HP-35 to market. Quickly dubbed the “electronic slide rule,” it could perform trigonometric, logarithmic and exponential functions – the essential tools of technical professions and the primary calculations performed on slide rules.

Part of the HP-35's technical achievement was its innovative and efficient data input method called Reverse Polish Notation (RPN). With RPN, the HP-35 required fewer keystrokes and was able to handle larger and more complex problems with less memory than other calculators. Still today, RPN is a much-beloved feature and industry differentiator across HP's line of scientific, graphing and financial calculators.

Weighing in at only 9 oz, the HP-35 stood apart from its elementary predecessors in portability and computing power. Although marketing experts declared there was no future for a handheld scientific calculator that cost \$400 when a slide rule cost \$20, more than 100,000 HP-35s were sold in the first year, and it went on to become one of the most successful products in HP's history. In 2000, Forbes ASAP named it as one of the 20 “all time products” that have changed the world.

### **HP's commitment to innovation**

Hewlett envisioned HP as a preeminent innovator in calculator technology and the leading developer of high-performance, high-quality programmable calculators for the business and scientific marketplace. This commitment to quality, reliability and innovation helped cement HP as a leader in the history of the handheld calculators.

When the HP-35 was introduced, there were 75 handheld calculators on the market from more than 20 manufacturers. All of these were four-function calculators and could only add, subtract, multiply and divide. From 1972 to 1976, four-function calculator prices fell 95 percent – plummeting from an average of \$195 to just \$9.95. Falling prices unseated a number of calculator brands.

When the consumer calculator market went through a shakeout in 1978 and 1979, HP had already built a strong position in the professional calculator market segment. That position was based on innovative products such as the HP-35 scientific calculator; the HP-80, the first pocket-sized business calculator; the HP-65, the first programmable handheld calculator and the HP-25C, the first handheld calculator with non-volatile memory.

During that time period, HP had also developed the unique HP-01 wrist instrument. More than the sum of its parts, the HP-01 combined a wristwatch and a calculator, but in a way that the device could do things that neither could do alone. For instance, a user could calculate a real time display of money spent or made by multiplying the stopwatch by a rate of spending.

HP went on to develop advanced handheld calculators such as the HP-41C – the first programmable, alphanumeric handheld. According to the Smithsonian National Air and Space Museum, on a total of nine Shuttle missions, astronaut Sally Ride and several other astronauts used the HP-41C. Loaded with a variety of specialized software programs at a very low cost, the HP-41C gave the astronauts more computing power than a custom-made device produced specifically for a given space mission.

Across the line, HP calculators are known for their legendary reliability and durability. Innovatively constructed to withstand everyday drops and bumps, HP's calculators often survive the most unusual of circumstances, like the following customer story reported in a 1977 edition of *HP Digest*:

"Last night while backing my wife's 73 Ford Gran Torino, I opened the door for a better look back, and my HP-25 in the carrying case fell out of my pocket without my knowing it. Seeing that I needed to pull up and move over, I did and backed up again. This time I heard a thump. Sure enough it was my HP-25. I had run over it with the front wheel against frozen gravel. I was sure it was smashed flat but it was not hurt at all."

### **Focus on design**

The HP-35's industrial design was unique in its day as it was created around user needs rather than simply designed around the latest technology: the "pocket-sized" specification was the guiding mandate of the design. Based on this foundation, a number of HP calculators continue to be standouts in industrial design.

In the late 1970s, HP introduced the HP-92 desktop printing financial calculator and HP-38 financial calculator whose ground-breaking top row key design helped lead to HP's lasting success in the financial calculator market. HP recognized the need for users to easily solve for a fifth unknown variable in basic financial calculations and designed new top row keys to answer this real-life challenge. As a result of this innovative key design, which dramatically expanded functionality and ease of use, the HP-92 and HP-38 became the forefathers of HP's very successful line of financial calculators.

Echoing the HP-35's history, HP engineers were charged with creating a financial calculator that would fit conveniently in a shirt pocket, be reliable and have a long battery life. The design team decided to lay out the calculator in a horizontal position



This was partly to accommodate all the keys in a small form factor and because many commonly used adding machines were also oriented horizontally. The result was the HP-12C Programmable Financial Calculator, which is instantly recognized for its unique horizontal layout still today.

In addition, during the final stages of development, the design team was not happy with the 12C's battery life for usability reasons. The solution was to add a third battery in series, which would require an entire re-design of the chip layout and the case to accommodate this change. As a result, the upper back of the case was thickened just enough to allow the extra battery. Not only did this increase the "worst case" battery life up to six months, but the case's tilt made it easier to read and use when lying on a desk. Now an iconic consumer electronics product, the HP-12C that's sold today acts and looks just like it did when it made its worldwide debut over 25 years ago.

Last year, HP introduced the stylish HP 39gs graphing calculator, targeted for high school classrooms. In addition to its ease-of-use and reliability features, the HP 39gs sports a modern white and gray look and clean lines to appeal to its design-conscious teenage audience. Looking to the future, customers can expect HP calculators to continue to be on the forefront of user-centric design.

### **HP calculators today**

Having spurred the leap from slide rules to handheld scientific calculators, HP continues its 35-year heritage of delivering innovative products, offering a complete line of market-leading financial, graphing and scientific calculators. Today its high-end graphing calculators offer more connectivity options and greater configurability than other calculators in their class, and the HP-12C Financial Calculator has become an industry standard in the business and finance community with more than 15 million units sold to date.

According to the NPD Group:

- HP Financial Calculators are rated No. 1 in U.S. dollar share sales;
- The HP 33s Scientific Calculator is rated the "Best Seller" in the Scientific Programmable Calculator category in both units and dollar share;
- All four HP Financial Calculators (10bII, 12c, 12c Platinum, 17bII+) are top ten "Best Sellers" in the Financial Calculator category in both units and dollar share.

Rooted in a challenge personally set forth by HP co-founder Bill Hewlett, HP handheld calculators are a cornerstone of HP's history of innovation. Following Hewlett's commitment to calculator innovation, HP will continue to shape the landscape of calculator technology in the future.

## TIMELINE OF BREAKTHROUGH HP HANDHELD CALCULATORS

### 1972 HP-35: World's first handheld scientific calculator

The HP-35 virtually made the engineer's slide rule obsolete. It was HP's first product containing both integrated circuits and LEDs (light-emitting diodes). Both technologies had been developed in HP Labs.



### 1973 HP-80: World's first pocket-sized business calculator

Popular among bankers, investment analysts and real-estate professionals, the HP-80 eliminated the need for financial tables used to compute compound interest, annuities and bond yields. It could also perform complex statistical operations, such as linear-regression analysis and standard deviation.

### 1974 HP-65: World's first programmable pocket calculator

The HP-65's keystroke programmability later led some to deem it the world's first handheld computer. Calculator programs were recorded on small magnetic cards, which then could be re-entered into the calculator and run again.

### 1976 HP-25C: World's first handheld calculator with non-volatile program memory

The calculator's continuous memory could retain programs and data no matter how often it was switched on and off.

### 1977 HP-01 Wrist Instrument

Combination digital wristwatch, calculator and personal calendar. Performed more than three-dozen functions to manipulate and interrelate time, calendar and numeric data. It demonstrated HP's excellence at miniaturization.



### 1979 HP-41C: World's first programmable, alphanumeric handheld calculator

Capable of displaying numbers, letters and common symbols, it became the heart of the first calculator/peripheral system. Owners could purchase a number of peripherals, including a magnetic-card reader, a thermal printer/plotter, a barcode reading wand or other accessories. Much like a computer, the HP-41C could prompt users with phrases such as "Annual Interest Rate = ?" and then could label answers with phrases such as "Monthly Payment = \$525."

**1981 HP-12C: HP's longest and best-selling calculator, 1981**

The HP-12C sold today acts and looks just as it did when first introduced in 1981, with the exception of improved performance due to modern components. Valued for its reliability, proven accuracy and long battery life, the HP-12C has become an industry standard in the business and finance community.



**1982 HP Interface Loop (HP-IL), first system to allow handhelds to communicate with computers**

The HP-IL provided data input/output for battery-operated devices. For example, the loop allowed a salesperson or scientist to gather information in the field using a handheld calculator, then transfer the data to a PC.

**1986 HP-18C: First calculator with HP Solve**

HP Solve is an HP calculator differentiator that lets users solve an equation for any variable without rewriting the equation. The HP-18C was also the first calculator with infrared printing and with menu-driven soft keys for better usability.



**1987 HP-28C: First full RPL calculator**

In the late 1980s, HP developed a new programming language for its new series of extremely powerful calculators. By combining elements of RPN, Lisp and Forth, HP came up with a language called RPL (or ROM-based Procedural Language).

**1989 HP-48SX**

First handheld calculator with two-way infrared communication.



**1991 HP 95LX Palmtop computer**

Largely leveraging HP's calculator technology, the HP 95LX had as much computing power as a desktop PC and able to run many standard DOS programs on it. It had a financial calculator, telephone number/address program, simple text editor and infrared link for transferring data. Widely considered HP's first PDA (personal digital assistant), it was the first palmtop PC with built-in Lotus 1-2-3.



**1993 HP 48gx**

Sophisticated scientific-graphics calculator featuring 3D plotting and other advanced built-in features not previously found in calculators.



**1999 HP 30s**

A scientific algebraic calculator featuring an interchangeable keypad overlay so users could change the calculator's color.



**2003 HP 12c Platinum**

An enhanced version of the HP 12c financial calculator, the HP 12c Platinum boasts increased memory to allow for more keystroke programming steps and offers more built-in functions, including the option of standard algebraic mode as well as Reverse Polish Notation mode.



**2003 HP 49g+**

First handheld calculator to offer expansion via SD cards.

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