

AccessionIndex: TCD-SCSS-T.20241031.003

Accession Date: 31-Oct-2024

Accession By: Prof.J.G.Byrne

Object name: HP9815A calculator

Vintage: 1975

Synopsis: Hewlett-Packard third-generation reverse-Polish programmable desktop calculator, S/N: 1535G00802.

Description:

This item is Hewlett-Packard's third-generation reverse-Polish programmable desktop calculator introduced in 1975 costing \$2900, see Figures 1 and 2. It was smaller, lighter and less expensive than its predecessors. It had only a single line 16-digit 7-segment Burroughs *Panaplex-II* display but replaced the earlier magnetic stripe card drives with a tape drive that allowed more extensive programs (up to 96kB in size) to be stored on a HP-200 or standard 3M DC-100 tape cartridges, and a 16-character dot-matrix thermal printer that printed on a paper roll.

This calculator was introduced three years after the HP-35, the very first hand-held scientific calculator, and used the same version of reverse-Polish notation (RPN) used on the hand-held calculators, with a four-level stack x, y, z, t , with all results in the x register and implied pushes. It had ten numeric keys, 15 special function keys, 28 built-in scientific functions, 10 data registers and 472 programming steps (optional upgrade to 2008 steps). The **ENTER** key pushed the displayed value x up the stack. Any binary operation popped the bottom two registers and pushed the result. When the stack was popped, the t register duplicated into the z register. Users adapted to this rather than algebraic notation remarkably quickly.

The 28 scientific functions included trigonometric functions (arguments in degrees, radians, or grads), base 10 and natural logarithms, square root, y^x , polar/rectangular conversions, degrees/minutes/seconds conversions, reciprocal, mean (average) and standard deviation, and integer extraction. The machine operated in any of three display modes, fixed-point decimal when sensible, scientific (exponential) notation, and engineering notation (exponents as even multiples of three). Hyperbolic functions were missing, but HP distributed a large library on tape cartridges that executed most functions.

Simpler programming was enabled by support for multilevel nested subroutines, nested FOR/NEXT looping, indirect addressing, branching by address or label, rich conditionals, and automatic update of branch addresses on insert/delete of program steps. Multikey program sequences were combined internally to save space. Available program space was dependent on the number of registers defined, where the ratio could be set, with guidance to such non-intuitive actions under the printer cover.

The 9815A was based on a Motorola 8-bit MC6800 microprocessor (the first HP calculator not to use a serial bus), six Intel 2112 256 x 4bit static RAMs in three 8bit banks, and seven 2k x 8bit *nMOS-II* HP-proprietary ROMs, and the MC6821 PIA. Most of this logic for the 9815 was located on the rear of the keyboard; the rest of the case contained the display, tape drive and printer and associated electronics. US Patent 4,089,059 describes the 9815A in great detail, see Fig.3 and the related folder in this Collection.

The 9815A supported two optional I/O interfaces, each of which could accommodate one of the following cards:

- [1] HP 98130A: interface to 9872 plotter.
- [2] HP 98131A: interface to 9871A page-width impact character printer.
- [3] HP 98132A: interface to 9862A Plotter.
- [4] HP 98133A: 9-digit BCD input plus 8-bit parallel output.
- [5] HP 98134A: bidirectional 8-bit interface to 9800 calculator peripherals.
- [6] HP 98135A: HP-IB card for up to 14 interconnected instruments.
- [7] HP 98136A: RS-232 or current loop serial communications.

Once set up, the 9815A could control the data flow to/from instruments while also gathering and processing the data.

Subsequently the HP9815S model was released, with a redesigned CPU board, extra Intel 2114 1k x 4bit static RAMs and two 8k x 8bit ROMs, 3800 programming steps, plus the two I/O interfaces as standard.

This item is a HP9815A. It was only discovered, somewhat serendipitously, in 2024 in the office in Westland Row that Prof.J.G.Byrne occupied in retirement as an emeritus professor.

This Collection holds two other notable HP desktop calculators: the first-generation HP9100A programmable calculator, their fascinating first calculator, introduced c.1968 (the second-generation is considered to be the early integrated-circuit-based HP9810, introduced c.1971, which sadly the Collection does not hold), and the HP9820A programmable scientific calculator, their first algebraic calculator, introduced c.1972. These were designed by HP's Calculator Products Division (CPD), which afterwards morphed into its Desktop Computer Division (DCD), changing focus to traditional computing, evolving into a large slice of HP as it is today.

The Collection also includes two of HP's subsequent hand-held calculators, the HP-45 scientific calculator, introduced c.1973 (successor to the HP-35), and the HP-16C computer programmers calculator, HP's first and only hand-held calculator especially targetted at computer programmers, introduced c.1982.

The homepage for this catalog is at: <https://www.scss.tcd.ie/SCSSTreasuresCatalog/>
 Click 'Accession Index' (1st column listed) for related folder, or 'About' for further guidance.
 Some of the items below may be more properly part of other categories of this catalog,
 but are listed here for convenience.

Accession Index	Object with Identification
TCD-SCSS-T.20241031.003	HP9815A calculator. Hewlett-Packard third-generation reverse-Polish programmable desktop calculator, S/N: 1535G00802. 1975.
TCD-SCSS-T.20121208.016	HP9100A Programmable Calculator. HP's first calculator. S/N: 816-02612. c.1968.
TCD-SCSS-T.20121208.029	HP9820A Programmable Calculator. Electronic programmable scientific calculator, HP's first algebraic calculator. S/N: 1144A02907. c.1972.
TCD-SCSS-T.20160121.003	HP-45 Scientific Calculator. Hewlett Packard's successor to the HP-35 (their first hand-held calculator). S/N: 1350A 26828. c.1973.
TCD-SCSS-T.20160121.004	HP-16C Computer Programmers Calculator. Hewlett Packard's first and only hand-held calculator especially targetted at computer programmers. S/N: 2437A33074. c.1982.

References:

1. Wikipedia, *HP 9800 series*, see: https://en.wikipedia.org/wiki/HP_9800_series
Last browsed to on 31-Oct-2024.
2. The Museum of HP Calculators, *HP 9815A/S*, see: <https://www.hpmuseum.org/hp9815.htm>
Last browsed to on 31-Oct-2024.
3. Google, *US Patent 4,089,059*, see: <https://patentimages.storage.googleapis.com/aa/6f/3e/4833abe1a35c1e/US4089059.pdf>
Last browsed to on 31-Oct-2024.
4. Douglas M. Clifford, F Timothy Hickenlooper, and A. Craig Mortensen, “*Mid-Range Calculator Delivers More Power at Lower Cost*”, Hewlett-Packard Journal, pp.24-32, June, 1976.



Figure 1: HP9815 calculator advertisement, page 1, 1975.

Announcing the HP9815. Look what your bucks will buy now.

High-speed data cartridge provides up to 96,384 bytes of program and data storage. Dual-track, 140 foot magnetic tape can be searched bi-directionally at 60 inches a second.

Thermal printer has full set of alphanumeric characters. Prints up to 16 characters per line at 2.8 lines a second.

Easy-on-the-eyes display can display up to 16 numeric characters or up to 10 digits in scientific notation.

15 user definable keys allow single keystroke execution of programmed routines.

Auto-Start switch initializes programs so an operator need only switch on the power and Auto-Start, and begin interacting with programs. It also provides power-fail restart.

Simplified programming, based on easy-to-understand logic and easy-to-remember mnemonics, lets you write powerful, complex programs easily.

Powerful editing features allow you to modify and update programs quickly and accurately.

Built-in math and trig functions provide simple, convenient keystroke calculations—just like you get from HP hand-held calculators.

HP stack-oriented notation is the efficient, powerful method for arithmetic operations. It reduces equations to a few easily-handled steps.

Compact and portable, the 13 pound HP 9815 is just 13½" x 13½" x 4".

\$2900.*

*U.S. domestic price only. Does not include options, programs or peripherals.

And that's just for starters.

At its base-price, the new HP 9815 computing calculator is a price/performance leader. And the powerful 9815 becomes a uniquely versatile performer as you add optional features.

Interfacing capability is provided through an optional \$200* two-channel I/O module.

It allows a choice of seven different HP peripherals to work with the 9815, including the new 9871 page printer. You just plug them in, and they're ready to go. HP interface cards and cables allow the 9815 to control, gather and process data from a variety of instruments. And by adding an HP-Interface Bus, up to 14 instruments can be monitored simultaneously.

HP general-purpose programs are now available for statistics, electrical engineering design, surveying and radioimmunoassay. With them, problem solving is reduced to data entry.

Power, versatility, simplicity, low-cost—these are the characteristics of the new 9815. We call it a four-dimensional machine. Call your local HP sales office, or write for a copy of the HP 9815 brochure, and you'll see why.

HP computing calculators put the power where the problems are.



Sales and service from 172 offices in 65 countries.
P.O. Box 301, Loveland, Colorado 80537

Circle No. 28 on Reader Service Card

Figure 2: HP9815 calculator advertisement, page 2, 1975.

[54] **PROGRAMMABLE CALCULATOR EMPLOYING A READ-WRITE MEMORY HAVING A MOVABLE BOUNDARY BETWEEN PROGRAM AND DATA STORAGE SECTIONS THEREOF**

[75] Inventors: **Bradley W. Miller; Franklin T. Hickenlooper; David C. Uhrlich; Marl D. Godfrey; Douglas M. Clifford; Rex L. James; Robert E. Watson; John C. Keith; Alan C. Mortensen**, all of Loveland, Colo.

[73] Assignee: **Hewlett-Packard Company**, Palo Alto, Calif.

[21] Appl. No.: **597,957**

[22] Filed: **Jul. 21, 1975**

[51] Int. Cl.² **G06F 9/06**

[52] U.S. Cl. **364/706; 364/200**

[58] Field of Search **235/152, 156; 340/172.5**

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,461,434	8/1969	Barton et al.	340/172.5
3,548,384	12/1970	Barton et al.	340/172.5
3,588,841	6/1971	Ragen	340/172.5
3,596,257	7/1971	Patel	340/172.5
3,878,513	4/1975	Werner	340/172.5
3,904,862	9/1975	Cochrun et al.	235/156

Primary Examiner—David H. Malzahn
Attorney, Agent, or Firm—William E. Hein

[57] **ABSTRACT**

An adaptable programmable calculator employs modular read-write and read-only memories separately expandable to provide additional program and data storage functions within the calculator oriented toward the environment of the user, an LSI NMOS central process-

ing unit, and an LSI NMOS peripheral interface adaptor capable of bidirectionally transferring information between the read-write memory and central processing unit and a number of input/output units. The modular read-write memory includes a movable boundary between a program storage section thereof and a data storage section thereof to permit the user to adjust the size of those sections of the read-write memory in accordance with his present problem solving requirements. The input/output units include a keyboard input unit with a plurality of alphanumeric keys, a magnetic tape cassette reading and recording unit capable of bidirectionally transferring programs and data between a magnetic tape and the calculator, a seven-segment gas discharge display for displaying data entered into the calculator, the results of computations, and selected alphanumeric messages, and a 16-column alphanumeric thermal printer for printing results of computations, program listings, messages generated by the user and the calculator itself, and error conditions encountered during use of the calculator. All of these input/output units are included within the calculator itself. Many other external input/output units may be employed with the calculator. The calculator may be operated manually by the user from the keyboard input unit or automatically through a program stored within the read-write memory to perform calculations and to provide an output indication of the results thereof. The calculator employs reverse polish notation (RPN) language including an operational stack of registers for efficiently evaluating algebraic expressions. The language is arranged on a modified key per function basis, incorporating some of the features of higher level languages such as loops. The language also includes sophisticated editing features that enhance the usefulness of the calculator.

6 Claims, 226 Drawing Figures



Figure 3: US Patent 4,089,059.



Figure 4: HP9815A calculator, front view.



Figure 5: HP9815A calculator, top view.



Figure 6: HP9815A calculator, keyboard left side.



Figure 7: HP9815A calculator, keyboard right side.



Figure 8: HP9815A calculator, rear view.

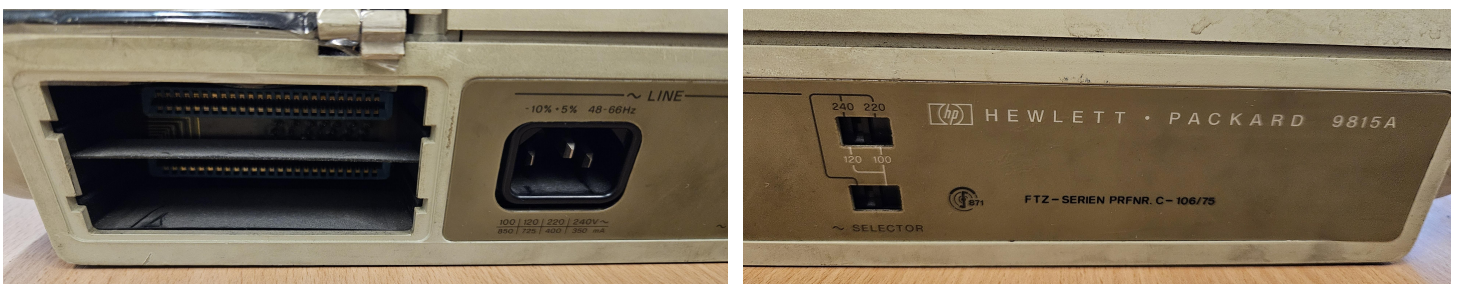


Figure 9: HP9815A calculator, rear view closeup.



Figure 10: HP9815A calculator manufacturing label, S/N: 1535G00802.



Figure 11: HP9815A calculator, internals, top view.
From <https://www.hpmuseum.org/hp9815.htm>.



Figure 12: HP9815A calculator, tape drive mechanism.
From <https://www.hpmuseum.org/hp9815.htm>.

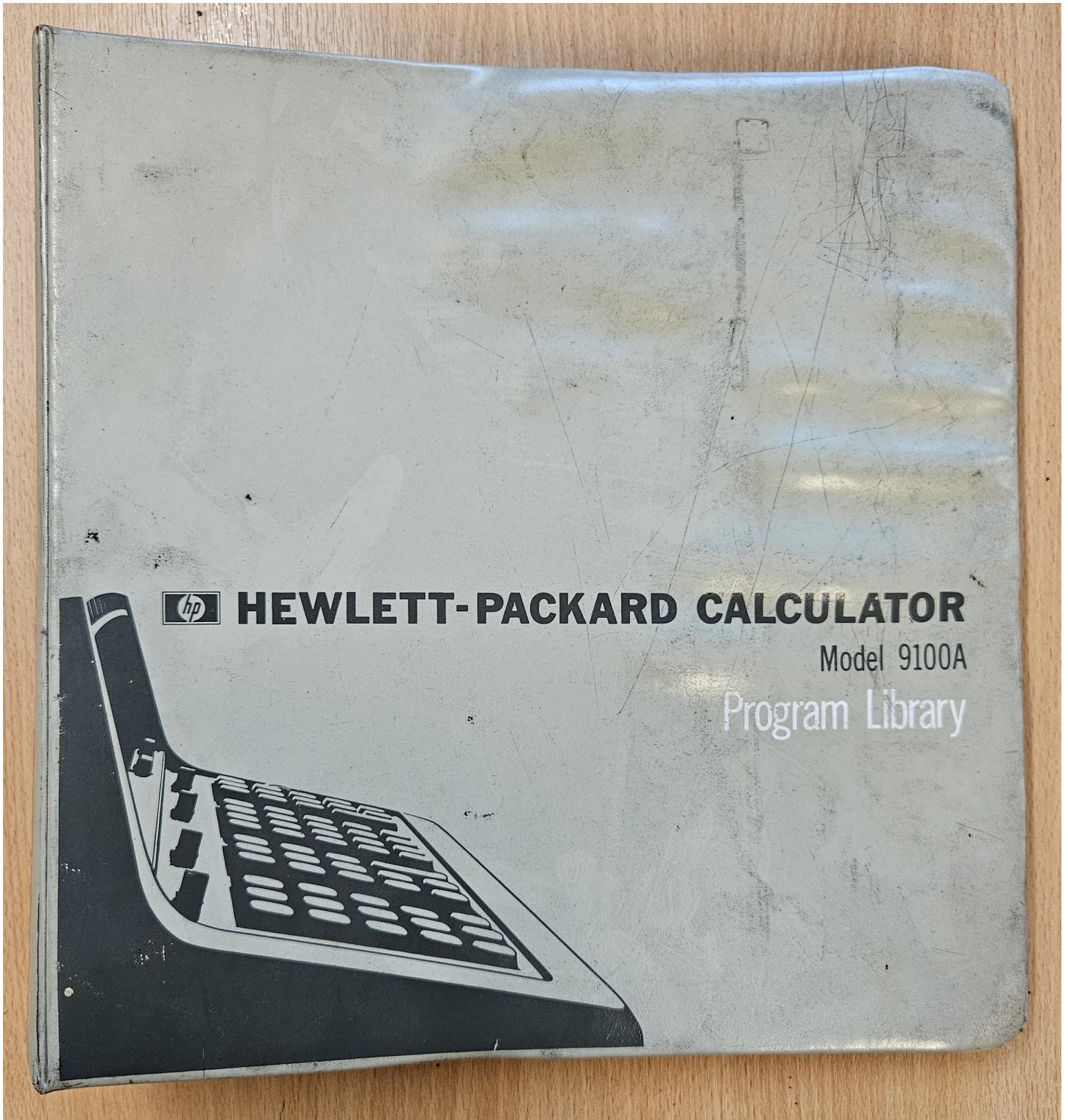


Figure 13: Folder for HP9100A program library re-used to hold HP9815A calculator manuals.

Hewlett-Packard 9815A Calculator
98134A General I/O Interface
Operating and Service

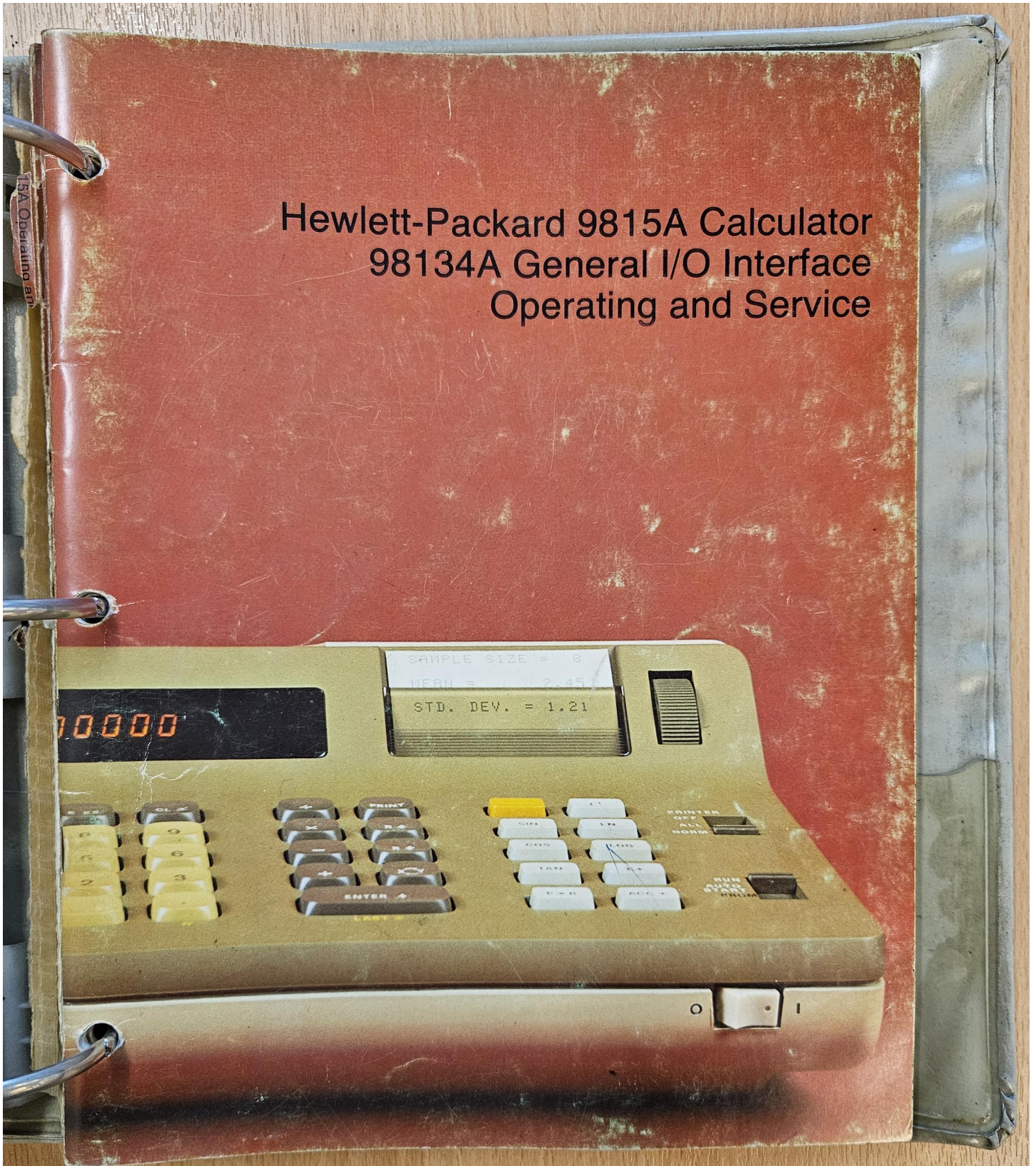
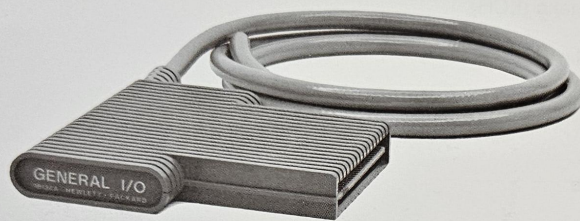


Figure 14: HP98134A I/O interface manual, cover page.

Operating and Service



HP 98134A General I/O Interface

HEWLETT-PACKARD CALCULATOR PRODUCTS DIVISION

P.O. Box 301, Loveland, Colorado 80537, Tel. (303) 667-5000
(For World-wide Sales and Service Offices see rear of manual.)

Copyright by Hewlett-Packard Company 1975

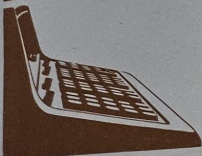


Figure 15: HP98134A I/O interface manual, fronticepiece.

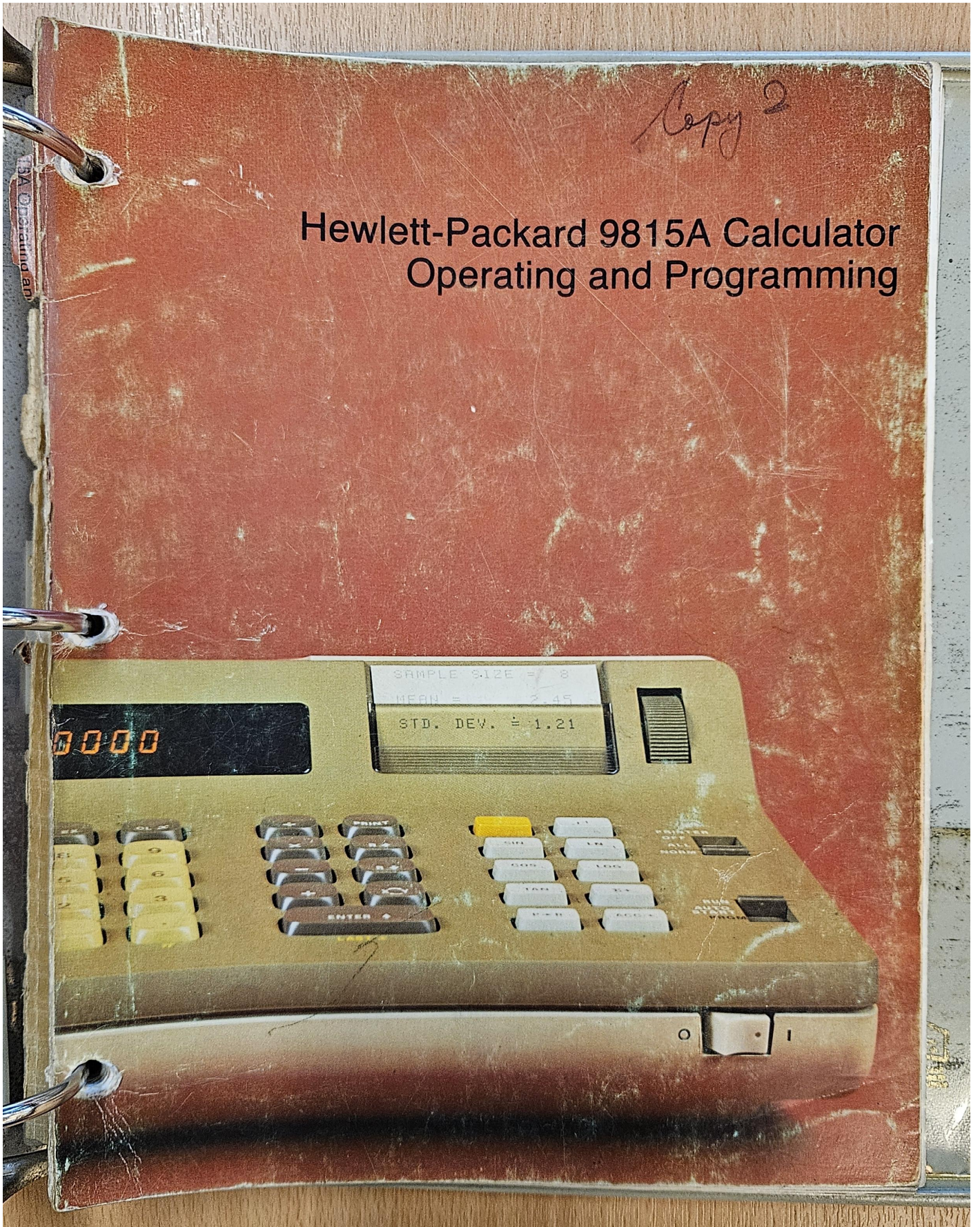


Figure 16: HP9815A operating and programming manual, front page.

Operating and Programming Manual



Hewlett-Packard 9815A Calculator

HEWLETT-PACKARD CALCULATOR PRODUCTS DIVISION
P.O. Box 301, Loveland, Colorado 80537, Tel. (303) 667-5000
(For world-wide sales and service offices see pages 115-116.)

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Figure 17: HP9815A operating and programming manual, fronticepiece.